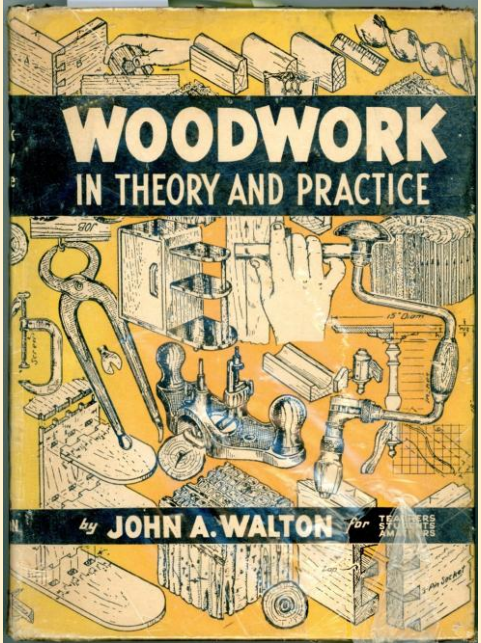

Joints!
Timber!
How are yours?

Disjointed


WOODWORK
IN THEORY AND PRACTICE
by JOHN A. WALTON

You can be overwhelmed by the shear amount of terminology that you are having to pickup. With a little time, research and practice, you'll soon find yourself picking up and feeling your confidence grow as you get more practical experience, in marking and cutting, almost perfect wooden joints. They will fit like a glove!

Tools required

• Marking knife. These are flat on the left hand side, with the bevelled cutting edge on the right. This applies to right handed people. If you are left handed do the opposite.

• A good sharp soft pencil to mark the face sides of the suitably prepared timber.

• Sharp fine toothed hand saw. Japanese (pulled cutting), or the traditional small hand saw (dovetail saw).

• Bench saw or drop saw, with a fine cross cut blade. The alternative to doing part or all by hand.

•Sharp bevel edged paring chisels, small to larger sizes. If cutting a mortise joint, a square sided mortise chisel the correct size of the mortise being cut.

• Small hammer or mallet. Most of the finished cutting out work is done with controlled hand pressure on the chisel.

• “G” cramp or bench hold fast to hold your work on the bench top to cut the waste from the joint. If required a suitable waste piece of timber under the piece you are cutting, so that your chisel does not cut into your bench top.

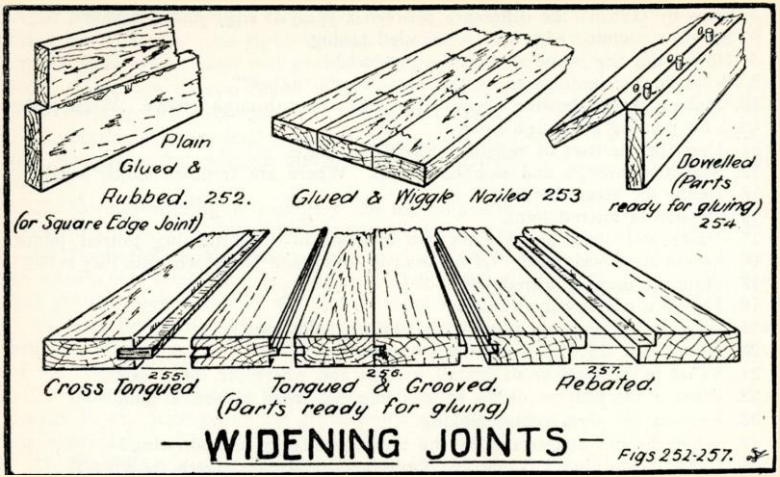
• Work bench at the right height for you with a suitable adjustable vice.

• Very good lighting, with an additional angle poise light adjustment to sometimes have diagonal lighting on the work. This is great helping you placing the chisel into the fine marking knife cut!

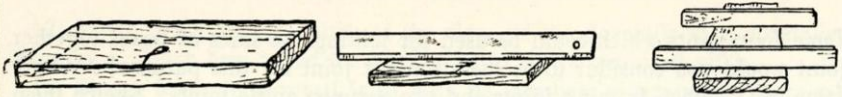
• Magnifying glasses if required.

Classification of (wooden) joints

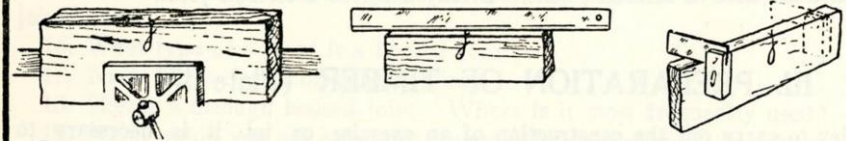
- Widening joints
- Angle joints
- Framing joints



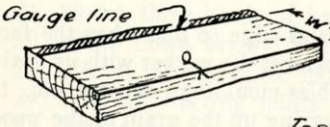
Rubbed joint
Dowelled
Tongued & Glued
Now Biscuits are available



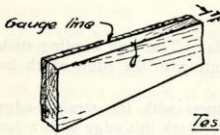
(1) Plane face side perfectly flat. Test with straight edge and winding sticks



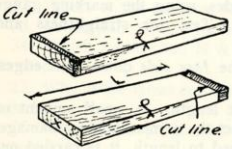
(2) Plane face edge perfectly straight and square to face side. Test with straight edge and try-square



(3) Gauge to the required width, on both sides from the face edge. Plane down to gauge lines. Test with straight edge and try-square.



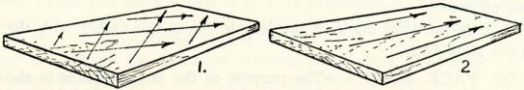
④ Gauge to the required thickness on both edges, (and for wide boards along the ends) gauging from the face side. Plane down to gauge lines. Test with straight edge and winding sticks.



⑤ Square, cut, and shoot one end. Test with try-square

⑥ Measure required length from prepared end. Square, cut, and shoot off waste. Test with try square.

NOTE:- When planing up wide surfaces, first plane diagonally (traverse planing), and finally plane along the grain. Test with straight edge and winding sticks.

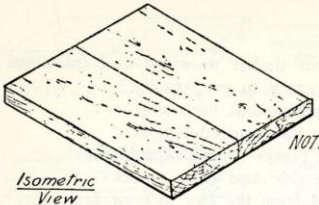


- PREPARATION OF TIMBER -

Widening Joints

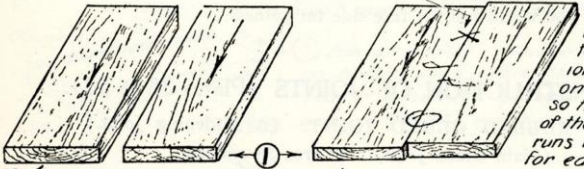
- Butt (rubbed glue) Joint
- Dowelled Joint
- Tongued Joint
- Tongued and Grooved Rebated Joint
- Biscuit Joint

