CONTENTS

INTRODUCTION

Jigs, tools, aids, devices, fixtures, gadgets.

These are all terms for ways and means of doing things other than by straightforward tool use. A jig is a technical term to an engineer. Gadget is a rather belittling term. Here the terms will be used indiscriminately and non-specifically.

The ideas presented have been developed for a number of reasons. Often they guarantee more accuracy than does general handwork, so they are particularly useful to workers who have not yet acquired the higher skills. Some will speed up production by eliminating slow, high-skill handwork. Others are useful when a number of identical items is required.

In the minds of some workers there is the belief that "the old men" preferred to do all their work entirely by hand and that the artist craftsmen of the Arts & Crafts Movement were machine haters. These ideas are proved to be quite untrue when it is considered what power sources, other than muscles, were available to them. These were either the water wheel or the steam engine, both suited only to a large-scale operation. Had the fractional horsepower electric motor existed, there is no doubt that they would have used it. The availability of light and portable woodworking machinery, plus the increasing provision of home garages and workshops, have totally transformed the working methods of the keen amateur and the small professional. I have considered as normal, therefore, the use of such machinery, though it is by no means essential for every example given.

As far as tool making is concerned, it is not the intention that the reader be encouraged to make most of the tools in the standard kit. Many are quite beyond the hand worker and others are economically not worthwhile. Those featured are either original tools, improvements on commercially available tools or recreations of useful tools now no longer manufactured. The distinction between tool, appliance, equipment etc. is a fine one, so the reader should expect what he or she considers a tool to be in another section.

It cannot be claimed that all these devices are original. Over the years, many woodworkers must have produced similar solutions to the same problem and no doubt many readers will carry some of these ideas a stage further or modify them for additional purposes.

Exact species of timber are not required unless specifically stated. Similarly, many of the sizes are merely suggestions. If a particular size is important, this is mentioned. Imperial/metric conversions are made to the nearest round number. Where it is important, exact conversions are given.

Many of these ideas were originally published in an edited form in the magazine *Woodworker*, whose editor kindly agreed to their re-use.

Drawings are by the author.

Chapter 2

MARKING AIDS

Straightedge

A straightedge, longer than the normal steel versions of 2'-3' (500 mm-1 m), is occasionally required. Select the wood carefully using only well-seasoned stable hardwood. Produce to size, then true up the true edge, ideally by machine planing. The other edge should be slightly shaped to avoid confusion. Drill a hanging hole and always hang when not in use; leaning it against a wall over a period will bow the straightedge. Varnish or paint well as this not only helps to reduce movement, but makes it readily identifiable as a tool, which prevents misuse in a communal workshop.

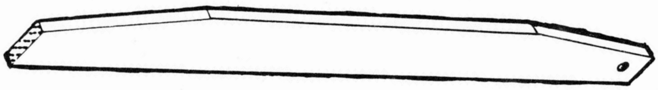


Fig. 1.

Diagonal Laths

A pair of laths, **A**, will check the equality of diagonals inside a frame or carcase. Push firmly into two corners and make the pencil mark shown. Repeat in the other corners and compare. Using this method and measuring the combined sticks enables a length to be measured in a place where a rule cannot be held, e.g. from the bottom of one small hole to the bottom of another.

Model **B** is more commonly used where cramps and other restrictions are not in the way. Make the two pencil marks and adjust the cramps to give the mean reading.

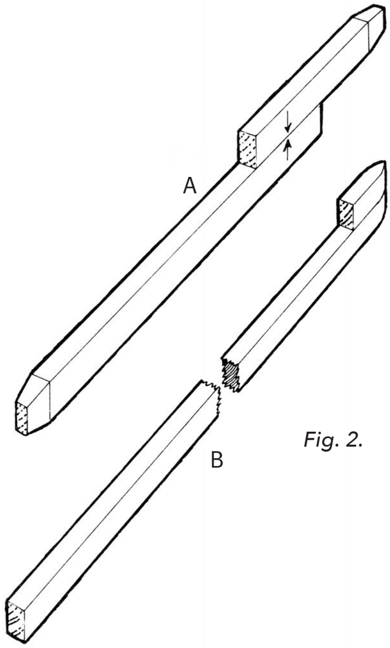


Fig. 2.

