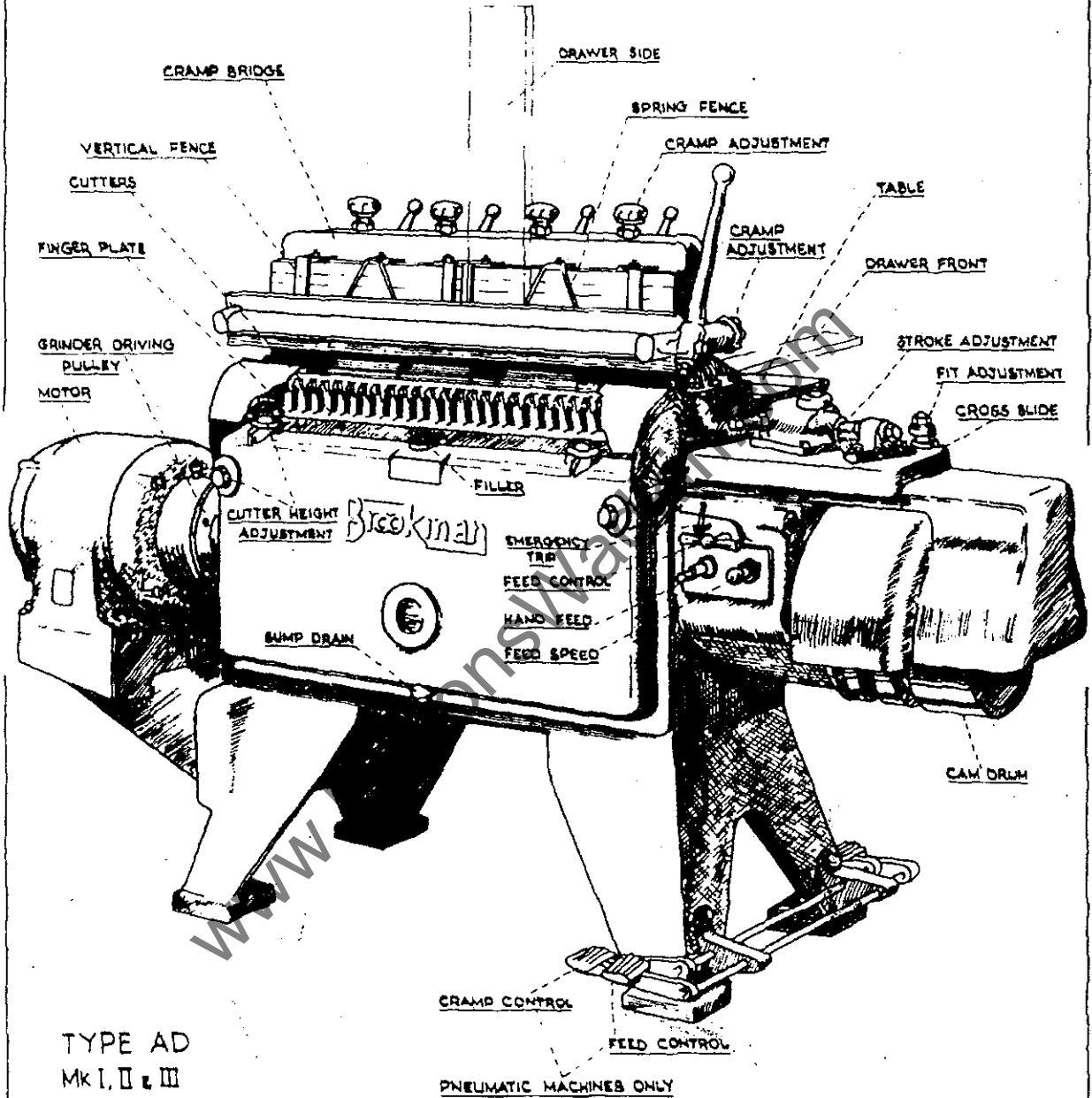


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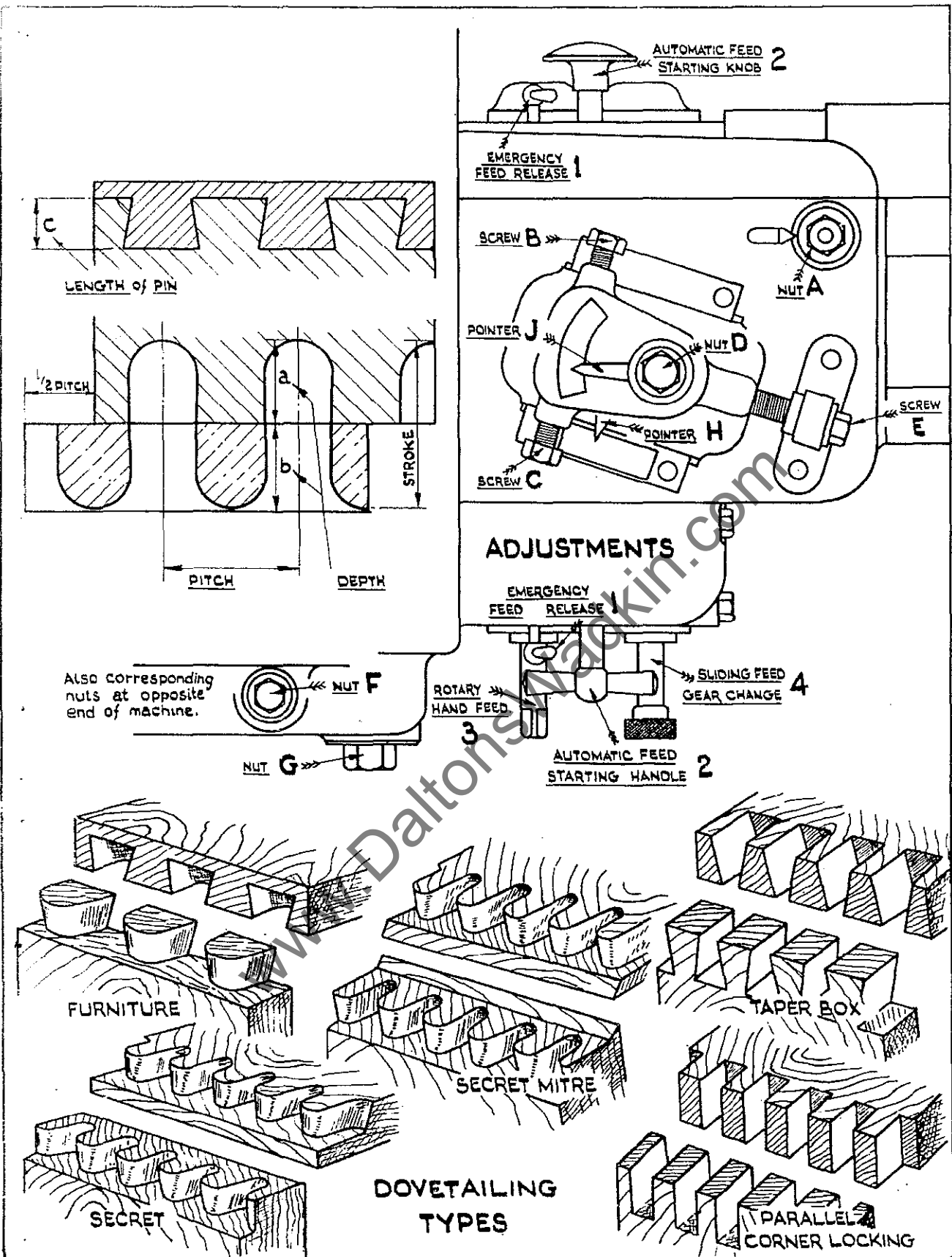
AUTOMATIC DOVETAILER OPERATING INSTRUCTIONS



TYPE AD
Mk I, II & III

R. S. BROOKMAN LTD. *Parkside Works* ROTHLEY
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OM. ADM.1



THE 'BROCKMAN' FULLY AUTOMATIC DOVETAILING MACHINE.

The 'Brookman' Fully Automatic Dovetailing Machine is available in several forms to suit varying applications. Manual or Pneumatic cramps may be fitted. With pneumatic cramps, automatic Drill attachments can be supplied. Similarly, although most machines are supplied equipped to cut 1" pitch Furniture dovetails, many other equipments are available for other styles and pitch sizes.

In all cases, the general method of operation, the working adjustments and the controls are the same. The following notes, therefore, refer first to the detail of operation that is common to all machines; the variations are dealt with in subsequent paragraphs, as are the differences between manual and pneumatic cramps, etc.,

Information is given on lubrication and cleaning. In cases where the machine has been disassembled to facilitate export packing, notes on re-assembly are given in Appendix 'A'.

IMPORTANT: The slides are usually locked by tightening the gib screws to prevent movement during transit. Re-adjust these screws before operating.

GENERAL PRINCIPLE OF OPERATION

The cutters are accommodated in a bank of spindles (25 or 17). The cutter spindles all rotate in the same direction. The table, carrying the cramp bridge, is fed on to the cutters under the influence of a cam drum. By using different cams different table actions are possible to cut different dovetail styles and different pitch sizes within the style. Having selected the appropriate style and pitch, adjustments in the machine enable variations in the dimensions of the dovetailing.

EQUIPPING TO SUIT STYLE AND PITCH

The majority of machines are supplied for furniture work with the 1" pitch Furniture Equipment No. APQ.3. Hence this will be in position when the machine is received, and need not be disturbed, unless at some later date a different pitch equipment has to be used. But assuming the equipment is not fitted, then the following procedure should be followed:-

The cam drum bolts on to the hub at the end of the machine opposite from the motor drive end. The two rollers depending from the cross slide run in the two tracks in the cam. In the cam flange are four bolt holes and a screw. The screw is to assist pushing the cam off the spigot when removing. Before fitting it should be unscrewed so that the end is below the face of the flange.

On the rim of the cam is a stop; this goes towards the machine and uppermost. This will bring the screw uppermost also and the head outwards. Slip the cam over the hub, offer up on to the rollers; the tracks are cut away at the entry point to assist this. All the cams have the same track centres at this point, so that the rollers will be in the correct position to accept another cam when one has been removed. If the rollers are not at the right centres push the table towards the cutter spindles to decrease, and away to increase. The cross slide will move bodily taking both rollers as a cam is pushed on or off.

Make sure that the flange and hub faces are clean, and that the flange locates correctly on the hub spigot. Secure with the four bolts, using the box spanner provided.

Next fit the finger plate which locates in the recess in the front of the table, behind the cutter spindles and under the cramp bridge. Bolt in position by the five screws, using the Weasel spanner provided.

Always fit this plate before screwing in the cutters, or the latter will obstruct access.

The cutters screw is right handed. The tommy bar provided fits into the hole in the rim of the grinder driving pulley between the motor and the machine. Then the cutter spindles can be rotated or held stationary. The cutters are provided with flats which fit the $\frac{3}{8}$ " Gap spanner.

On a 25 spindle machine, with the normal 1" pitch equipment and the $\frac{1}{2}$ " pitch, every spindle accepts a cutter. On $\frac{2}{3}$ " pitch however, the cutters are spaced in every other spindle, and on $1\frac{1}{2}$ " pitch every third, starting from the end spindle in both cases. Spindle plugs are provided to blank off the spindles not in use.

On a 17 spindle machine every spindle accepts a cutter for both $\frac{3}{4}$ " and $1\frac{1}{2}$ " pitch.

FEED CONTROLS

Before engaging the feed ensure that gib screws that may have been locked to prevent slide movement in transit, are re-adjusted. They should be unscrewed, and then re-tightened, full finger tight, and locked by the nut.

The machine has three rates of automatic feed. Looking at the front of the machine, the knurled knob (4) on the lower right projecting spindle is the speed change. Right in is the slow feed, right out the fast, and intermediate midway. The squared shaft (3) to the left accepts the hand crank for testing. The table can be fed by hand to check a setting. (It may be necessary to use this when fitting a cam, as above, to bring the bolt holes into the correct alignment).

It is advisable, especially until the operator is fully proficient, to check settings by this hand rotation to ensure the cutters clear, before engaging the mechanical feed.

The feed is engaged by the cross tee handle (2) which is pulled. This is duplicated at the rear by a flat headed knob which is pushed. An emergency release (1) is provided to disengage the feed, at any part of the cycle, should this become necessary.

ADJUSTMENTS TO DETERMINE DIMENSIONS OF FURNITURE
TYPE (HALF LAP) DOVETAILS

LENGTH OF PIN

The adjustment for the length of pin "c", i.e. the amount the cutter head extends above the table level, is by the two Screws F.F. The frame carrying the cutter spindles is cramped in position by Screws G.G. It is suspended on Screws F.F. To adjust, release Screws G.G. and turn Screws F.F. clockwise to raise and anti-clockwise to lower. Screws F.F. are provided with indicator scales so that their movement can be synchronised. One complete turn is 1/16".

When lowering the frame drops under gravity. It may therefore be necessary to apply pressure to the two screws to assist the downward movement. It is advisable to adjust below the position required, and then to bring up again to the desired level.

Always re-tighten Screws G.G. after adjusting.