— RUBBED GLUED JOINT —



Isometric View

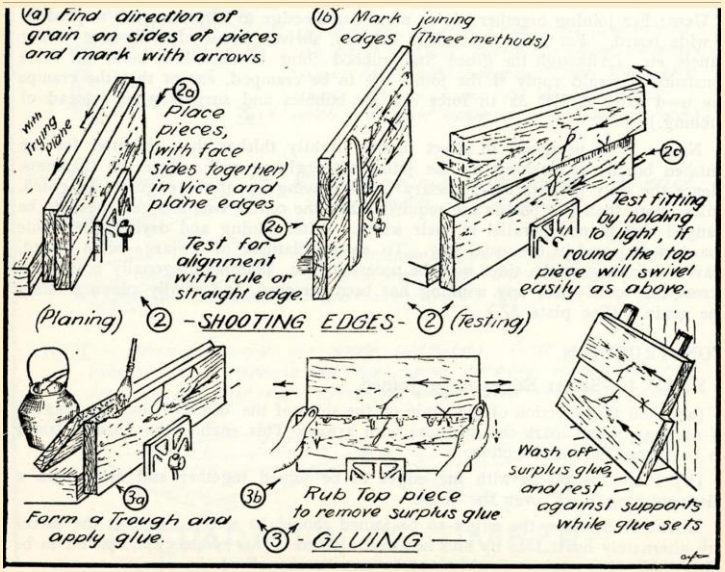
NOTE - As this joint is used for joining pieces in their width to make a wide board, each piece is not prepared to sizes, but the whole board is planed as one piece after gluing.

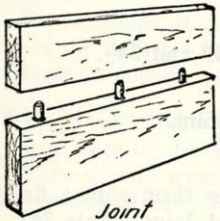


Note 1a
It is necessary to mark direction of grain on faces of pieces so that the grain of the finished board runs in one direction for easy planing.

1a Find direction of grain on sides of pieces and mark with arrows.

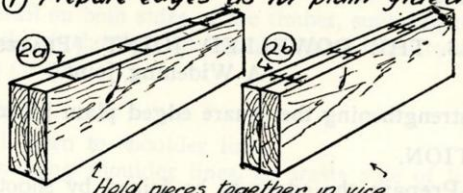
1b Mark joining edges (three methods)


(1a) Find direction of grain on sides of pieces and mark with arrows.
(1b) Mark joining edges (Three methods)
with trying plane
2a
Place pieces, (with face sides together) in Vice and plane edges
2b
Test for alignment with rule or straight edge.
2c
Test fitting by holding to light, if round the top piece will swivel easily as above.
(Planing) (2) - SHOOTING EDGES - (2) (Testing)
3a
Form a Trough and apply glue.
3b
Rub Top piece to remove surplus glue
Wash off surplus glue, and rest against supports while glue sets
(3) - GLUING -



Joint
Ready for gluing and Cramping

(1) Prepare edges as for plain glued joint.



2a Mark position for dowels - squaring lines across both edges together.
2b Gauge half thickness from face sides on both pieces.

(3a) Bore holes about $\frac{3}{4}$" to 1" deep. (3b) Countersink holes.
(4) Prepare dowels (5) Assemble with glue and cramp up.

- FOR WIDENING JOINTS -

- DOWELLED JOINTS -

Angle Joints for box-like construction

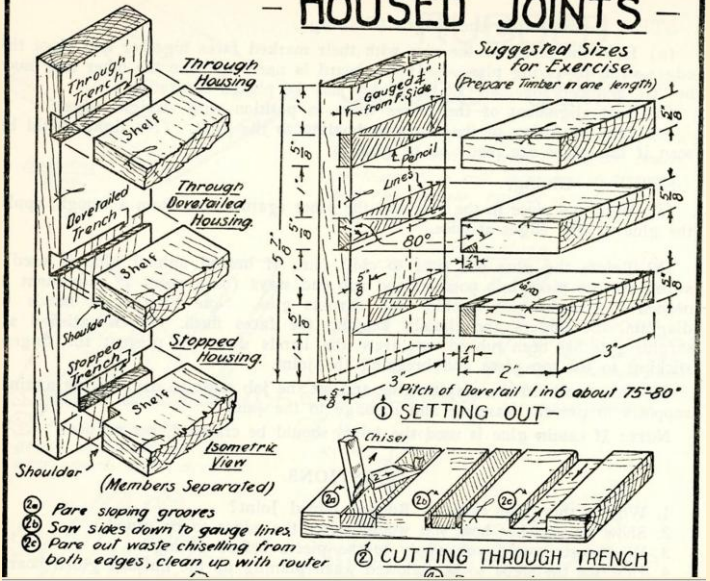
- Corner angled joints
- Rebated Butt, shouldered Corner or Angle lap.
- Housed and Shouldered or Tongued and trenched.
- Rebated and Mitred Angle Joint
- Plain Mitred Joint.
- Dovetailed Joints: Single, Lapped, Secret.
- Comb or Box Pin Joint.
- Scribed Joint.

This Step Ladder was made in form two as part of the Manual Training system in place at the time, 1956! (extra screws have been added since)

Each of the two steps are through housing rebate joints, cut at an angle and prepared in the same way as the diagram before has shown. The two pieces joining the back legs top and bottom are halving joints, cut meticulously as the next diagram illustrates!

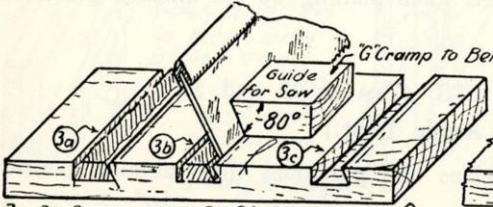
These steps have now retired and hang in my workshop reminding me and possibly you of the challenges we were given all those years ago and guess what, we are still after a challenge!

– HOUSED JOINTS –



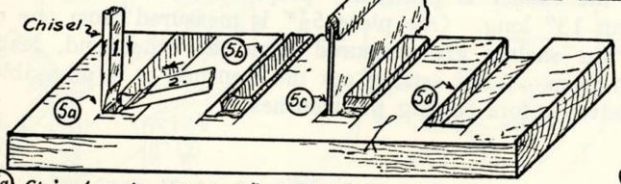
(2a) Pare sloping grooves
(2b) Saw sides down to gauge lines.
(2c) Pare out waste chiselling from both edges, clean up with router

both edges, clean up with router



3a, 3b, 3c, same as 2a, 2b, 2c above.

(3) CUTTING DOVETAIL TRENCH

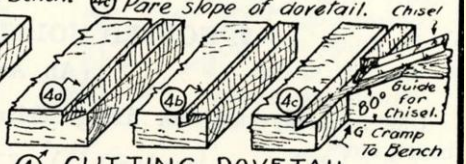


(5a) Chisel out recess at end of trench.
(5b) Pare sloping grooves. (5c) Saw sides.
(5d) Pare out waste, clean up with router.

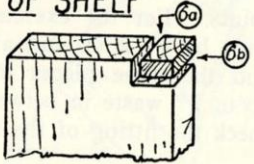
(5) CUTTING STOPPED TRENCH

(2) CUTTING THROUGH TRENCH

(4a) Pare sloping groove.
(4b) Saw shoulder
(4c) Pare slope of dovetail.



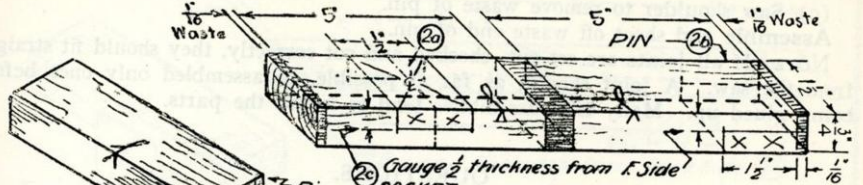
(4) CUTTING DOVETAIL ON END OF SHELF

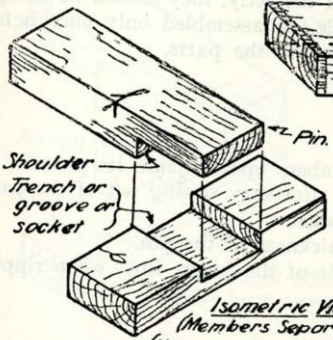


(6a) Rip side of notch
(6b) Saw shoulder.

(6) CUTTING NOTCH

① Prepare for exercise to required sizes in one length.





② —SETTING OUT—

N.B. Waste of Socket on Face Side, Waste of Pin on Reverse Side, so that Face Sides of assembled joint will be flush. MARK WASTE "X"

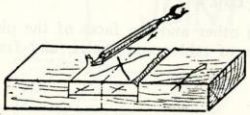
—TEE HALVING JOINT—

Separate Pieces and —CHECK FITTING—

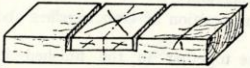
③

(note position of face marks)

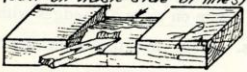
TEE HALVING JOINT



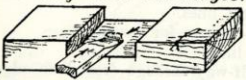
4a Pare sloping grooves.
(See 4a & 4b Cross Halving Joint)



4b Saw sides down to gauge lines
(Saw on waste side of lines)



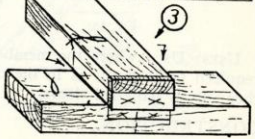
4c Pare out waste chiselling half-way from both edges.

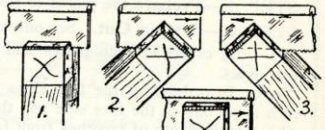


4c Pare out remaining waste.

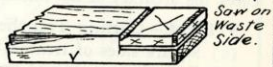
4 - CUTTING SOCKET -

Separate Pieces and
CHECK FITTING



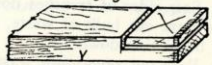


5a Steps in Ripping thickness of Pin.



5b Pare sloping groove.

Saw on Waste Side.

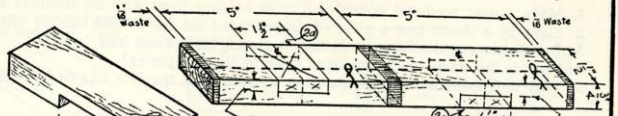


5c Saw shoulder.

5 - CUTTING PIN -

CROSS HALVING JOINT

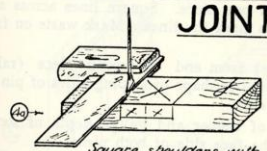
① Prepare pieces for exercise to required sizes in one length



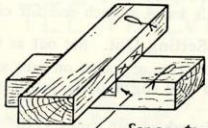
Isometric View
(Members separated)

—SETTING OUT—

Waste on F.S. of one piece, and on reverse side of the other piece
MARK WASTE "X"

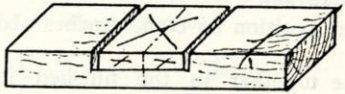


Square shoulders with Marking Knife

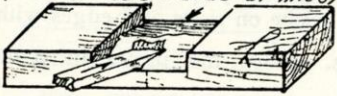


Separate pieces and
— CHECK FITTING —

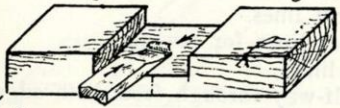
4a Pare sloping grooves. (See 4a & 4b Cross Halving Joint)



4b Saw sides down to gauge lines (Saw on waste side of lines)

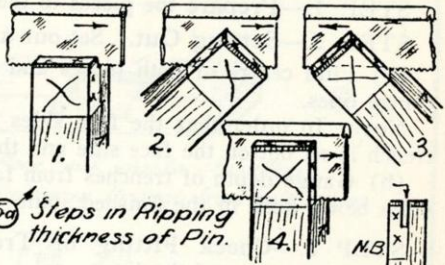


4c Pare out waste chiselling half-way from both edges.



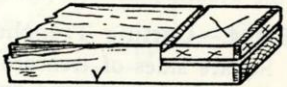
4c Pare out remaining waste.

4 - CUTTING SOCKET —

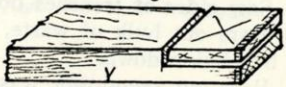


5a Steps in Ripping thickness of Pin.

N.B. Saw on Waste Side.



5b Pare sloping groove.



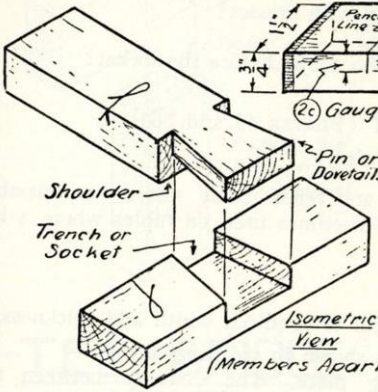
5c Saw shoulder.

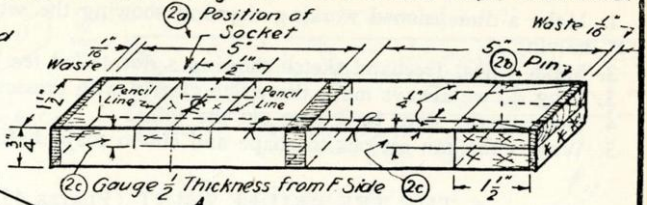
5 - CUTTING PIN —

(1.) Prepare pieces for exercise to required sizes in one length

One or both sides of pin may be dovetailed. Slope about 1 in 6.

Sometimes dovetailed on one side only.

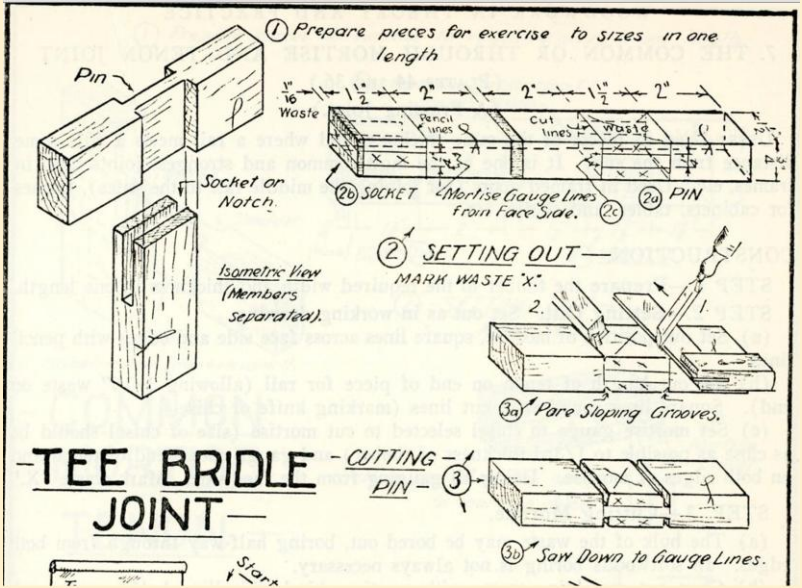


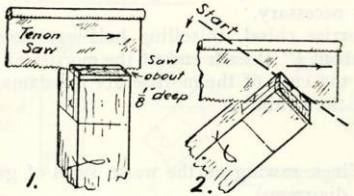


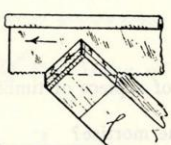
(2) — SETTING OUT —

N.B Waste of Socket on Face Side, Waste of Pin on Reverse Side, so that Face Sides of assembled joint will be Flush. MARK WASTE X"