STROKE ADJUSTMENT

The maximum stroke of the table is determined by the cam. This can be shortened below the maximum by adjusting Screw E. This screw moves the Adjuster Slide, the position of which is indicated by a scale. In position "10" the table will travel the maximum cam stroke. The slide can be adjusted to any position down to the minimum at "0".

The slide is locked by Screw 'D'. To adjust slack Screw 'D' and turn Screw 'E'. Re-tighten 'D' after adjusting.

This adjustment makes both dimensions "a" and "b" equally greater or smaller to accommodate differences in the thickness of the wood on which the pins are cut. Do not confuse with the next adjustment for depth.

NOTE: This adjustment refers to Furniture type Dovetailing only. When cutting Box Dovetailing and Corner Locking the adjustment is set at maximum "10".

DEPTH

Adjustment for flush fit or otherwise. Screws 'B' and 'C' are horizontally opposed on a vertical pin and should be moved in conjunction one with the other. If 'B' is unscrewed one turn, 'C' should be screwed up one turn. The curved indicator scale shows a position "0" between the words "deep" and "shallow". With the Pointer 'J' adjusted to this zero position the resulting joint should knock together flush. The stroke adjustment and the tightness of the fit, however, have some effect on this and slight final adjustment will be necessary.

Supposing when a joint is cut, the pins stand proud, adjustment is made as follows: Release the Cramping Screw 'D', and unscrewing Screw 'C', tighten Screw 'B', causing the Pointer 'J' to move towards the word "Deep" on the scale. Lock 'B' against 'C' and re-tighten 'D'. If the reverse is required release 'B' and tighten 'C' to move pointer towards "Shallow".

The adjustment will increase "a" to the same extent that it decreases "b", and vice versa. "a" plus "b" remains constant.

This adjustment is very fine. A quarter turn of either screw "B" or "C" will make considerable difference to the joint. The scale can only be used as a guide, and re-setting to marks is not practicable.

ADJUSTMENT FOR FIT

Highering or lowering the cutters, the difference between thick and thin drawer sides, hard and soft timbers, cutter wear, and the requirements of the particular work, all affect the fit of the joint. The precise fit required can be obtained by adjusting Screw "A". The upper hexagon nut is for locking and should be unscrewed clear before adjusting. The lower knurled nut makes the actual adjustment. Screwing left handed will tighten the joint, right handed will slacken. (Note: Machines with Serial Nos. 5203 and prior have adjusting screws which turn right handed to tighten the joint and left handed to slacken.)

If difficulty is experienced in turning, first ensure that the hexagon nut is slacked well away, then using the crank handle (see Feed Controls) rock the handle to and fro a half turn whilst applying a turning movement to the knurled nut.

If the adjustment is screwed to the limit and the joint is still slack then it will be necessary either to higher the cutters slightly or to use smaller cutters. As mentioned above the cutters become smaller with grinding and if difficulty is experienced obtaining a fit on short pin work (Dimension "c") then keep the worn cutters for this and use the newer cutters on longer pin work. (See Appendix "B" for cutters available.)

The foregoing information will enable the more general purpose dovetailing to cut. The notes that follow give points on the wider applications.

Always remember, having adjusted, to re-tighten the locking nuts and screws, A. D. and G. G.

REBATED DRAWER FRONTS

The dovetailing of Rebated Fronts is similar to the normal flush fit type except that the Stroke Adjustment (Screw E) will be placed to give longer stroke than is normally required for the thickness of drawer sides. The additional length is necessary to span the depth of the rebate.

The Depth adjustment must be moved towards DEEP, as in effect a very deep cut is necessary in the drawer front. Having made this adjustment it is advisable to check the cam cycle by using the hand crank to ensure that the cutters do not foul the finger plate.

In cases where the cutting of the rebate is not regularly accurate it is advisable to employ a special finger plate with projections against which the shoulder of the rebate will locate. This plate can be specially supplied, or the standard plate can be drilled to accept small dowel pins.

SECRET DOVETAILING

Secret dovetailing is achieved by cutting the whole of the furniture dovetailing action into each piece of wood. To do this the two components of the joint are placed in the machine side by side. The horizontal wood does not butt up behind the vertical piece, but is placed along side with the outer edge aligned with the outer face of the vertical piece.

When producing it is probably advisable to cut all the vertical pieces at one operation, and the horizontal at another. When cutting the horizontal pieces, a stop can be clamped permanently in the vertical cramps against which to locate.

The Stroke Adjustment will have to be shortened, and the Pointer 'J' on the Depth Adjustment moved over to "SECRET" on the scale. The Depth Adjustment will be used in the normal way to obtain a flush fit, and the Fit Adjustment screw A operates in the ordinary way.

If the material is mitred the cutters will have to be raised the amount of the mitre when cutting the vertical pieces. If the mitre is very deep it may be necessary to use cutters with extended shanks.

BENT & CURVED WORK

The machine has two provisions for bent and curved work. The centre of the table can be removed to allow the curve to pass below normal table level. The cramps are provided with swivel or removable pads to suit the direction of the curve.

To remove the centre piece unscrew the two hexagon bolts recessed into the work table. The middle section 12" wide can then be removed. If the curve is moderate the centre piece can be left in position but the face lowered below the normal table level by adjusting the stop screw at the rear. This same screw will enable the centre piece to be adjusted above normal table level if necessary.

The well in the table revealed by the removal of the centre piece has two horizontal pads drilled and tapped $\frac{1}{4}$ " Whitworth. Shaped saddles to position the woods can be screwed to these.

Practically every curved work application has its own problems. Extended cutters, special finger plates, etc., are available to accommodate this work. It is usually cheaper, however, to make wooden support saddles than to purchase a brass finger plate for one particular bent work job.

CRAMPS & WORK FENCES

A full set of work location fences is provided. There are two pairs of fences on both the vertical face of the clamp bridge and on the horizontal face of the work table. These two faces also carry rule scales to assist in positioning the fences.

It will be observed that these rule scales are zeroed on the centre line of the machine. It is necessary to work outwards from the centre line to keep the work correctly "handed". For example one pair of the table, or horizontal, fences are usually placed on the 12" mark, one each side of the work table. A drawer front, when being dovetailed will be offered up with the face edge to the right hand fence, and then it will be "handed" over and offered to the left hand fence.

As already indicated, it is usual to keep one pair of fences at the fullest width of the table, and bridge, faces. This enables any width of board up to 12" to be worked without altering the fence positions except for very minor adjustments. Should the boards be less than 6" wide the remaining fences are placed, back to back, on the centre line, when four joints can be dovetailed at each table operation. For widths over 6" but less than 8", the centre fences should be spread to approximately the 4" marks, when three joints can be dovetailed together.

The precise setting of a fence depends upon the exact width of the work to be dovetailed and the exact characteristic required of the final joint. Much will depend upon the user's requirements and decisions will come more easily as experience is gained in using the machine. The general rule, however, is that the table, or horizontal, fence is placed on the full pitch dimension and the vertical, or bridge fence, half a pitch from this. For example on the 1" pitch dovetailing, which is the most commonly used, the table fence will be placed, with the edge against which the wood will locate, on the full inch mark, say 12". The bridge fence will then be placed on $11\frac{1}{2}$ " or $12\frac{1}{2}$ "; that is half a pitch off. This will cause the two edges to align when the joint is knocked together. Moreover, the table fence being on the full inch mark will cause the edge of the wood to fall plumb along the brass supporting finger and remain solid wood. If this rule is not followed the upper or lower corner of a joint, or both, will have half a dovetail pin showing.

When working pitches other than 1" the same rule applies except that the table fence positions become multiples of the pitch (the full inch marks were multiples of 1"). In any case aim to keep the edge of the wood that matters most, usually the upper edge of a drawer front, to fall plumb along the centre of the finger.

To assist in keeping the vertical woods up to the fences prior to cramping, spring fences are provided. These should be placed to give light pressure on the edge of the wood to hold it against the fence. They have no function after cramping, and when the width of the woods absorb the full width of the bridge face they have to be dispensed with.

When cutting very wide stock up to the full capacity of the machine, the horizontal fences may be reversed and the short end will then pass behind the cramp bridge foot.

MANUAL CRAMP BRIDGE

The manual cramp bridge has one long eccentric cramp to secure the vertical pieces of wood, and four independent cramps to secure the horizontal pieces.

The vertical cramp is adjusted by nuts on horizontal screws at each end of the bridge. A simple method of adjusting is to place in position a piece of wood of the thickness to be cramped; place the operating handle vertically and then push the roller and cramping plate on to the wood. Screw up the adjusting nuts and it will be found that the correct tightness of cramping results when the handle is pushed home. It is advisable to adjust this cramp as close as is possible consistent with the eccentric gripping satisfactorily. There is a danger, if a wide gap is left, of the wood missing the brass finger plate when, the operator not realising, the wood will be jammed behind the plain portions of the cutters and breakage of the cam traverse rollers results.

The horizontal cramps are adjusted by four vertical screws. They should be set so as to give the maximum cramping with the handle just above horizontal.

Lock nuts are provided on all the adjustments.

All the cramp faces have rubber and wood pads which can be replaced when worn, or made to special shapes if necessary.

PNEUMATIC CRAMP BRIDGE

The Pneumatic Cramp Bridge has two banks, of eight cramps each, operating in the vertical and horizontal directions. The cramps are closed by foot pedals and are released automatically. This is dealt with in a later paragraph on Pneumatic type machines.

Each cramp has an independent air stop valve so that it can be put out of action to conserve air when possible. When a cramp is in use the stop valve should be well open, three complete turns of the screw.

The cramps holding the horizontal woods require no adjustment. The travel is ample to take up variations in the thickness of wood. The cramps holding the vertical wood, however, must be adjusted to suit variations in thickness not so much to facilitate cramping as to prevent woods being incorrectly positioned. The yoke carrying these cramps is adjustable as a unit by screws at each end of the bridge. The yoke should be adjusted as close to the bridge face as possible consistent with easy access for the wood. Too wide an aperture allows the wood to slip past the brass finger plate and might cause damage to the feed mechanism if engaged with the wood in this wrong position.

The cramp shoes can be removed and shaped wooden pads screwed on if so required.

DRILLING ATTACHMENT

These can only be used in conjunction with the pneumatic cramps. The cramp bridge is surmounted by a bronze head plate which feeds air to the cramps, and provides a separate supply for the drilling attachments. The brackets to mount the drills secure to the upper face of this head plate, T slots enabling adjustment the full length of the work table. The drills can be adjusted away from the bridge along the bracket arms. Consequently a drill can be positioned anywhere over the table area.

The drills themselves are from the Brookman Self Feed Drilling System, and are self operating. During the dovetailing cycle, trips on the cam will open an air valve whereupon the drills will feed down and withdraw automatically. The only setting up necessary is to position the drill or drills correctly for the holes to be drilled as required in the drawer front, and for the correct size drill bit to be secured in the chuck. It is also necessary to position the drill bodily in its bracket to give the correct depth of drilling; the travel is $1\frac{1}{2}$ " , hence the drill point should be say, $1.7/16$ " from the table level to allow for break through.

As the drills operate automatically, the operator should take special care that he does not leave his hands in the path of the drills, whilst the dovetailing operation is taking place.

Should any or all of the drills not be required, the flexible lead from the head plate should be disconnected, and the aperture plugged.

For maintenance and servicing of the Self Feed Drills, see the manual relating to this type of equipment.

BOX DOVETAILING

Box dovetails are cut at two separate operations, and all the woods are placed in the machine vertically. It is of course necessary to have the appropriate box equipment which will need to be obtained if, as is frequently the case, the machine was originally supplied equipped for furniture work only.

The Stroke Adjustment should be adjusted, by turning Screw 'E' having unlocked 'D', to the "LONG" position. The slide is left in this position throughout all Box dovetailing. Similarly the Pointer "J" should be centred on to the zero position.

A box equipment comprises two cams, a finger plate, a set of parallel cutters and a set of taper cutters. One cam gives a taper movement to the work table and, together with the parallel cutters, executes the female box end portion of the joint. The other cam has a straight movement and, in conjunction with the taper cutters, executes the male or box side portion.

The fitting of the finger plate and the bolting on of the cam is described earlier in these notes.

It is advisable to cut the female or box end portion first, i.e. taper action cam and parallel cutters. Adjust Fir Adjuster Screw 'A' to the "tight" position; it is preferable to apply fit adjustment on the male portion. Cut a series of joints, or if the required degree of proficiency has been reached, the whole batch.

Change cam and cutters and cut the male portions; checking immediately for fit with the female. Apply fit adjustment by Screw 'A' as necessary.

The work fences will follow the same rule as previously detailed, except that the vertical bridge fence only is concerned. When cutting the female (box end) the fence should be in the full pitch dimension, the edge of the board on the supporting finger. When cutting the male (box side) the fence should be moved half a pitch away.

The cutter height must be adjusted to suit the thickness of the other piece of wood to the joint. Hence when cutting the box ends the cutters must project above the table level an amount equal to the thickness of the box side. A simple method to adjust this is (with the machine switched off) to place the other piece of wood under the rear table cramps and push it up to the cutters. Adjust the cutter height (Screw F.F.) until it coincides with the upper surface of the board.