— DOVETAILED TEE HALVING —

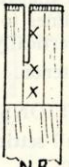

1 Prepare pieces for exercise to sizes in one length
Pin
Socket or Notch.
Isometric View (Members separated).
1" 16 Waste
1½"
2"
2"
1½"
2"
Pencil lines
Cut lines
Waste
2b SOCKET
Mortise Gauge Lines From Face Side.
2c
2a PIN
2 SETTING OUT—
MARK WASTE "X."
2.
1.
3a Pare Sloping Grooves.
TEE BRIDLE JOINT—
CUTTING PIN
3
3b Saw Down to Gauge Lines.
Start





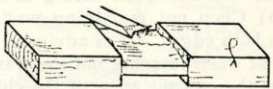
4. As in 1. and saw to shoulder.

4a Rip Sides of Socket.

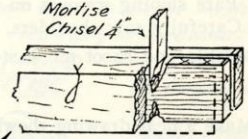


Saw on waste side of gauge lines.

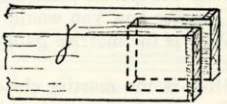
3b Saw Down to Gauge Lines.



3c Pare out Waste Chiselling from Both Edges



4b Chop out from both edges (Side removed to show cutting)

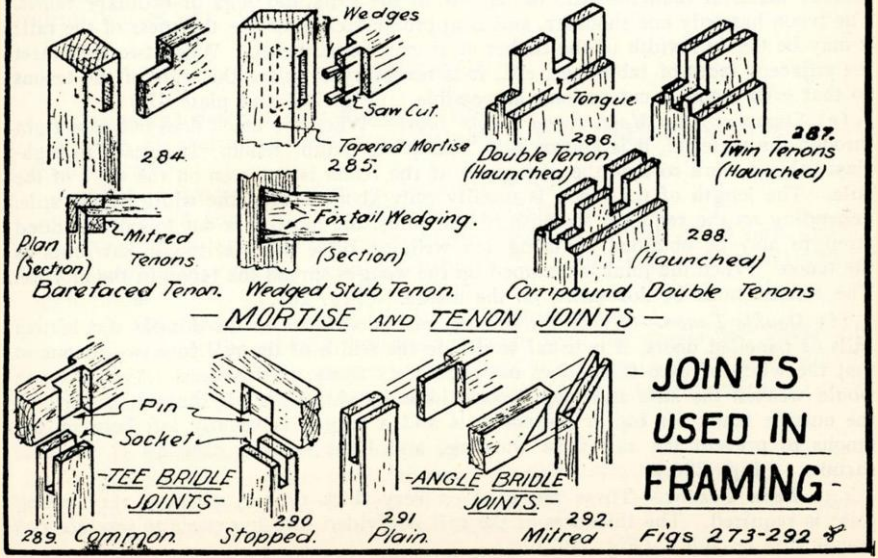


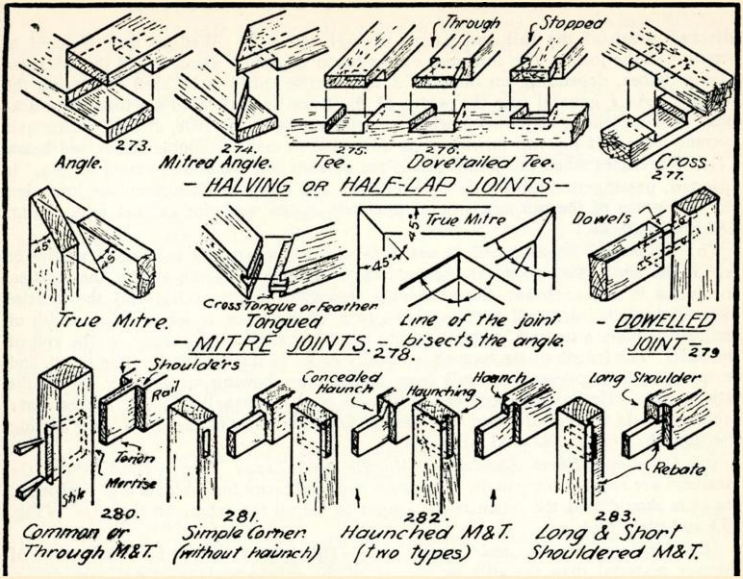
Pare out remaining waste to required depth.

—CUTTING SOCKET—

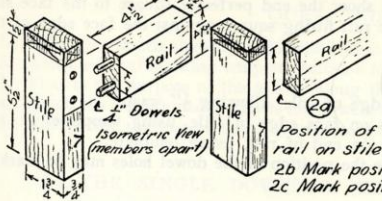
④

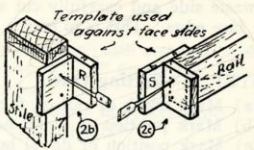
TV Cabinet. Door frames joined with a Tee Bridle joint on each corner. The inside edge of the door frames are also
rebated to accept the panels, which are not glued. The thickness of the frames is 15mm, timber Fijian Yaka.


Wedges
Saw Cut
Tapered Mortise
284.
285.
Tongue
286.
Double Tenon
(Haunched)
287.
Twin Tenons
(Haunched)
Fox tail Wedging.
Plan
(Section)
Mitred
Tenons
(Section)
288.
(Haunched)
Barefaced Tenon.
Wedged Stub Tenon.
Compound Double Tenons
— MORTISE AND TENON JOINTS —
Pin
Socket
-TEE BRIDLE JOINTS-
289. Common.
290
Stopped.
-ANGLE BRIDLE JOINTS.-
291
Plain.
292.
Mitred
- JOINTS USED IN FRAMING -
Figs 273-292


Through
Stopped
273.
Angle.
274.
Mitred Angle.
275.
Tee.
276.
Dovetailed Tee.
Cross
277.
- HALVING OR HALF-LAP JOINTS -
45°
45°
True Mitre.
Cross Tongue or Feather
Tongued
True Mitre
Line of the joint
bisects the angle.
Dowels
- DOWELLED
JOINT -
279
- MITRE JOINTS. - 278.
Shoulders
Rail
Tenon
Mortise
Stile
280.
Common or
Through M&T.
Concealed
Haunch
Haunching
281.
Simple Corner
(without haunch)
Haunch
282.
Haunched M&T.
(two types)
Long Shoulder
Rebate
283.
Long & Short
Shouldered M&T.

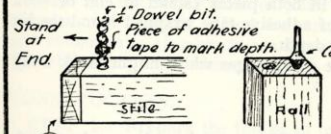
Prepare pieces to required width and thickness in one length
Mark length of rail - square lines round with cut lines - pare
sloping grooves on waste side of lines - square, cut and shoot off waste.

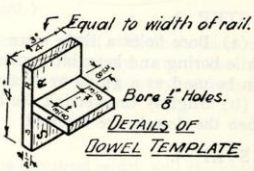




2b Mark position of dowel holes on stile.
2c Mark position of dowel holes on rail

- FOR FRAMING JOINTS -





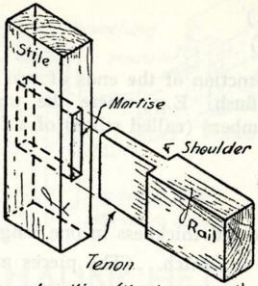
3a Bore holes deep. 3b Slightly countersink holes.

4a Sharpen ends of dowels.

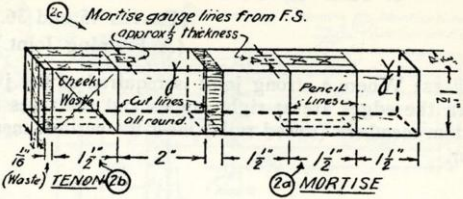
4b Saw shallow groove along dowel to allow surplus to escape.

5 Assemble with glue and cramp up.

(1) Prepare pieces for exercise to required sizes in one length.

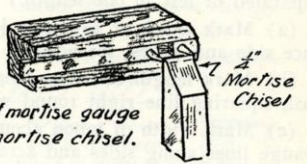


Isometric View (Members apart).

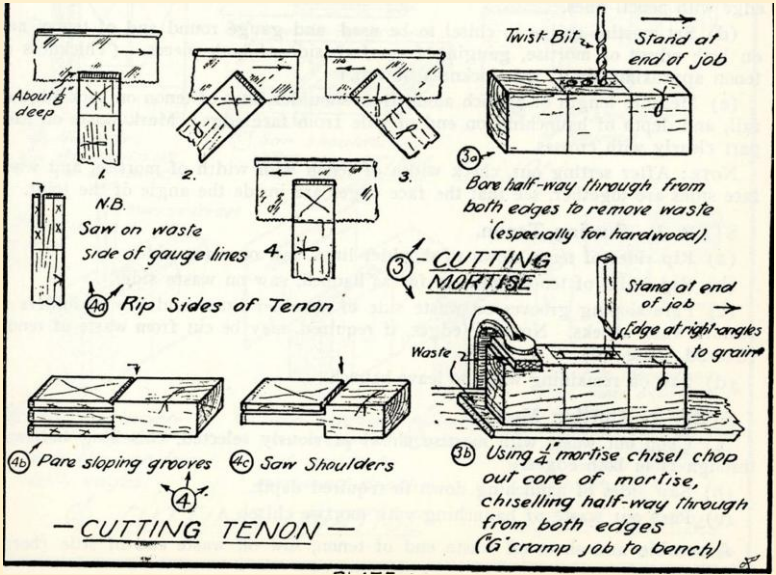


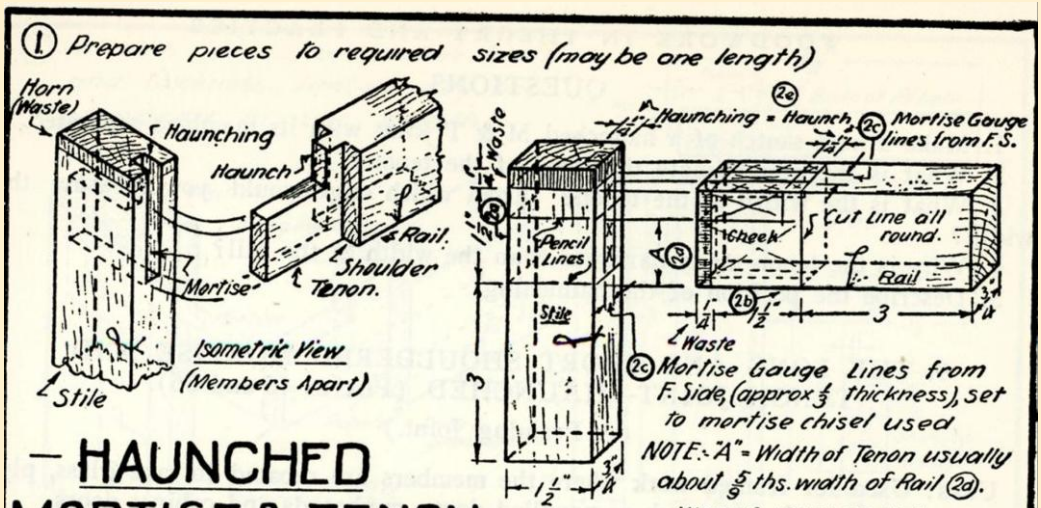
(2) —SETTING OUT— MARK WASTE "X"

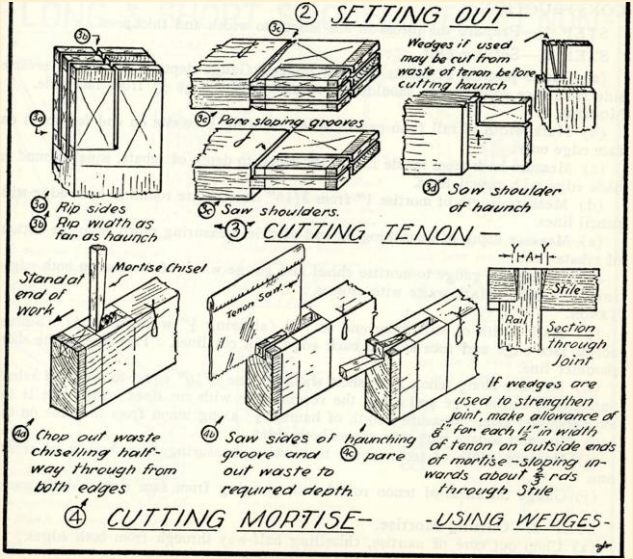
— COMMON MORTISE AND TENON —

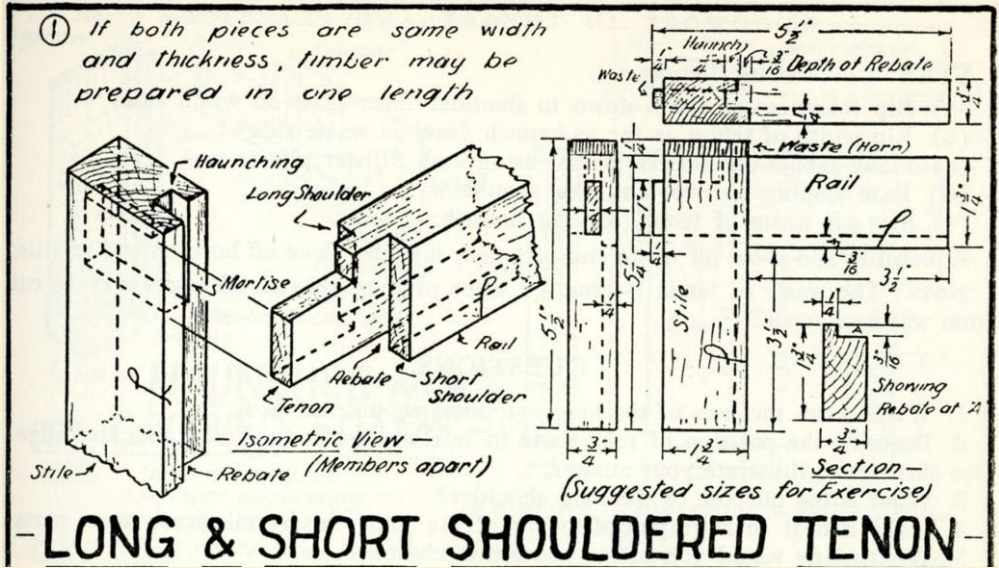


Setting spurs of mortise gauge to mortise chisel.