To prevent the wood splintering away at the point of break through, woods of sufficient thickness should be cramped in the rear table cramps permanently during the dovetailing. In the same way the wood and rubber faced block on the front vertical cramp (manual type) can be removed and wood substituted which extends down to table level. This will be cut through at the first operation, leaving a "comb" to reinforce against the cut.

On pneumatic cramp machines an auxiliary holder is provided for these fronting woods.

The taper action of the cam and taper of the cutters are designed to be the same. Owing to the relief on the cutters however, the angle may change slightly as the cutters are sharpened. The table taper action can be adjusted to vary the resulting angle by moving Pointer 'J' in the normal way using screws 'B' and 'C'. Adjusting the pointer towards DEEP will cause the included angle to be reduced; contrarily adjusting towards SHALLOW will increase.

CORNER LOCKING

Corner locking is in every way similar to the Taper Box Dovetailing described in the foregoing paragraphs, except that parallel cutters are used in both cuts with a straight motion cam. These do not have to be changed from male to female cutting.

The other rules of cutter height setting, work fence positioning however, apply.

GENERAL NOTES ON PNEUMATIC CRAMP MACHINES

Whilst the Manual Cramp and Pneumatic cramp machines are basically the same, and all the foregoing instructions will apply, there are additional points to watch on Pneumatic machines chiefly due to the automatic release of the cramps.

The cramp control pedals are duplicated at front and rear of the machine. The inner pedal (closer to the centre of the machine) closes the cramps which hold the vertical woods. The outer pedal closes the rear, or horizontal cramps. As the cam rotates, to provide the table movement, trips bolted to it will connect with a roller which in turn operates the valve to cause the cramps to open.

The rear or vertical cramps will release before the completion of the cycle, so that the horizontal woods can be removed whilst the dovetailing of the vertical pieces is being completed. The vertical cramps will be similarly released when the cutting of the wood is finished.

When Secret type joints are being cut the advance release of the horizontal woods is not possible. The trip which actuates the rear cramps must therefore be moved adjacent to the vertical cramp trip so that the two sets of cramps release together.

The rear cramp control pedal is also connected to the feed engagement. The movement of the pedal is in two distinct phases, the first closing the cramps and further pressure engaging the feed.

When operating box dovetailing on a pneumatic cramp machine the vertical cramps only are used, the rear cramps are kept closed permanently to secure the backing woods in position. In order to retain the feed engagement characteristic in the one pedal the cramp air feed pipes, where they connect to the valve control box should be changed over. In other words the inner pedal will now control the rear vertical cramps (and will remain permanently depressed), and the outer pedal will control the front vertical cramps and when depressed will operate the vertical front cramps and the feed engagement.

LUBRICATION

The machine is sump lubricated and provided the oil level is maintained the greater part of the lubrication will be taken care of. The level should be checked when the machine is not running. It is critical and the level must not be allowed to drop any appreciable amount below the line marked. Over-filling on the other hand will only result

in the surplus oil being pumped by the cutter spindles where they protrude through the brass cover plate. In fact evidence of slight oil leakage by this plate is a good indication that the amount of oil in the sump is sufficient and can be taken as a guide as to the correct amount in addition to the level indicator.

The blend of oil to use is Mobil Vactra Heavy Medium obtainable from the Mobil Oil Co., or from R. S. Brookman Ltd. If equivalent blends by other oil suppliers are used care should be taken to ensure that it is to the same quality and type as the Vactra Heavy Medium.

It will be found that when the machine has run for a period there is considerable heat generated in the sump. This is quite in order being due to fluid friction resulting from the swirl of the oil in the sump and it is in no way detrimental.

The table mechanism is lubricated by the oil can at oil points let into the work table surface. These require a few drops of oil each week. Whilst some oil must be so introduced excessive oiling must be avoided.

Pumping large quantities of oil into the table mechanism will not improve the functioning of the machine but it will lead to sawdust accumulation. The need to keep the table mechanism clean is stressed in a subsequent paragraph.

The control panel over the gear box should also receive the attention of the oil can. One oiling point, marked 'X' on the diagram is very important and should receive daily attention.

The cam tracks and rollers again do not require excessive lubrication, as it only leads to dust accumulation. The tracks should be wiped clean from time to time and smeared with a film of oil.

Pneumatic cramp machines are fitted with a "Swartwout" to remove water, that should be drained from time to time, and an "Ayrlyne" lubricator which should be kept filled with Wakefield Magna S.P. oil.

The electric motor has two oiling points which should receive weekly attention. On machines for 3 phase A.C. supplies, Crabtree auto star-delta starters are fitted which should be filled to the line indicated with transformer oil.

CLEANING

The vital point of chip and sawdust congregation is along the front of the work table below and behind the cutter spindle brass cover plate. This congregation is hidden from normal view and must therefore be kept in mind. The diagrams show a sectional view of the machine and the points where

the chips will congregate. If allowed to accumulate they will be pushed solid by the continual forward movement of the table and eventually obstruct. This may lead to straining of the table mechanism or heavy wear in the cam tracks.

To avoid this accumulation the chips must be agitated frequently and regularly so that they will be dislodged and fall down the sloping back of the main frame and out of the three ports at the rear. A strong blower should be used at each end of the machine every week for this purpose.

If the machine can be coupled to the dust exhaust system in the factory it is of course much to be preferred.

GRINDER ATTACHMENT & CUTTER SHARPENING

The cutter grinding attachment is on the rear of the machine, adjacent to the motor end. It is mounted on a bracket that enables it to be swung clear when not in use; in fact it must be swung clear, otherwise it will foul the table when the feed is engaged.

When in use the attachment is swung up and locked by the screw in its bracket. It is driven by a cross belt from the pulley between the motor and machine. The cutter is held in the hands, the arms being supported in the machine work table. Greater convenience for support can be obtained by cramping a piece of wood in the machine cramps.

When grinding the cutters care should be taken to follow the original flute form so far as is possible. Good quality dovetailing will not result unless the cutters are keen and are cutting freely. If the dovetailing is of poor finish obviously the cutters require sharpening but if after sharpening the finish is reasonable but the shape is poor, it indicates that the cutters are not ground so as to cut freely. This is cutter form, as distinct from keenness, that is at fault.

APPENDIX 'A'

RE-ASSEMBLING MACHINES PACKED FOR EXPORT

When packed for export it is usual to remove the Cramp Bridge and the Cam, to facilitate enclosure in a smaller box. The replacing of the Cam Drum has already been described under "Equipping to suit Style and Pitch".

The Cramp Bridge is secured to the table by six screws, three in each of the bridge feet. The dowels should be knocked up, the bridge bolted on and then the dowels tapped down. In some cases the vertical front cramp, either the eccentric roller on the manual type, or the yoke assembly in the pneumatic type, may also have been removed from the bridge. The eccentric roller should be replaced with the operating handle at the gear box end, i.e. away from the motor end. The pneumatic cramp yoke should be similarly replaced with the plain side uppermost.

The air leads on pneumatic type machines must also be replaced. These leads are of different lengths, the longer feeding the front or vertical cramps, the shorter the rear or horizontal cramps. By moving the foot pedals it will be found which pedal operates which valve. The pedal nearest the centre of the machine is to control the front vertical Cramps, hence the air outlet from the valve moved by the inner pedal should be connected to the front cramps. Similarly the outer pedal valve to the rear cramps. Note, by front vertical cramps is meant those operating on to the face of the bridge; by rear horizontal cramps these operating on to the face of the table.

On machines having provision for air drills the innermost valve controls these drills, the double roller rocker being actuated by the cam alone. The air outlet from this valve should be connected by the third, smaller diameter pipe provided, to the drill feed manifold on the very top of the cramp bridge.

APPENDIX 'B'STANDARD RANGE OF CUTTERS

Furniture Type Cutters Cutters must be selected in the appropriate pitch range according to the pitch equipment being used. The following dimensions indicate variation in the "length of pin" dimension "c" which is possible. Cutters cannot be used successfully outside their designed range, either because the cutter head is insufficiently long or the diameter is too great. If a cutter will not produce a tight joint with the screw "A" adjusted to the limit, then the next smaller sized cutter must be used, or the length of pin of the dovetail itself increased.

<u>PITCH SIZE</u>	<u>REF. NO.</u>	<u>MIN.</u>	<u>LENGTH OF PIN NOMINAL</u>	<u>MAX</u>
1/2"	F.11	7/32"	1/4"	9/32"
2/3"	F.21	9/32"	5/16"	3/8"
2/3"	F.22	11/32"	3/8"	7/16"
1"	F.40	1/4"	5/16"	3/8"
1"	F.41	5/16"	3/8"	7/16"
1"	F.42	7/16"	1/2"	9/16"
1 1/2"	F.51	1/2"	5/8"	11/16"
1 1/2"	F.52	11/16"	7/8"	7/8"
1 1/2"	F.53	7/8"	1"	1.1/16"
3/4"	F.31	9/32"	5/16"	3/8"
3/4"	F.32	3/8"	3/8"	15/32"

Box Dovetailing and Corner Locking The limitations upon the range of thicknesses to which a box type cutter, and even less so, to which a Corner Locking cutter, can be applied, is not so confined as with the Furniture type cutters. The main consideration is to select cutters appropriate to the thicknesses to be dovetailed as they will make for easier adjustment for fit, and have longer wearing qualities in the thickness range for which designed.

It is important to remember that the range of thicknesses referred to below is that of the mating board, not the wood actually being cut. For example a box having 1" thick ends and 3/4" thick sides, will require 1" long T.43 cutters to cut the sides, and 3/4" long P.41 cutters to cut the ends.

FITCH SIZE	TAPER BOX REF. NO.	PARALLEL BOX REF. NO.	C/LOCK REF.NO.	THICKNESS MIN	OF NOMINAL	MATING BOARD MAX
1/2"	T.11	P.11	C.11	1/4"	3/8"	3/8"
1/2"	T.12	P.12	C.12	3/8"	1/2"	1/2"
1"	T.41	P.41	C.41	1/2"	3/4"	3/4"
1"	T.42	P.42	C.42	5/8"	1"	1"
1"	T.43	P.43	C.43	7/8"	1 1/4"	1 1/4"
1 1/2"	T.51	P.51	C.51	3/4"	1 1/4"	1 1/4"
3/4"	T.31	P.31	C.31	3/8"	3/4"	3/4"

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IF AVAILABLE
USE STRONG BLOWER
AT EACH END OF
TABLE

MOTOR

ADJUSTMENT
PANEL

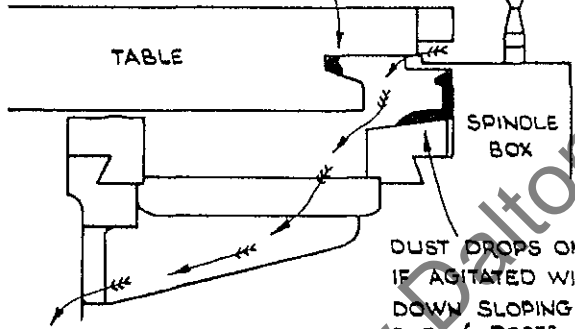
SUMP
FILLER PLUG
DRAIN PLUG

CAM

OIL DAILY AT X

LUBRICATION

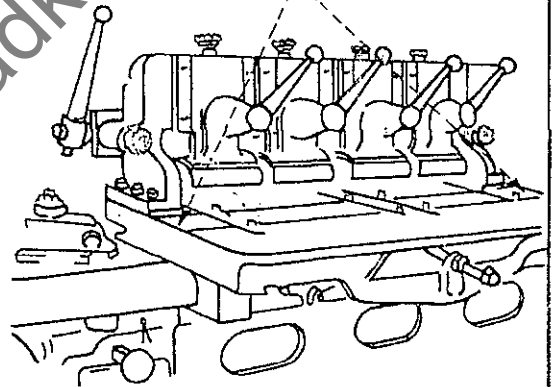
DUST IS ALSO RAMMED TIGHT IN VEE
OF TABLE. REMOVE BY PUSHING A LATH
FROM END TO END.