About ⅛" deep
1.
2.
3.
4.
N.B.
Saw on waste side of gauge lines
4a Rip Sides of Tenon
4b Pare sloping grooves
4c Saw Shoulders
4 — CUTTING TENON —
Twist Bit
Stand at end of job
3a Bore half-way through from both edges to remove waste (especially for hardwood).
3 - CUTTING MORTISE -
Stand at end of job
Edge at right-angles to grain
Waste
3b Using ¼" mortise chisel chop out core of mortise, chiselling half-way through from both edges ('G' cramp job to bench)

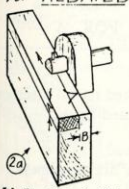

(1) Prepare pieces to required sizes (may be one length)
Horn (Waste)
Haunching
Haunch
Rail.
Shoulder
Tenon.
Mortise
Stile
Isometric View
(Members Apart)
Waste
Pencil Lines
Stile
3
1½"
Haunching = Haunch
Mortise Gauge lines from F.S.
Cheek
Cut line all round.
Rail
A
3
Waste
Mortise Gauge Lines from F. Side, (approx ⅓ thickness), set to mortise chisel used
NOTE:- "A" = Width of Tenon usually about ⅝ths. width of Rail (2a).
WASTE MARKED "X"
See C.M&T. Step 2. Setting Mortise Gauge.
— HAUNCHED MORTISE & TENON —


2 SETTING OUT—
3b
3a
3d
3c
Pare sloping grooves
Wedges if used may be cut from waste of tenon before cutting haunch
3d Saw shoulder of haunch
3a Rip sides
3b Rip width as far as haunch
3c Saw shoulders.
3 CUTTING TENON —
Stand at end of Work
Mortise Chisel
Tenon Saw
4a Chop out waste chiselling half-way through from both edges
4b Saw sides of groove and haunching out waste to required depth
4c pare
Stile
Rail
Section Through Joint
If wedges are used to strengthen joint, make allowance of 1/8" for each 1/4" in width of tenon on outside ends of mortise - sloping inwards about 1/8 rds through Stile
4 CUTTING MORTISE-
-USING WEDGES-

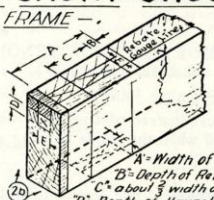

① If both pieces are same width and thickness, timber may be prepared in one length
Haunching
Long Shoulder
Mortise
Rail
Rebate
Short Shoulder
Tenon
Stile
Rebate
– Isometric View –
(Members apart)
5½"
Haunch
Waste
Depth of Rebate
Waste (Horn)
Rail
Stile
Showing Rebate at ½
– Section –
(Suggested sizes for Exercise)
LONG & SHORT SHOULDERED TENON

LONG & SHORT SHOULDERED TENON

For REBATED FRAME —

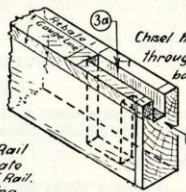


'A' Depth of Rebate
'B' approx ⅓ Thickness of Timber. Gauge position of Rebate from F.S & F.E on Both Pieces



'A' = Width of Rail
'B' = Depth of Rebate
'C' = about ⅔ width of Rail.
'D' = Depth of Haunching measured from bottom of Rebate
'E' = Mortise gauge lines, set to mortise chisel. Gauge from F.S

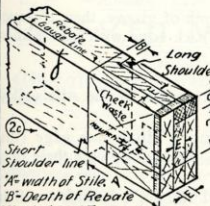
(2) SETTING OUT MORTISE —



Chisel half-way through from both edges.

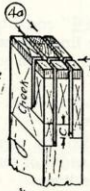
3a Chop out mortise
3b Saw and pare out waste of Haunching

(3) CUTTING — MORTISE —



'A' = width of Stile
'B' = Depth of Rebate
'C' = Width of Tenon = to Mortise.
'E' = Mortise Gauge lines from F.S

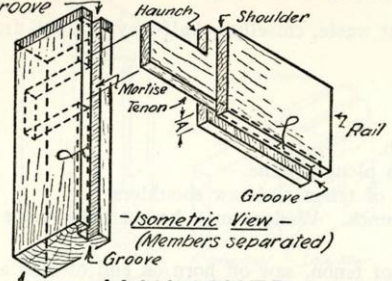
(2) SETTING OUT TENON —



4a Rip thickness
4b Rip width as far as Haunch 'C'

(4) CUTTING TENON —

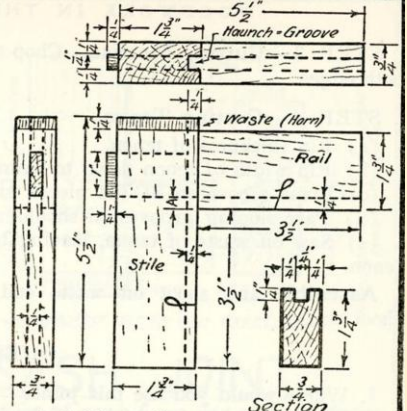
The Haunch is necessary to fill in end of groove



– Isometric View –
(Members separated)

– HAUNCHED M & T. FOR GROOVED FRAME –

NOTE:- Groove may be narrower depending on thickness of panel.

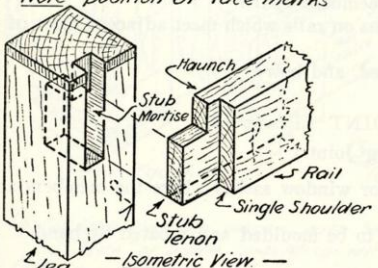


Suggested Sizes for Exercise

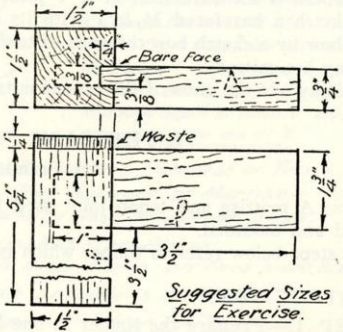
CONSTRUCTION:- Similar to Haunched Mortise and Tenon - with the exception the tenon is cut away on the inside edge by an amount equal to the depth of the groove as shown at "A".

NOTE:- Groove is worked AFTER ripping sides of tenon and cutting mortise.

Note position of face marks



— Isometric View —



Suggested Sizes for Exercise.

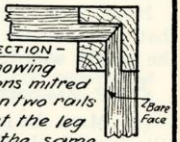
BAREFACED M & T.

(HAUNCHED)

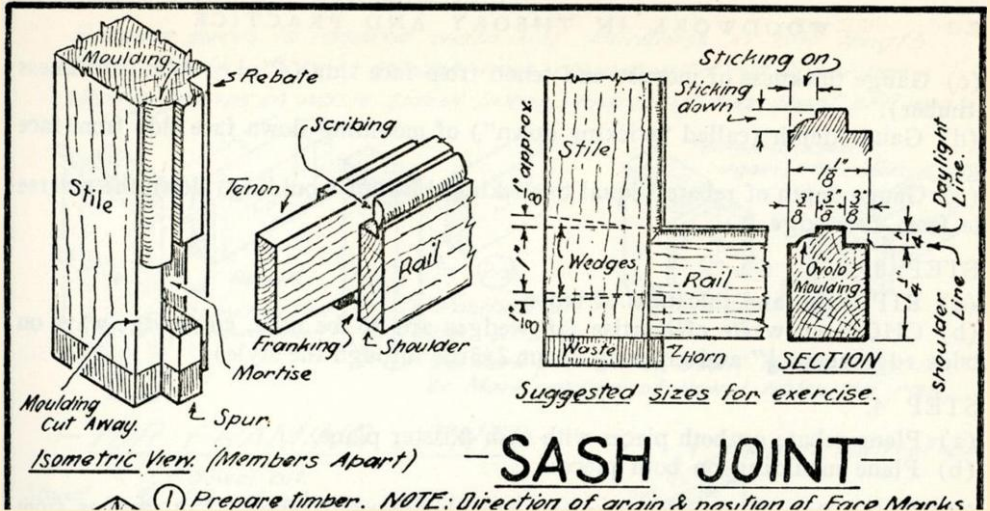
CONSTRUCTION: ① Prepare pieces to sizes

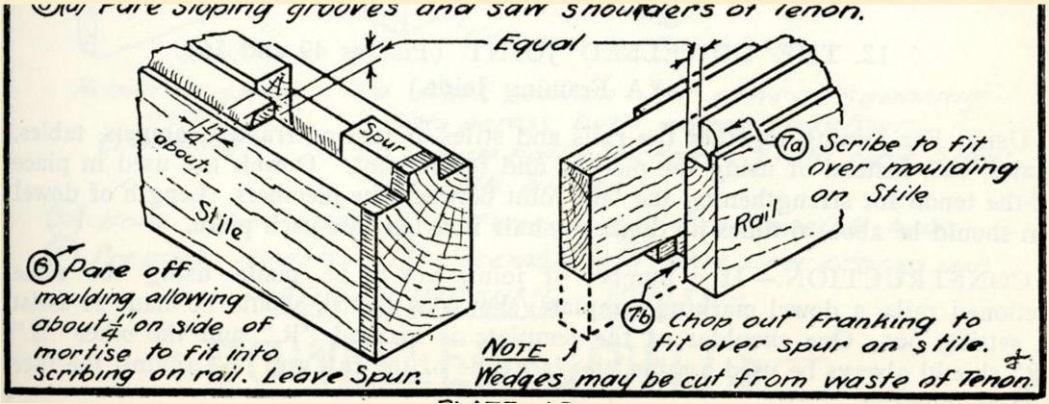
② TENON (a) Square shoulder line (= to length of tenon)
(b) Square width of tenon (about 5/8 ths width of Rail)
(c) Gauge thickness (= to chisel with Marking Gauge)
(d) Rip thickness & width down to haunch (Saw on Waste Side)
(e) Pare sloping grooves and saw shoulders.

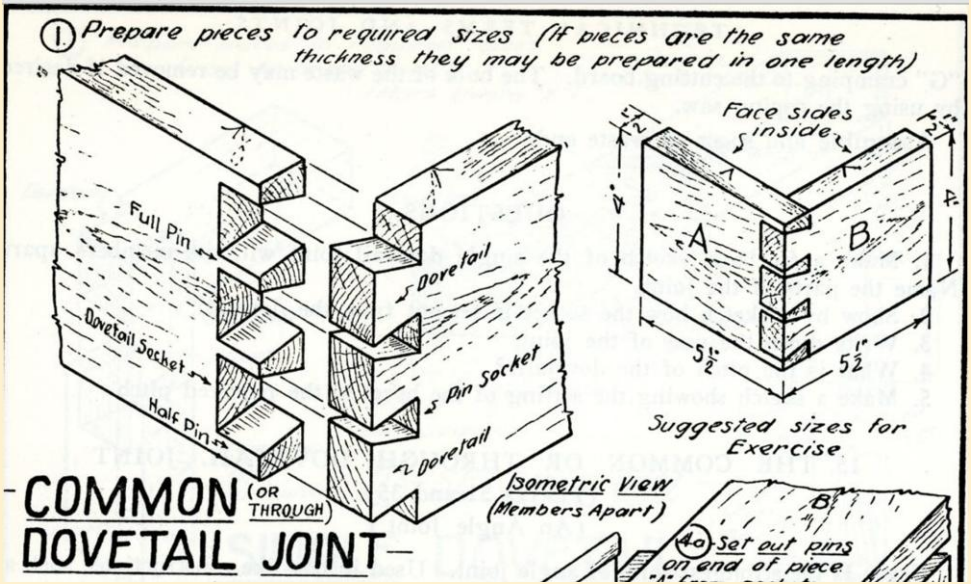
③ MORTISE (a) Mark position & length = to width of Tenon
(b) Gauge from outside of leg with Mortise Gauge, Spurs set to Mortise Chisel. Fixed spur set to thickness of Rail.
(c) Chop out waste to required depth
(d) Saw sides of haunch and pare out waste



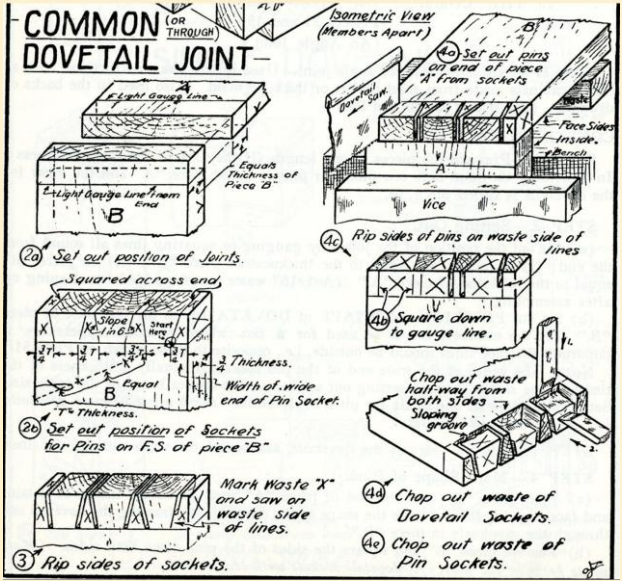
— SECTION —
Showing Tenons mitred when two rails meet the leg at the same level as in the Top rails of Tables etc


Moulding
Rebate
Scribing
Tenon
Stile
Rail
Franking
Shoulder
Mortise
Moulding Cut Away.
Spur.
Isometric View. (Members Apart)
Sticking on
Sticking down
Stile
Wedges
Rail
Waste
Horn
SECTION
Ovolo Moulding
Daylight Line.
Shoulder Line
Suggested sizes for exercise.
-SASH JOINT-
(1) Prepare timber. NOTE: Direction of grain & position of Face Marks


Equal
A
Spur
about 1/4"
Stile
6 Pare off moulding allowing about 1/4" on side of mortise to fit into scribing on rail. Leave Spur.
7a Scribe to fit over moulding on Stile
Rail
7b Chop out Franking to fit over spur on stile.
NOTE
Wedges may be cut from waste of Tenon.