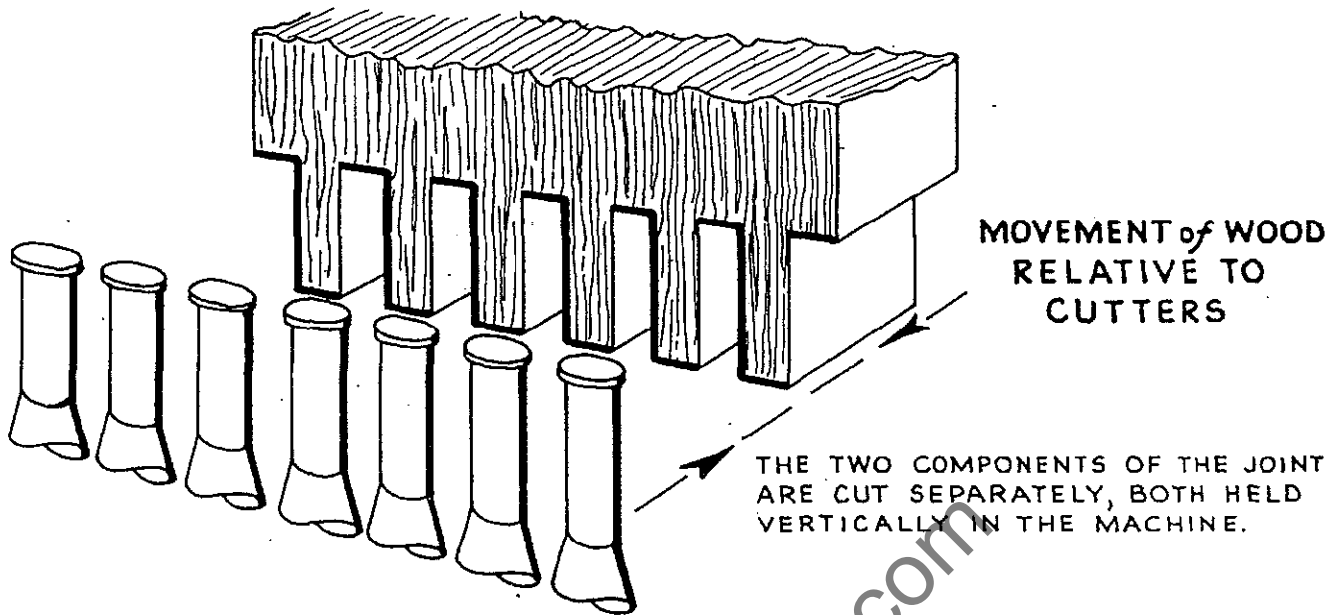
DUST DROPS ON LEDGE.
IF AGITATED WILL FALL
DOWN SLOPING BACK
OUT OF PORTS AT REAR.

IF LEFT, IT IS RAMMED BEHIND SPINDLE BOX BY
FORWARD MOVEMENT OF TABLE.

OIL POINTS



CORNER LOCKING EQUIPMENTS



1/2" PITCH

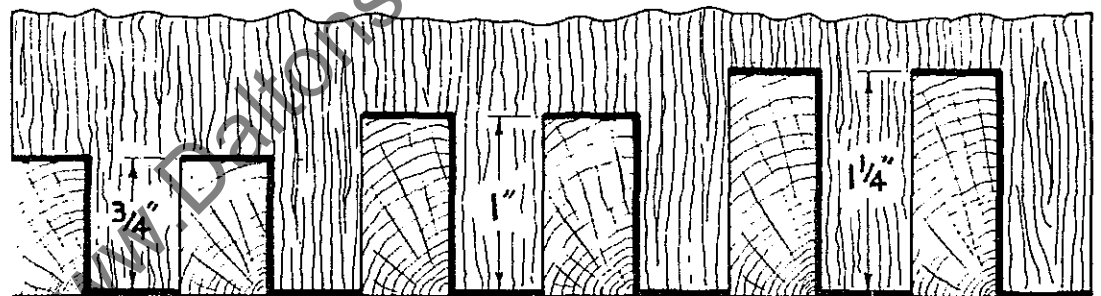


LENGTH OF PIN RELATES TO THICKNESS OF MATING BOARD.

MAXIMUM LENGTH of PIN:

With C.11 cutters 3/8" (9,5 mm)
With C.12 cutters 1/2" (12,7 mm)

1" PITCH

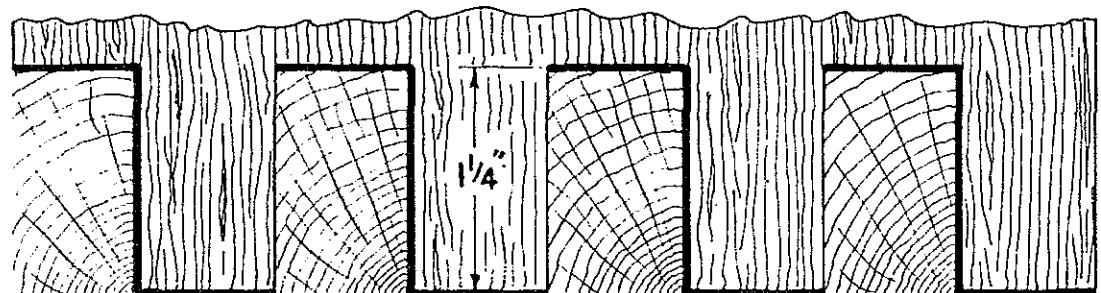


MACHINE ADJUSTMENT ALLOWS FOR PIN LENGTHS LESS THAN MAXIMUM POSSIBLE FROM A PARTICULAR CUTTER.

MAXIMUM LENGTH of PIN:

With C.41 cutters 3/4" (19,0 mm)
With C.42 cutters 1" (25,4 mm)
With C.43 cutters 1 1/4" (31,75 mm)

1 1/2" PITCH



MAXIMUM LENGTH of PIN:

With C.51 cutters 1 1/4" (31,75 mm)

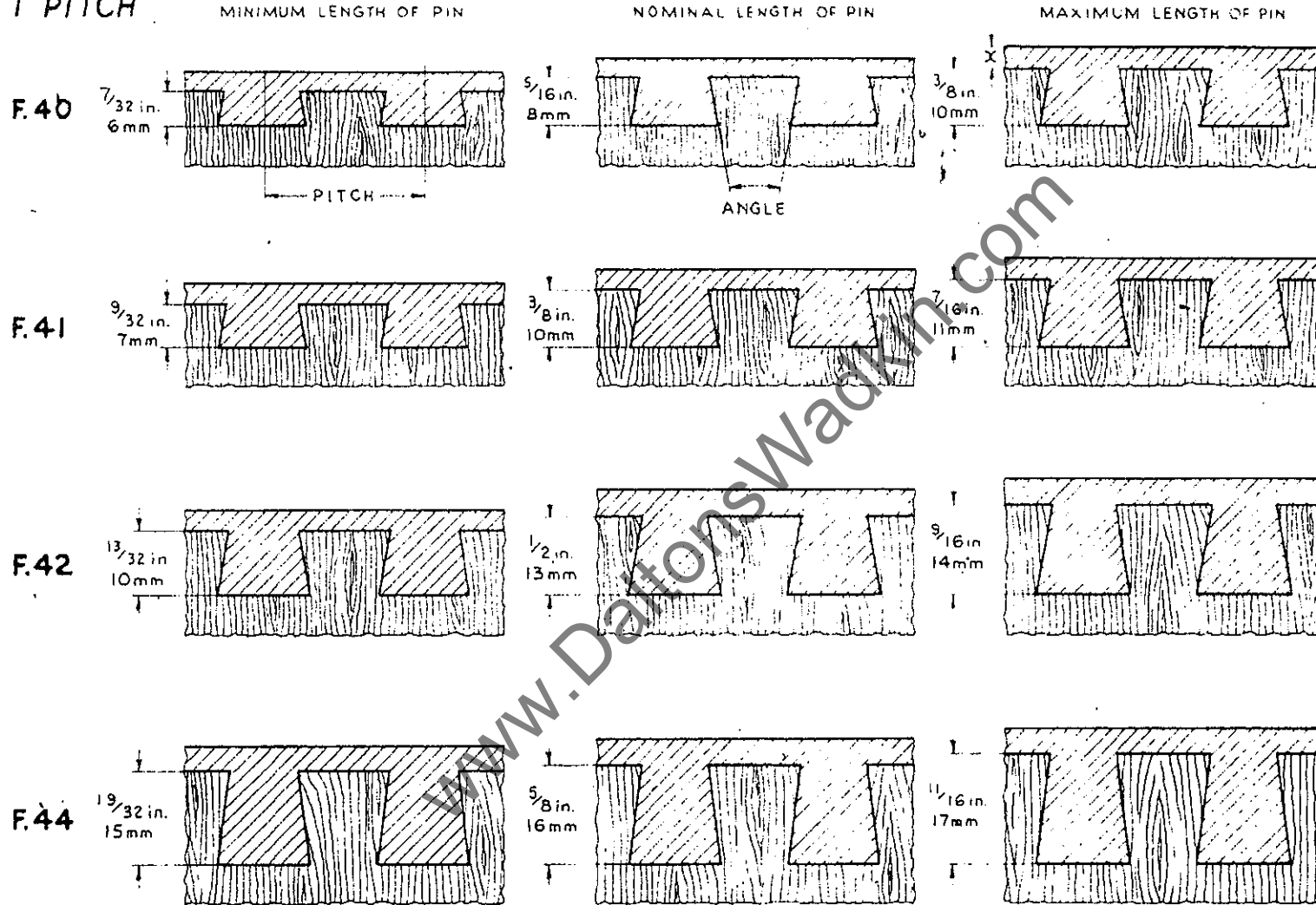
EQUIPMENTS for
15 SPINDLE MACHINES
25 SPINDLE MACHINES

1/2" PITCH
RCQ.1
APQ.18

1" PITCH
RCQ.2
APQ.19

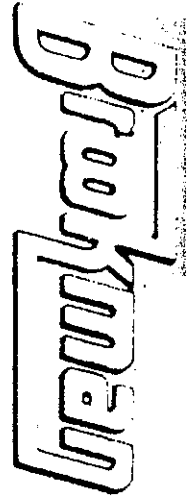
1 1/2" PITCH
—
APQ.20

1" PITCH



The size of dovetail pins is governed by i) the pitch ii) the angle iii) the length. This Data Sheet refers only to 1" pitch, the size in most common use. See Data Sheet DS.003 for other pitch sizes. All cutters, except F44, are made to 20° angle (F44 15°)

Above is shown (Scale 1:1) the length of pin variations possible when cutters are used on 15 Spindle and 25 Spindle Machines. On 9 Spindle Machines the cutters will produce dovetails to the "Nominal" lengths only. Dimension X is not governed by dovetailing operation.



CRAMP ADJUSTMENT. AUTOMATIC DOVETAILERS 25 AMM: 25 APM.

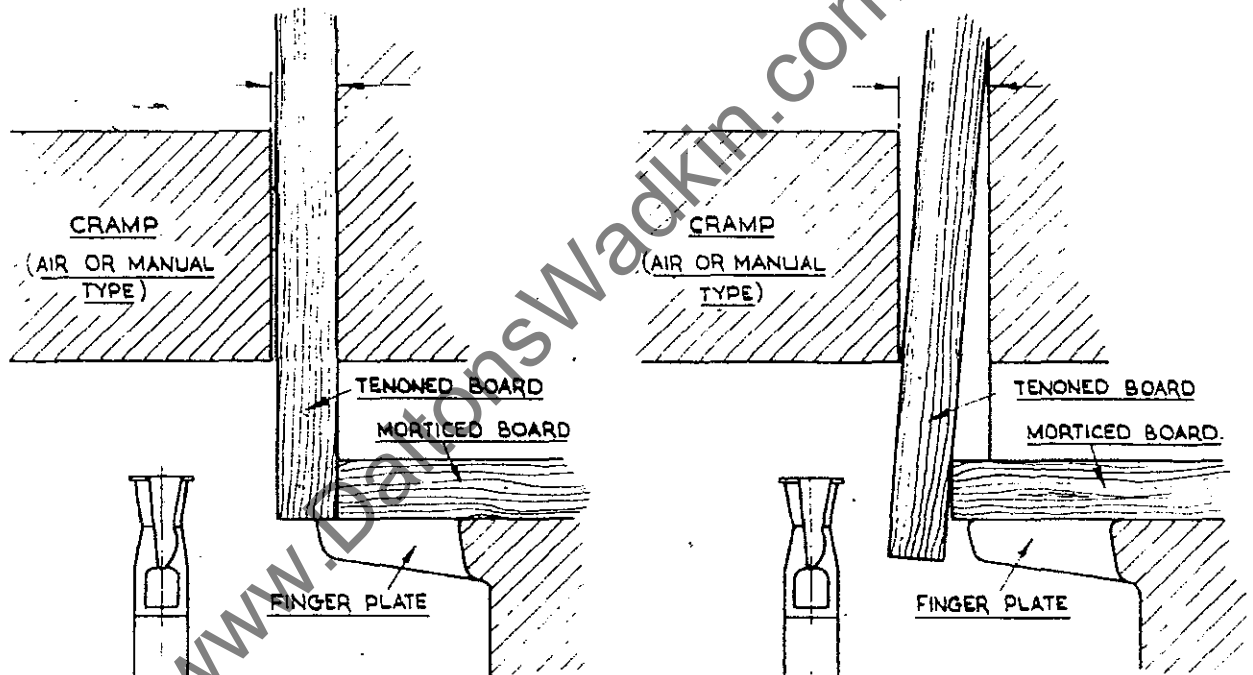
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CORRECT

ONLY SUFFICIENT CLEARANCE
FOR FREE ENTRY

INCORRECT

CLEARANCE TOO WIDE. BOARD NOT
LOCATING ON FINGER PLATE.



THE VERTICAL (FRONT) CRAMP SHOULD BE ADJUSTED AS CLOSE AS POSSIBLE TO ALLOW FREE ENTRY OF THE BOARD. AN UNNECESSARILY WIDE ADJUSTMENT MAY RESULT IN MIS-POSITIONING OF THE BOARD AS INDICATED BY THE ABOVE SKETCHES. THIS LEADS TO BREAKAGE OF THE CAM TRACK ROLLERS.



RECOMMENDED LUBRICANTS.

R S BROOKMAN LIMITED · PARKS DE WOODS · ROTHLEY · LEICESTER · ENGLAND

DOVETAILERS, All Models

Electric Motor Bearings, Ball or Roller	Grease packed.	Mobilux Grease N°3.
Bearings and Gears Enclosed	Oil Sump.	Mobil Vactra Oil, Heavy Medium.

DOVETAILERS, Pneumatic Cramp Models.

Cramp Cylinders and Drill Attachments	Air-Line Lubricator.	Mobil Almo Oil N°1 or Wakefield Magna SP
--	----------------------	---

HYDRAULECTRIC MORTICER, All Models.

Electric Motor Bearings, Ball or Roller	Grease packed.	Mobilux Grease N°3
Feed Mechanism	Hydraulic Pump Box.	Mobil DTE Oil Light
Tool Head, Bearings and Gears.	Oil Sump.	Mobil DTE Oil AA

BORER - All Models

Drill Unit.	Oil Bath.	Mobil Vactra Oil, Heavy Medium.
-------------	-----------	------------------------------------

BORER - Pneumatic Models.

Feed Control.	Dashpot.	Mobil Aero Hydraulic Oil HFA
---------------	----------	---------------------------------

SELFEEEDRILS.

	Air-Line Lubricator.	Mobil Almo Oil N°1 or Wakefield Magna SP
Feed Control.	Dashpot.	Mobil Aero Hydraulic Oil HFA

AUTOMATIC GLUEING & ASSEMBLING MACHINE.

Air - Hydraulic System.	Header Tank.	Mobil DTE Oil Light.
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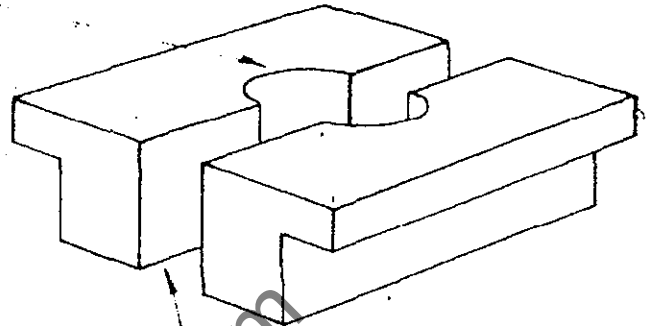
SPINDLE REPLACEMENT
DOVETAILERS.

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11" / 16 (17.46 M/M) DIA. HOLE THROUGH.

SKETCH SHOWING ADJACENT CUTTER SPINDLES. LONG AND SHORT PATTERNS ARE USED ALTERNATELY. ODD NUMBERS SHORT. EVEN NUMBERS LONG.



BEARING REMOVAL BLOCKS.

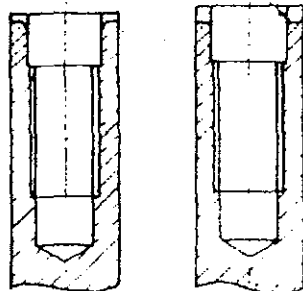
PART NO REFERENCE.

	9 SPINDLE MACHINE	15 SPINDLE MACHINE	25 SPINDLE MACHINE
SHORT SPINDLES	42354	42111	2966D
LONG SPINDLES	42355	42112	2966C
LOWER BEARING	RSB. NO. P.128 R&M. NLDJ 12		
UPPER BEARING	RSB. NO. P.129 R&M. NLDJ 15		
CAP SCREW	SD 6. - 1/4 BSF x 1/2		
WASHER	SD 9 - 1/4"		

IT IS PREFERRED TO SUPPLY REPLACEMENT SPINDLES ASSEMBLED COMPLETE WITH BEARINGS.

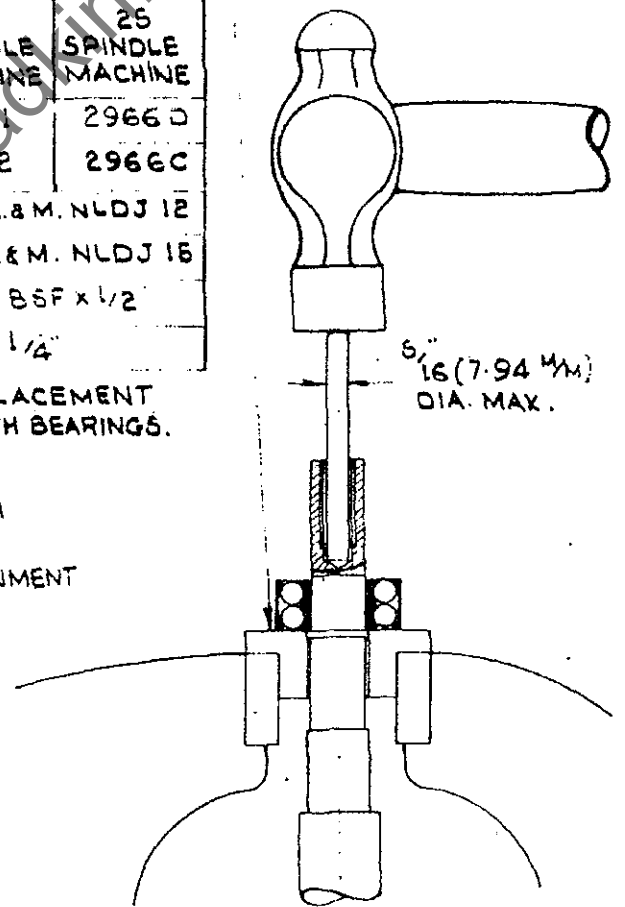
SPINDLE ENDS ARE LEFT OVER LENGTH TO ALLOW FOR TRIMMING PARALLEL TO WORK TABLE SURFACE, AND ALIGNMENT ONE WITH EACH OTHER.

ALIGNMENT WITH WORK TABLE SURFACE.



1/32 R.

N.B. SKETCH EXAGGERATES TRIM REMOVAL. BARE MINIMUM SHOULD BE REMOVED TO ALLOW FOR FUTURE OCCASIONS.

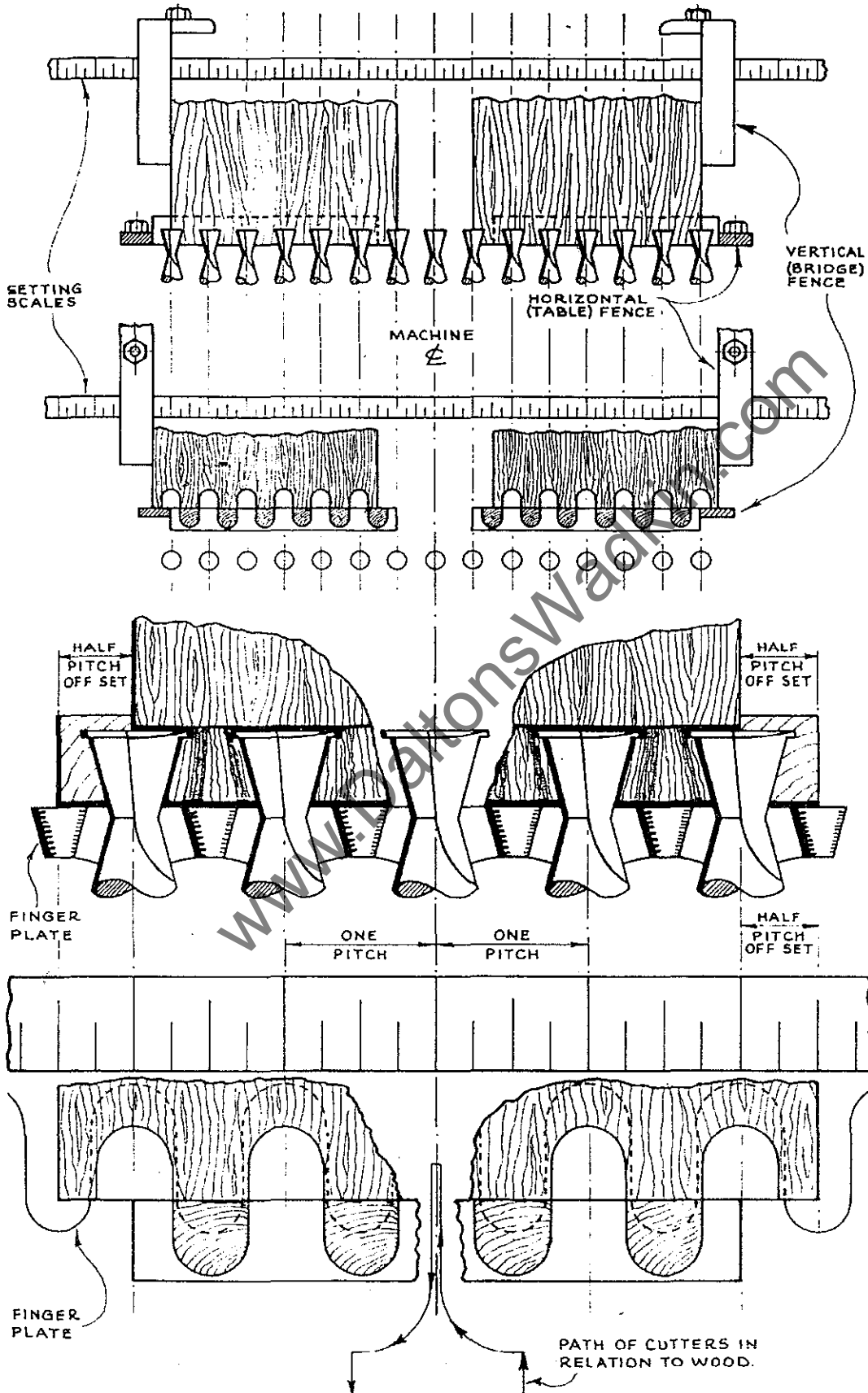


5 1/16 (7.94 M/M) DIA. MAX.

METHOD OF REMOVING BEARINGS.

FENCE SETTING DOVETAILERS

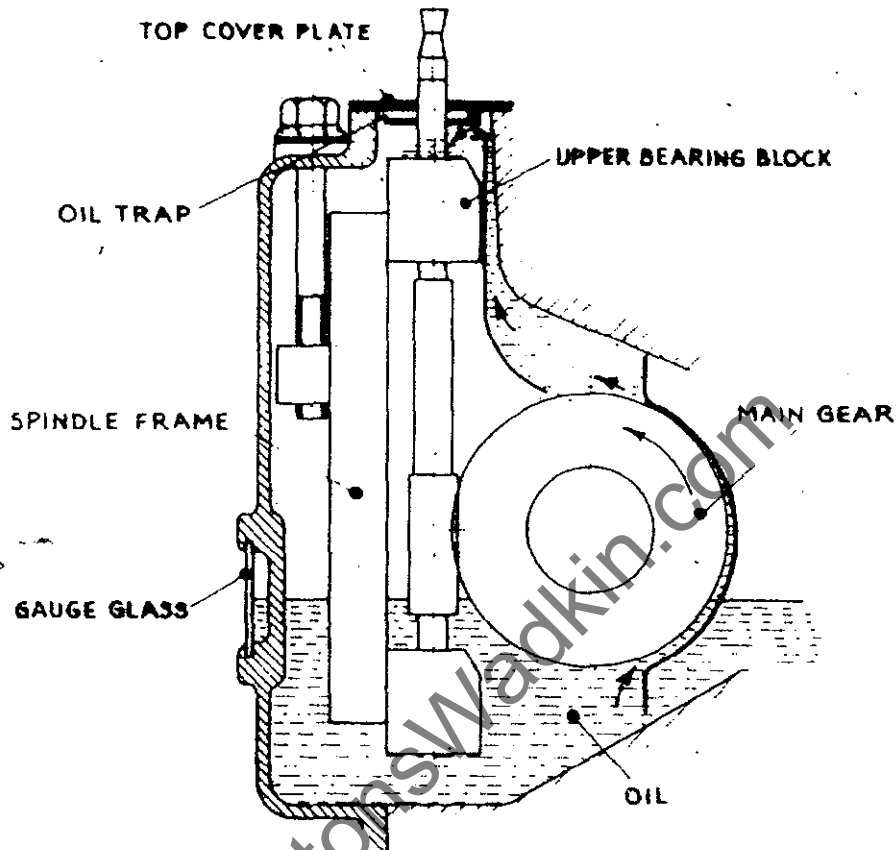
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THE TWO COMPONENTS OF THE DOVETAILED JOINT, MALE (DRAWER SIDE) AND FEMALE (DRAWER FRONT) NEED TO BE OFF SET ONE TO THE OTHER BY HALF A PITCH. FENCE SETTING SCALES ARE GRADUATED IN "PITCHES", THAT IS THE SAME AS THE CUTTER SPINDLE CENTRES.

EXAMPLE: WHEN WORKING 1" PITCH FURNITURE THE VERTICAL (MALE) FENCES ARE SET ON THE FULL PITCH MARKS, AND THE HORIZONTAL (FEMALE) FENCES ON THE HALF PITCH MARKS. (NOTE: THIS REFERS TO THE SYMMETRICAL FEED MOVEMENT MACHINES, ON THE OFF SET FEED TYPES THE REVERSE OF THIS STATEMENT APPLIES)

SUMP LUBRICATION. AUTOMATIC DOVETAILERS, 25 AMM. 25 APM.