1. Prepare pieces to required sizes (if pieces are the same thickness they may be prepared in one length)
Full Pin
Dovetail Socket
Half Pin
Dovetail
Pin Socket
Dovetail
Face sides inside
A
B
5½"
5½"
Suggested sizes for Exercise
COMMON (OR THROUGH) DOVETAIL JOINT
Isometric View (Members Apart)
4a. Set out pins on end of piece

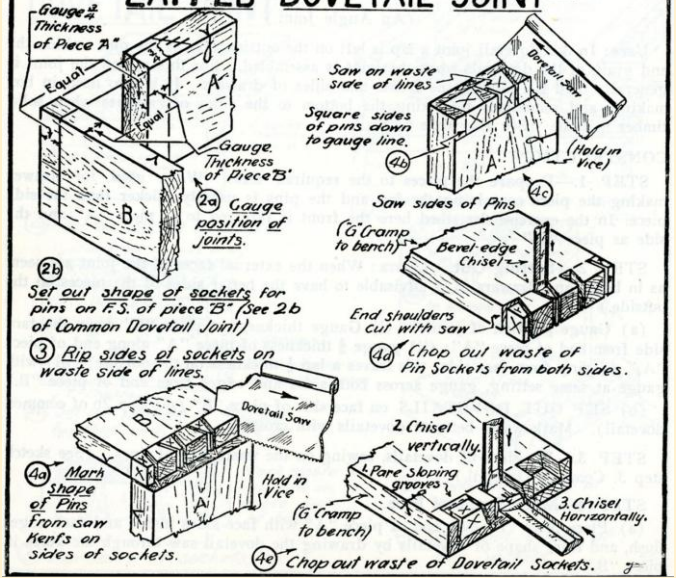
COMMON DOVETAIL JOINT (OR THROUGH)



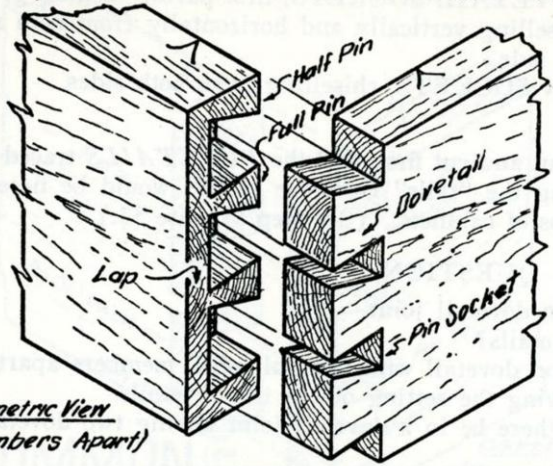

Matai Coffee table 40mm timber thickness, common dovetail.


Please note: scribe marks
inadvertently cut across the Tenon, a
common error.

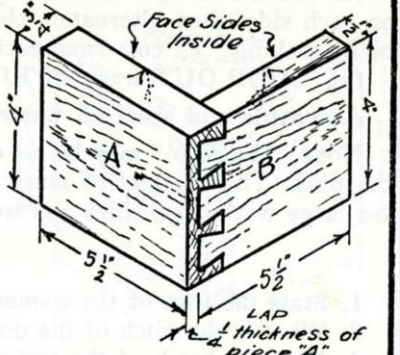
— LAPPED DOVETAIL JOINT —



1. Prepare pieces to required sizes. (If used for drawer construction piece "A" is the front and thicker than the side piece "B").



Isometric View
(Members Apart)



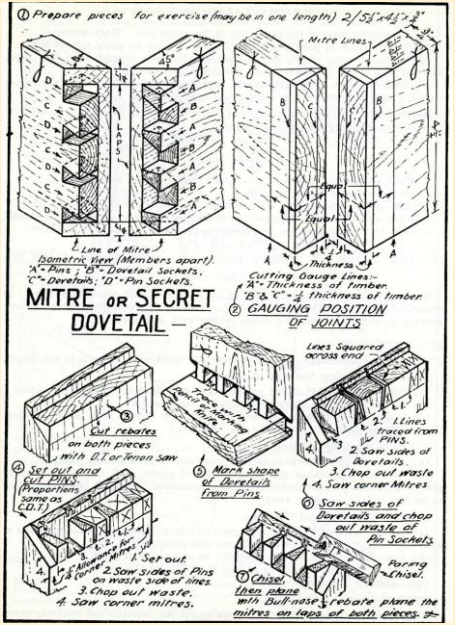
Suggested Sizes for Exercise.

— LAPPED DOVETAIL JOINT —

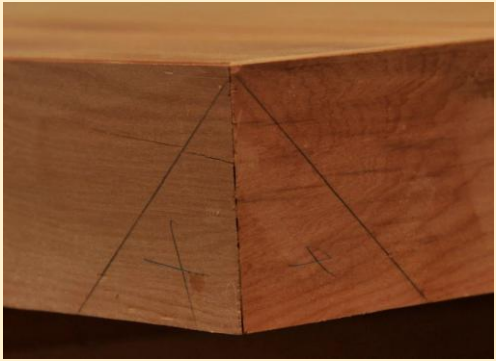
Gauge 3/4

Mahogany Chest of drawers, Serpentine Front about 1760, made in the 1970's QRC.

Drawer dovetail details with another layer of complexity, a cocked bead, 3mm thick and protruding 3mm.


① Prepare pieces for exercise (may be in one length) 2/5½"x4½"x 3"
LAPS
Line of Mitre
Isometric View (Members apart).
"A"= Pins; "B"= Dovetail Sockets.
"C"= Dovetails; "D"= Pin Sockets.
Mitre Lines
Equal
Thickness
Cutting Gauge Lines:-
"A"= Thickness of Timber
"B" & "C" = ⅓ thickness of timber.
② GAUGING POSITION OF JOINTS
MITRE OR SECRET DOVETAIL —
Cut rebates on both pieces with D.T. or tenon saw
Lines Squared across end
Lines traced from PINS.
1. Saw sides of Dovetails.
2. Chop out waste
3. Saw corner Mitres
④ Set out and cut PINS (Proportions same as CD.T.)
1. Set out.
2. Saw sides of Pins on waste side of lines.
3. Chop out waste.
4. Saw corner mitres.
⑤ Mark shape of Dovetails from Pins
⑥ Saw sides of Dovetails and chop out waste of Pin Sockets
⑦ Chisel then adzine with Buff-nose rebate plane the mitres on laps of both pieces.
Paring Chisel


Compound joints



Coffee table corners mitred. Important point: Each corner bevelled 45 degress from each corner. When the cut was made on the saw, the saw blade had to be bought back 5 to 6 degrees less than 45 degrees so that the cut was parallel to bevelled line. Making this a compound cut.

Template for drilling the dowel holes for the table and the legs.

Ready to glue the leg to the table. Steel pins have been used, making the joint stronger. A sash cramp was held vertically in place so that the leg was held perpendicular

Conclusion
The most universal joint used worldwide,
is the “ male and female joint”

PS. This rolling pin was given to my niece at her wedding, three weeks ago! QRC

Timber Joints

Compiled by Quentin Christie & Derek Hemming

Presented by Derek Hemming
KWWG April 12th 2025