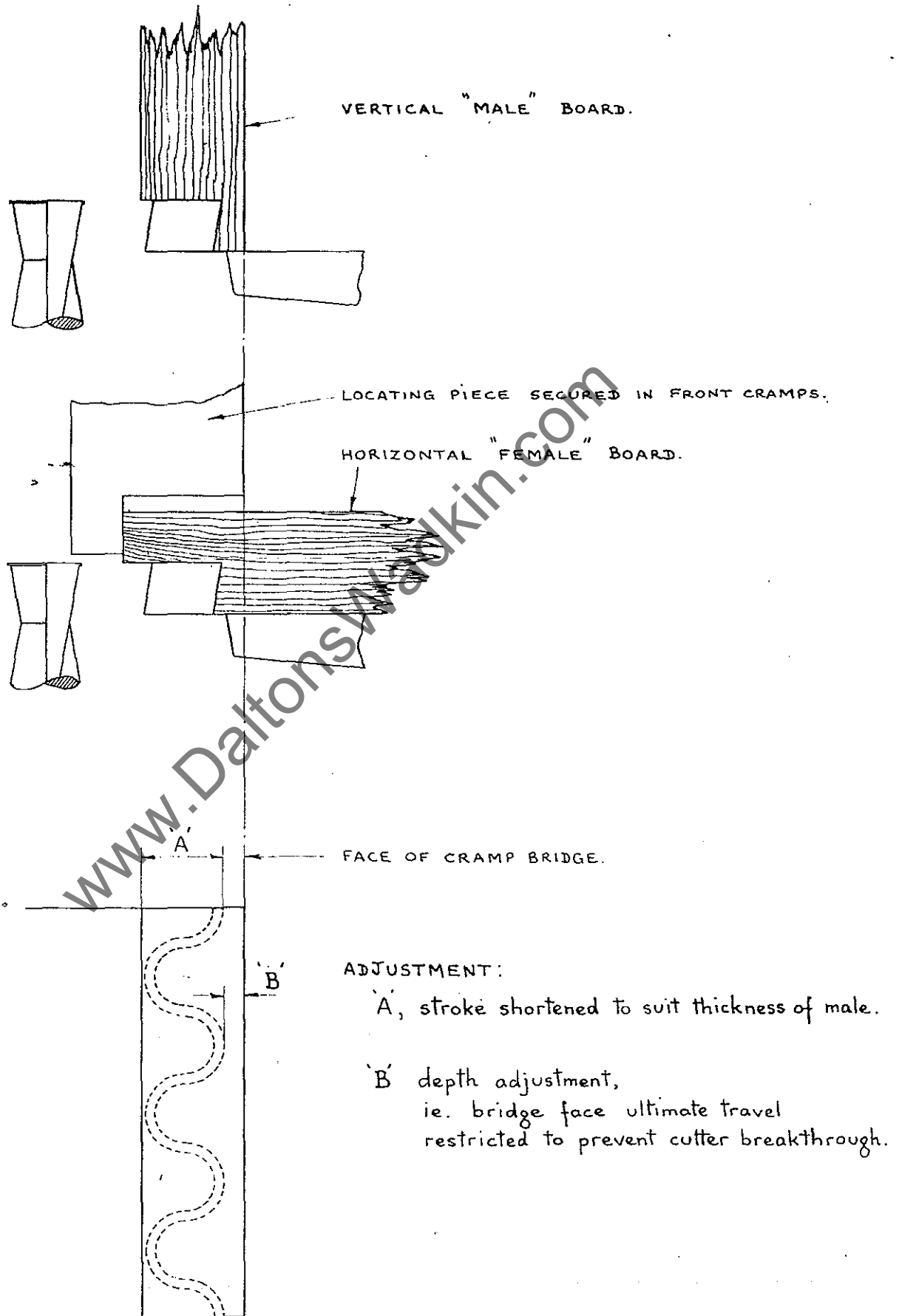


The sump level should be maintained to the mark on the gauge glass. If however there is evidence of excessive or insufficient lubrication the level should be checked and adjusted to suit the operating conditions. To do this run the machine with the Top Cover Plate removed. The oil is lifted by the pump action of the main gears and caused to flow over the Upper Bearing Block. Excessive flow will permit a lower sump level, inadequate flow a higher level. NB. It is better to err towards an excessive flow because an inadequate flow will starve the upper bearings of lubrication entirely. Check the level with the Spindle Frame adjusted to the uppermost position, which is the more difficult from the point of view of oil flow, and then re check in the lowest position, which is the easiest and may result in excessive flow if the sump level is too generous.

The Top Cover Plate is provided with an oil trap to retain the oil. This is drained to the front, i.e. the opposite side from the main oil flow. This trap will become ineffective when clogged with sawdust. If after a period of running oil begins to seep past the protruding spindles, the plate should be removed, the two constituent parts separated and the cavity between cleaned.

Always use Mobil Vactra Heavy Medium Oil. Sump capacity approximately $3\frac{1}{2}$ gallons.

SECRET DOVETAILING





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ENGLAND

Data Sheet DS.023

SECRET DOVETAILING

Secret Dovetailing is cut using the standard furniture equipment, the required adjustments coming from the setting controls incorporated in the Dovetailers.

When cutting the normal Furniture dovetail the two components, male and female, are cut together. The Work Table movement, in relation to the cutters, is such that the cutters pass through the vertical board, to form the male pins, and then cut into the horizontal board to form the female sockets. When cutting Secret dovetails the whole of the cutting movement is confined to each component of the joint, which being so they have to be cut positioned side by side, in the cramps, or cut at separate operations if the working width of the machine so requires.

The setting up procedure is for the vertical male board to be placed in the vertical cramps, and the adjustment so set that the cutter, at the crest of the round, just undercuts into the outer face of the board in the normal fashion. On Lever operated machines this is achieved by positioning the former plate; on Automatic machines by setting the "Depth" adjustment. The forward traverse of the table must now be restricted so as to prevent the cutters from breaking through the thickness of the board. Technically, at its foremost position, the face of the cramp bridge must not pass beyond the scribe periphery of the dovetail cutters. These adjustments made the maximum dovetail form will be obtained according to the thickness of vertical male board to be worked.

No further machine setting, except perhaps by tightness of fit, is required to cut the horizontal female board, but a forward location for this board will be required. This is the more easily achieved by permanently securing the vertical cramps, a piece of wood rebated to the extent that the end of the horizontal board should project beyond the bridge face. (see Data Sheet DS.022).

Fit adjustment will apply in the normal way.

Summary:

The settings are:

Lever Operated Machines:

- a) To position the former plate in the normal manner according to the thickness of vertical board to be worked.
- b) To limit the forward movement of the work table by setting the depth screw so as to prevent the cutters breaking through the thickness of the wood.

Automatic Machines:

- a) The stroke is shortened to the amount deemed suitable for the thickness of vertical board to be worked.
- b) The depth adjustment pointer is moved across to the position "Secret" on the scale, to prevent cutter break through.

In all cases it is advisable to cut a trial joint to determine the fit adjustment after the stroke adjustment and positioning have been set satisfactorily.

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WORK TABLE FEED MECHANISM
Automatic Dovetailers 25.AMM & 25.AFM

References: Drawings 72133, 72134; Data Sheet 018
Instruction Manual.

Work Table Movement

1 The compound movement of the work table derives from the cam drum. The latter is provided with two tracks, the one determining longitudinal and the other the transverse movements of the table. Between the work table and the main body of the machine, there is a sub slide, named the "Cross Slide". This cross slide embodies the cam rollers, racks and pinions, and all the mechanism necessary to transfer the cam track movements to the work table. It also incorporates a device which enables the maximum feed stroke from the cam to be diminished before translation to the work table. This mechanism is termed the "Stroke Adjuster" and is detailed in drawing 72133. The cross slide generally is detailed in drawing 72134.

2 When cutting Furniture type dovetails, the rotary cutter leaves a half round end in the female socket, and the table movement is designed to round the male pin to marry with this. Hence when adjusting for thickness of drawer side, the requirement is to diminish or increase the full forward movement of the work table, but at the same time not to alter the shape of the rounding action. The above mentioned stroke adjuster facilitates this requirement of altering one part of the movement obtained from the cam drum without disturbing, to any marked extent, the other. The adjustment is made by moving the adjuster slide 31, together with the swing piece 33 bodily by the screw 25 (Screw B).

3 The swing piece 33 has a further function by adjusting for "flush fit". This is achieved by rotating the component under influence of screws 27 (screws C). Swing piece and adjuster slide are locked, after adjustment by screw 44 (Nut D).

4 A further working adjustment is the "Fit Adjustment". This comprises the drag link 7 which mounts the roller to run in the inner track of the cam. Screw 10 (A) determines the amount the drag link is allowed to move in relation to the cross slide. A brake device on the end of the cross slide assists the action of this link.

5 For the dovetailer to function correctly and for the dovetails cut to be accurate and well formed, it is necessary that all components and functions detailed above be in good condition, and act as intended. Dovetails which are misshapen notably as to the rounding of the pin, are the outcome of five conditions, or an amalgamation of two or more of these conditions, namely:-

- a) Blunt Cutters
- b) Brake Adjustment
- c) Accumulation of sawdust and chips under work table

- d) Cross Slide and table slide, including rack mechanism, require oiling and adjusting
- e) Wear or misadjustment of the table motion mechanism

There is a sixth case when the ball race 23 used as a roller has broken.

Blunt Cutters a)

6 Cutters which require sharpening or have not been ground to give sufficiently free cutting action, are a prime cause of indifferent dovetailing results. It is important to ensure that the cutters are sharp, and that the rake has been adjusted to the type of timber being machined. Blunt cutters set up "chatter" on both the table movement and of the cutter spindles themselves, and indifferent quality results.

Brake Adjustment b)

7 The Brake is on the extreme end of the cross slide, mounted on brackets 58 and 59. Its purpose is to retard the transverse table movement, giving preference to the cross slide longitudinal movement. This ensures that the "fit adjustment" from the drag link 7 functions correctly. It also maintains roller contact on the operative side of the cam drum track at any one time.

8 The brake is adjusted by the two screws 67. Excessive tightness is not required, in fact, it must be avoided. Incorrect function of the brake usually arises from oil in the vicinity of the brake pads. This should be wiped and cleaned away. The protruding portion of the push bar needs to be kept clean and dry for this reason. At the same time lubrication must be provided at the point where it passes into the cross slide.

Dirt under the work table c)

9 Unless regular action is taken to counteract, sawdust and chips will accumulate under the work table. In time these will restrict the free movement of work table and cross slide. More particularly the chips pack up behind the cutter spindle box, thereby preventing the full forward movement of the work table. Steps should be taken weekly to ensure that chips do not congregate under the work table. Action by a blower, agitation with a lath, and similar methods should be used to ensure chips do not lodge but fall down the sloped surface of the main body, out of the ports of the main body rear. If there is any doubt that accumulations have occurred which cannot be dislodged by these methods, it is necessary that the work table, at least, be removed to allow cleaning.

Cross slide and table slide oiling and adjustment d)

10 These two slides need to be oiled once per week, in the way of normal maintenance. They should also be kept adjusted correctly, giving free movement along the direction of the slide but allowing no side shake. Should oiling of the slides have been neglected, and there is the added problem of dirt having accumulated under the table, it might be necessary to remove the slides from the machine thoroughly clean and oil, and then for reassembly to follow to correct standards of

slide adjustment. The procedure for dismantling the work table and cross slide from the machine is detailed in subsequent paragraphs.

Taking up wear in table movement mechanism c)

11 Provided the cross slide mechanism is maintained in a properly clean and lubricated condition, little or no wear will occur over a very long period. If however wear does occur, or neglect necessitates that the mechanism be dismantled, cleaned, and reassembled, the procedure as indicated in the following paragraphs must be followed. If it should be that the dovetail pin is showing a severe distortion, to the extent of a near rightangle on one side of the pin, it is most probable that ball race 23 has broken. To replace it will be necessary to dismantle the cross slide mechanism completely.

Factors to be observed before dismantling

12 The setting adjustments, which are provided in the Dovetailer are somewhat complex, the more so because they are inter-related. Confusion can arise if an adjustment is made to correct an apparent fault, which in fact arises from another adjustment being out of setting. Accordingly when undertaking fundamental maintenance work, it is essential to work from a "datum" or zero position. The stroke adjuster 31, should be moved to the maximum stroke figure 10 position. (Pointer E); the depth adjustment (as indicated by pointer J) should be zeroed. Fit adjustment should be eliminated, (by tightening screw "A").

13 With the adjustments zeroed and with the 1" pitch furniture cam halted in its normal at rest "A" line position, the dimension from the front face of the cramp bridge to the centre line of the cutter spindle should measure 1.13/16" (46,0 mm). If this should not be so adjustment to the table position is made by the two lock nuts 99 on either side of the lugs bolted to the underside rear of the work table.

14 Note, reference has been made to the 1" pitch furniture cam. This is the cam used almost invariably, although equipments, and in consequence cams, are available to enable different pitch sizes and different styles of dovetailing to be cut. Should alternative cams be in use with the machine, it is advisable to work from the 1" pitch furniture when following these notes and making adjustments.

Dismantling

15 Remove the cramp bridge. This is secured to the work table by three bolts at each end, with dowels to give accuracy of position. To remove the work table remove the screws which secure the lugs to the table under side rear. Bearing in mind that this setting is critical, it is sometimes advisable not to disturb the nuts 99, or at least not to disturb the position of the inner nuts, so that the setting can be re-established. The lugs are dowelled, and these can be gently prised clear. Unscrew the five gib screws, at the motor end of the machine, withdraw the gib strip. The table can then be lifted clear by raising at the motor end first.

16 If minimum cleaning only is required, the cross slide is now exposed and accumulations of dirt and sawdust can be removed. The movement mechanism can be caused to operate by rotating the cam drum, thereby facilitating cleaning and oiling. If the machine is in good condition and cleaning and adjustment only is required, it is inadvisable to remove the cross slide.

17 If attention to the cross slide itself is required, which necessitates its removal, proceed as follows. Remove the cam drum. Remove the roller immediately above the rear automatic feed starting push knob. Unscrew the gib screws along the length of the machine body, and slide out the gib strip. Before removing the cross slide reflect that the front bearer incorporates a ball bearing slide and it is advantageous to move the cross slide leaving these balls insitu. Accordingly tilt the slide from the rear of the machine, and then carefully remove from the front.

18 The underside of the control panel end is covered by a guard. When this is removed the mechanism, as shown by drawing 72133 is exposed. Before dismantling further it is advisable to mark the meshing points of racks and pinions, or to observe closely how the meshing occurs, to assist subsequent re-establishment.

19 The drag link of the fit adjustment, which carries the inner track roller, should be removed. The brackets 81 which carry the centre pinions, the three screws 47 are removed. The push rod mechanism can then be removed complete.

20 In cases where the removal of this mechanism is on account of ball race 23 having broken, or the locating pin on swing piece 33, it is only necessary to replace these parts and to reassemble. If however wear has occurred the following points should be observed.

Wear in push rod and rack mechanism

21 The aim in setting up the cross slide mechanism is to maintain the smallest degree of backlash or slack movement, whilst at the same time ensuring the mechanism moves perfectly freely and sweetly. Consider first the long rack 93 to which is attached the quadrant rack 36. This is supported by a pad 37 which in turn is mounted on a peelable shim 42. Pad 37 should be adjusted out until it maintains a near tight running fit with the quadrant rack 36.

22 Now place in position the push bar 94 on which is mounted the quadrant 32 the teeth of which mesh with the quadrant rack. A peelable shim intervenes between the fulcrum block 35 and the push bar 94, thereby allowing the meshing of the quadrant teeth with the quadrant rack to be closed to the required amount. This should be .020" to .025".

23 The long rack 93 transfers its movement to the short racks 74 via the pinions 76. The brackets for these are dowelled in position. If wear of the rack teeth or pinion teeth has occurred, this can be taken up by resetting the brackets 80. The wear can frequently be successfully countered by remeshing the pinion at 180° from the previous meshing. Again the permissible back lash is .020" to .025".

24 When the cross slide mechanism has been completely assembled the accumulative back lash should not exceed .045". This can be checked by using a 'C' clamp to arrest the position of each short rack 74 in turn. By pulling on the push bar the amount of accumulative back lash can be checked. It is necessary to check this locking each short rack separately, to ensure that both racks will subsequently work in unison.

25 Wear can occur in the track of the swing piece 33 where the roller 23 operates. If the wear is slight this can be counteracted by closing the back lash at the quadrant rack and short rack positions. If it is excessive the swing piece 33 will need to be replaced.

Final Checking of Cross Slide Mechanism.

26 Before the cross slide is returned to the machine, the following checks can be made upon the correctness of the maintenance work carried out. Bearing in mind the "datum" factor, given in paragraph 12, check that the stroke setting is on maximum 10 and that the depth is at zero. Slack off the brake impinging on the push bar. The mechanism can now be caused to function, by pushing on the cam track roller of the push rod. Push bar and long rack will move together, in fact they should move exactly together, check being made by scribing with a pencil across both rack and bar. If there should be any tendency for the rack to move further than the push bar or vice versa to move a lesser distance, then the depth adjustment has not been correctly zeroed, or the pointer itself is out of position. The Swing Piece 33 should be adjusted by the two screws 27 until the track is exactly parallel with the movement of push bar and rack, in which position push bar and rack will move exactly together.

27 The foregoing remarks refer to the condition when roller 23 is moving in the main portion of the swing piece track. This latter track changes direction through 45°, at its extremity. When ball race 23 moves around this portion of the track, it will be seen that the long rack stays still, notwithstanding further movement of the push bar. As the stroke adjuster is moved to lower settings, towards minimum, this arresting of the long rack movement occurs earlier, thereby curtailing forward movement of the work table by the same amount.

28 There should be a final check of the accumulated back lash through the rack mechanism. The two parts of the brake can then be tightened to introduce the retarding action on the push bar movement.

Reassembling on to the Machine

29 The cross slide should be returned to its position on the main body of the machine, the gib strip re-established, the support roller screwed back into position, in fact all steps taken correctly to reassemble the cross slide into the machine. The gib slide should be adjusted at this stage making sure that the cross slide moves quite freely, albeit without side shake. In the ultimate adjustment it is required that the cross slide movement be slightly freer than the table movement. Hence at this point care must be taken to ensure that the cross slide is correctly adjusted in this way.

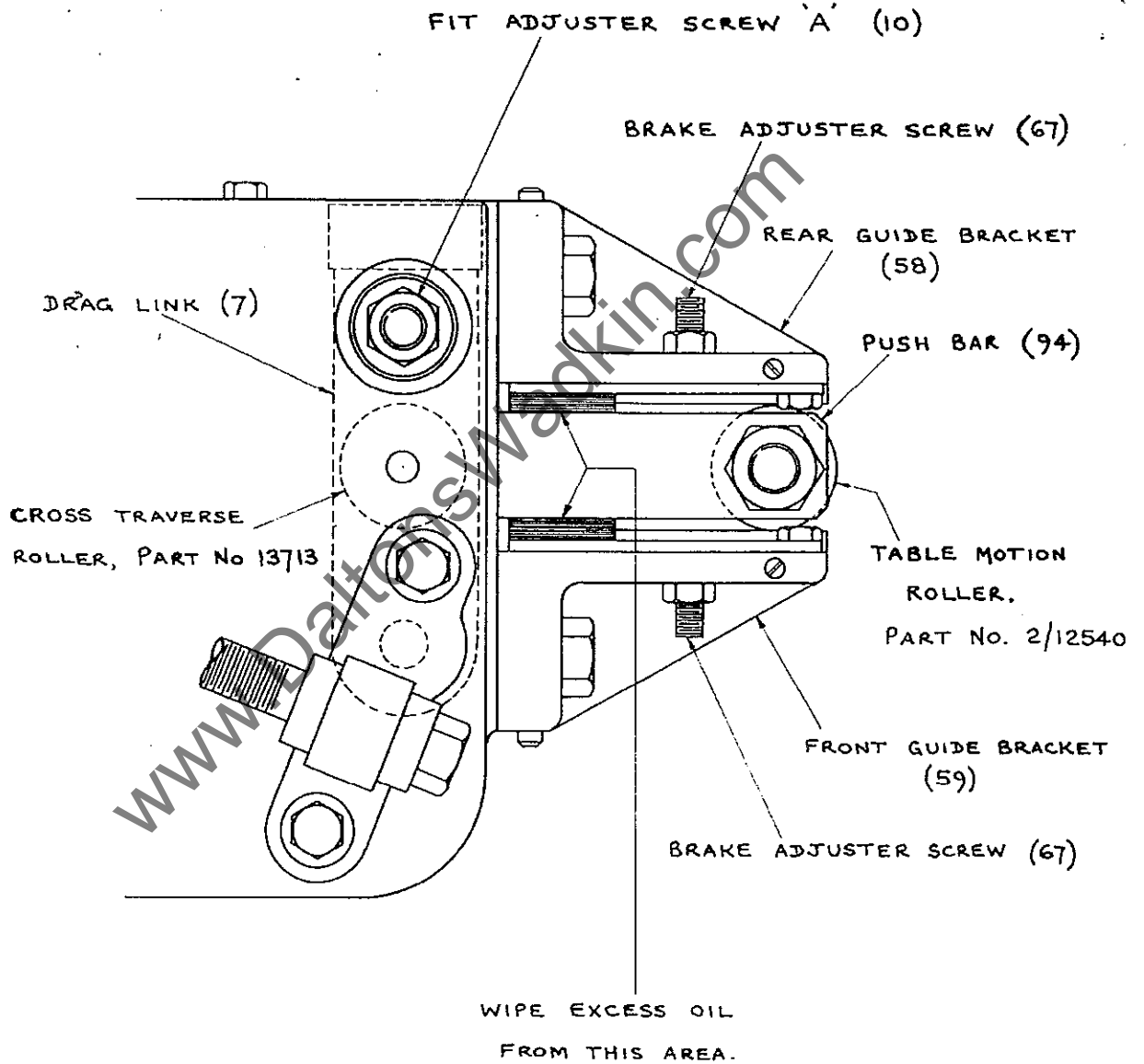
30 Remount the work table, and again re-establish the gib strip and adjust the gib slide before connecting the table to the short racks. As already stated the table must move freely and without side shake, but if there is any emphasis it is upon the table being adjusted slightly tighter than is the cross slide.

31 Reconnect the lugs on to the underside of the work table, and tighten up the lock nuts on either side of these lugs. Care must be taken to ensure that these short racks are tightened evenly side for side. Should the setting have been disturbed, then mount the cam drum into its position, and rotate to the 'stop' "A" line position. At this position the cam track rollers are at $4\frac{3}{8}$ " centres. When so positioned the dimension from the front face of the cramp bridge to the centre line of the cutter spindles, should measure $1.13/16$ ". Adjustment is by the nuts 99 either side of the lugs on the underside of the work table. The extreme front faces of the work table, coincide approximately with the bridge face, and can be used as measuring points at this stage. The final dimension can be checked after the cramp bridge has been re-positioned.

32 The cramp bridge is bolted back on to the upper face of the work table, taking steps to ensure correct location by the two dowels.

33 Cleanliness at all stages of re-assembly cannot be overstressed. The inner face of the cam drum, and the face of the cam hub should be carefully wiped before the cam is bolted back again; similarly the feet of the cramp bridge and the face of the work table to receive them.

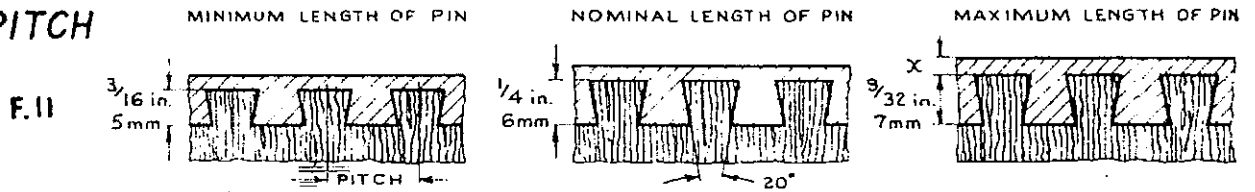
34 The proof of the re-establishment work will be in the quality of the subsequent dovetail cut. However a mechanical check can be made by cramping a pencil to the front face of the bridge, and allowing this to trace the track of the work table movement on to the top brass plate which covers the spindle box. The shapes obtained should coincide with the information given in data sheet reference DS.018.



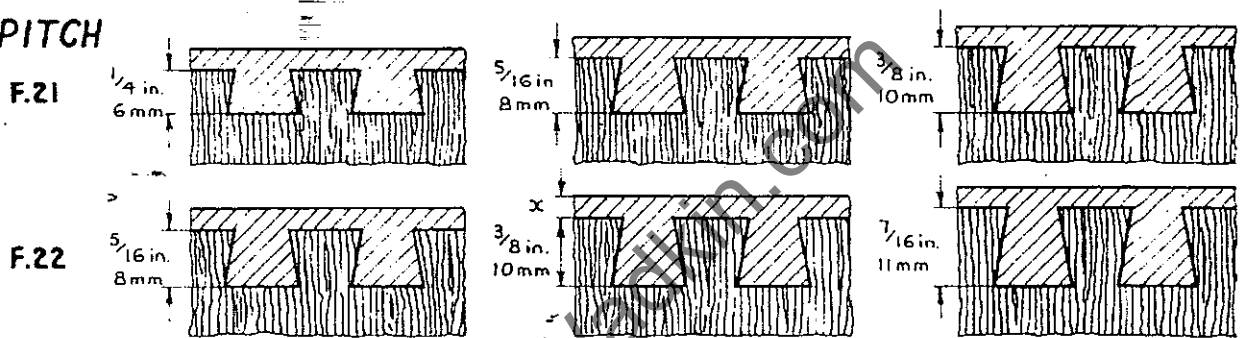
DOVETAIL CUTTER SIZES - Furniture Type 1/2", 2/3" and 1 1/2" pitch.

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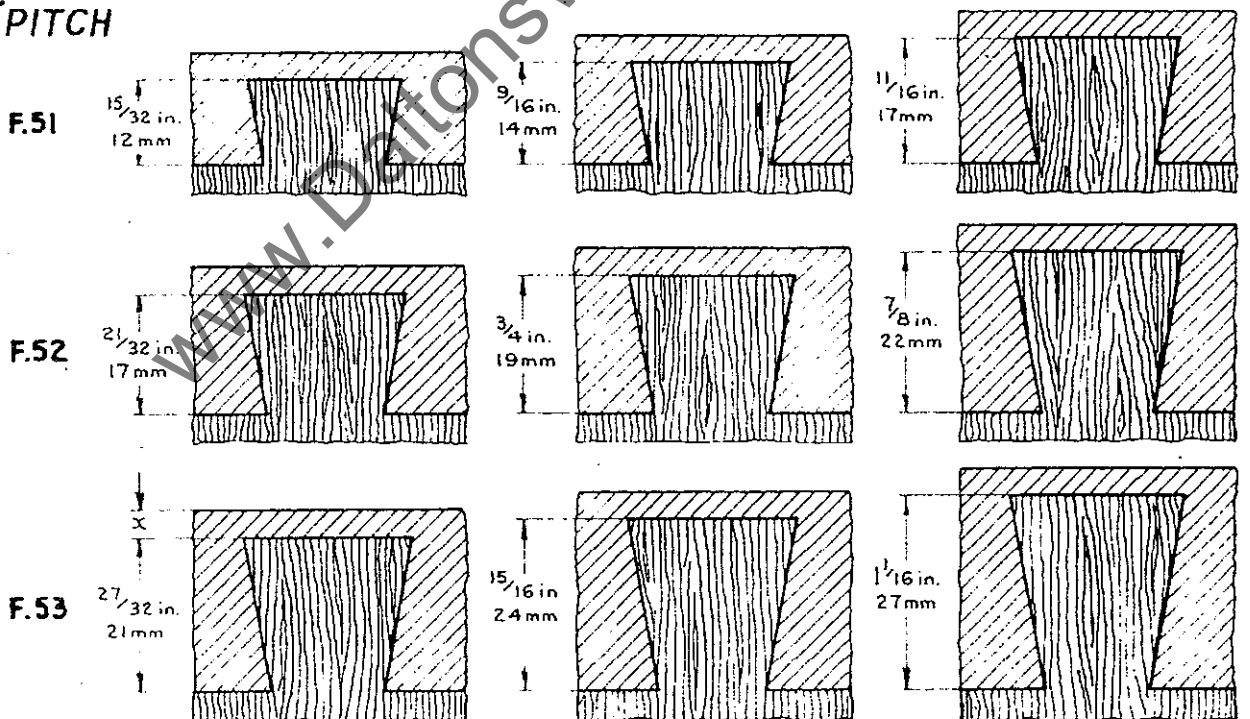
1/2" PITCH



2/3" PITCH



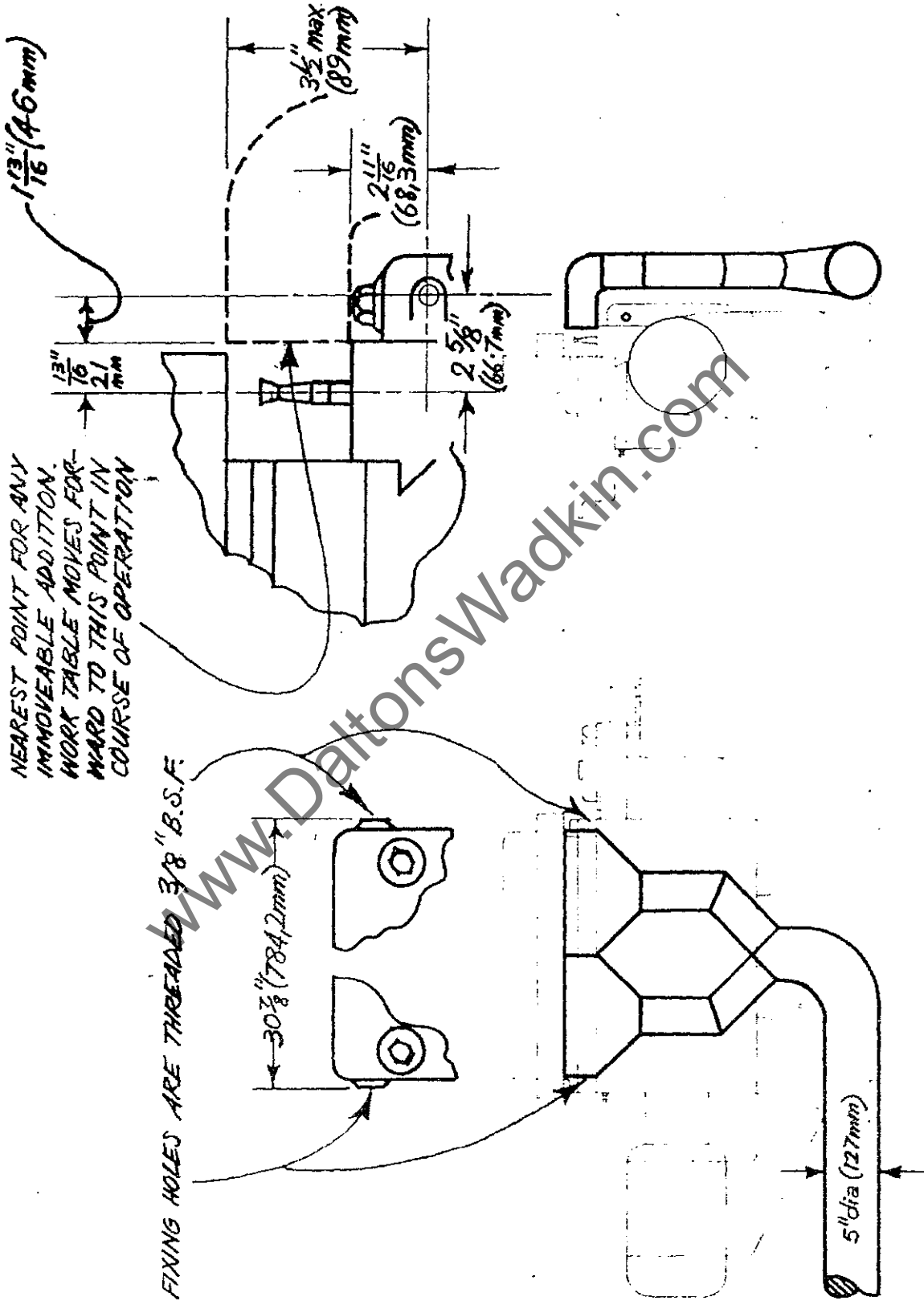
1 1/2" PITCH

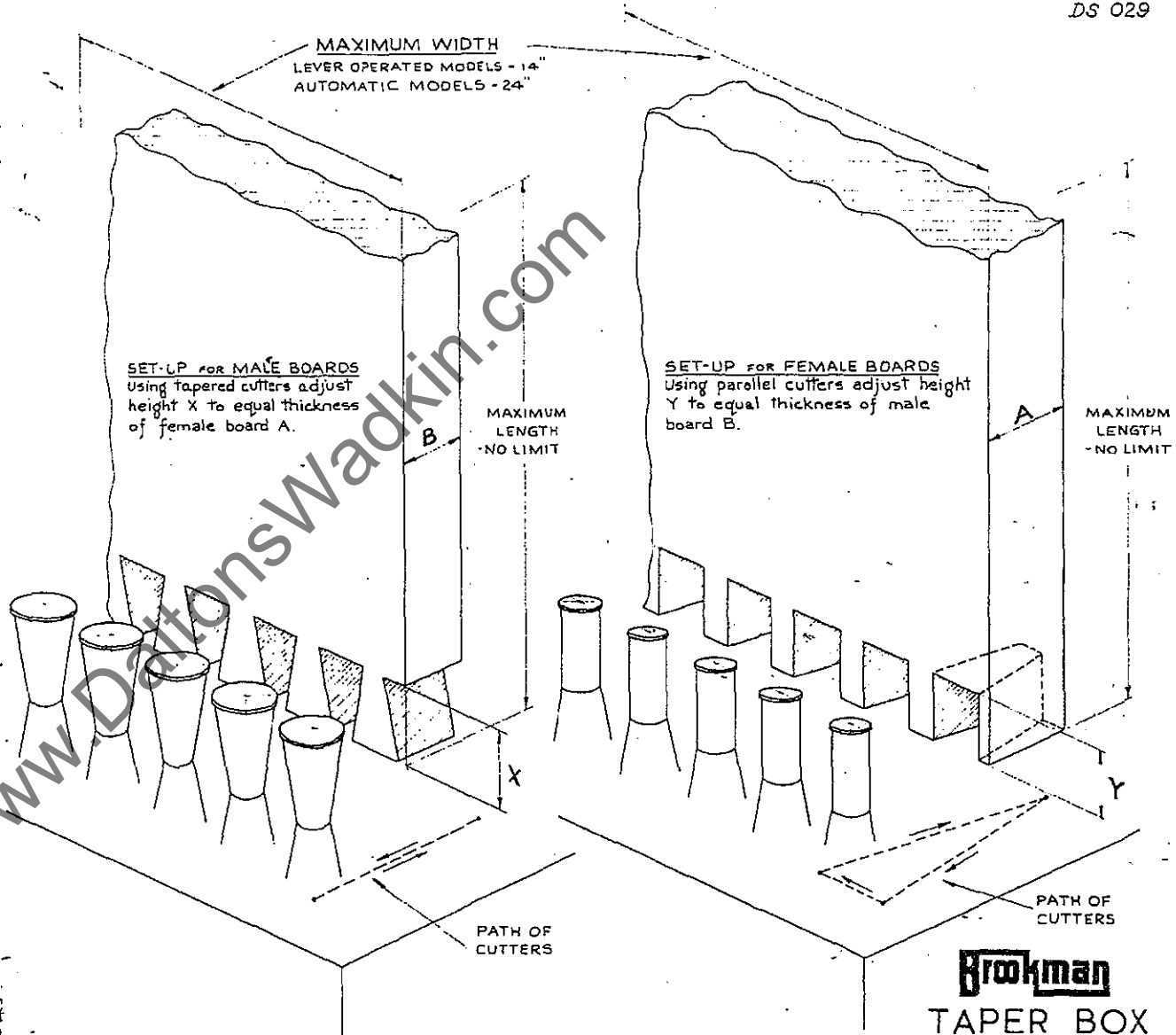
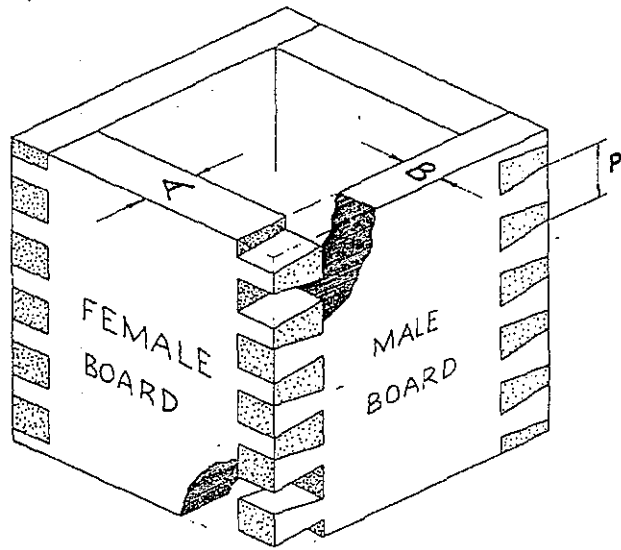


The size of dovetail pins is governed by i) the pitch ii) the angle iii) the length. Pitch is determined by the equipments with which the machine is provided, the angle is normally 20°. Remaining variable is the "length of pin", the scope of each cutter being shown by the above diagrams. (Scale 1:1) Dimension X is not governed by dovetailing operation.

The above pitch sizes refer only to 25 Spindle Machines, except 1/2" pitch which can be cut on the 15 Spindle Machines. For 1" pitch sizes see Data Sheet DS.004.

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CUTTER SELECTION CHART

FEMALE BOARD				MALE BOARD			
P	A		PARALLEL CUTTER LIST NO.	P	B		TAPERED CUTTER LIST NO.
	PITCH	MIN.			MAX.	PITCH	
1/2"	1/4"	3/8"	P. 11	1/2"	1/4"	3/8"	T. 11
1/2"	5/16"	1/2"	P. 12	1/2"	5/16"	1/2"	T. 12
1"	3/8"	1/2"	P. 41	1"	1/2"	3/4"	T. 41
1"	1/2"	1"	P. 42	1"	1/2"	1"	T. 42
1"	7/8"	1 1/4"	P. 43	1"	7/8"	1 1/4"	T. 43
1 1/2"	1 1/4"	1 7/8"	P. 51	1 1/2"	1 1/4"	1 7/8"	T. 51
2"	1 3/4"	2 1/4"	P. 31	2"	1 3/4"	2 1/4"	T. 31

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TAPER BOX
DOVETAILING