Large Wooden Square

This is used not so much for checking right angles (the diagonal lath is more accurate) but for marking out large components of plywood and other sheet material. It should not be used with the marking knife, which damages it.

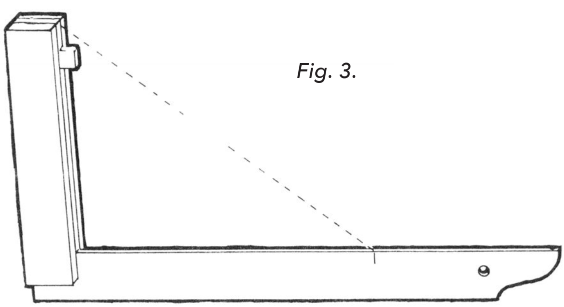


Fig. 3.

Aid for Copying Angles in Buildings

When building in fitments to a room one is soon made aware of the fact that few corners are really right angles. In order to saw large pieces of plywood, chipboard and similar materials to fit the corner exactly a large copying square is needed and 30" x 24" (750 mm x 600 mm) is a useful size.

This can best be made by laminating strips of hardwood or plywood as shown in **A**. The stock is of three layers, the centre one stopped well short of the rounded end. The blade is of a single layer also with one rounded end. Cut a 1/4" (6 mm) slot in the centre of the blade and drill a 1/4" (6 mm) hole in the centre of the stock and a same-sized hole in the curved ends of both. A 1/4" (6 mm) bolt with wing nut makes the pivot. A diagonal brace is necessary in order not to lose the angle during handling and this is made of the same material again with the ends drilled and rounded. A small stud inserted into the centre layer prevents the square from tilting in use.

Push the device hard into the corner to be measured and preserve the angle by fastening the brace. This must be fixed to the side convenient for the subsequent marking on the board. Illustration **B** shows how the angle is transferred to the board.

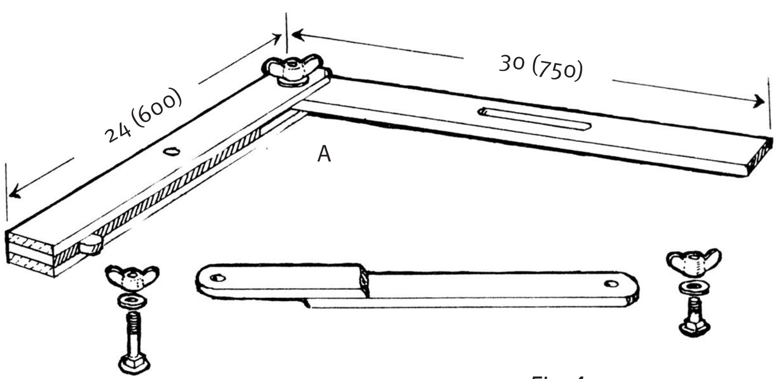
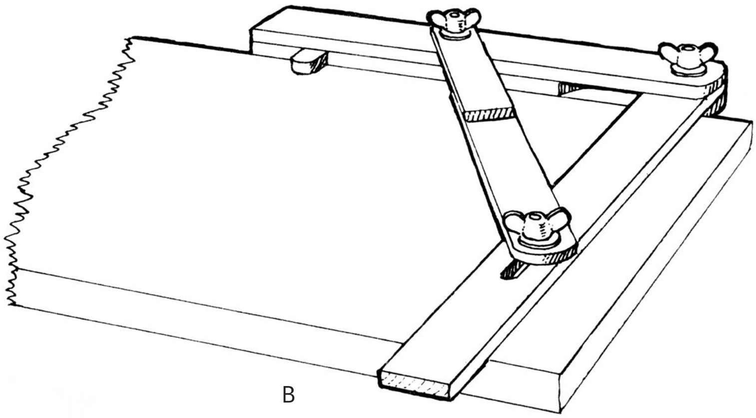


Fig. 4.



B

Try-square Pencil Gauge

This is a useful tool for rough marking out in the early stages. Many try squares are already calibrated, making the work that much easier. Drill holes at convenient intervals, 1/2" (10 mm), of a size to accept either a pencil point or a ballpoint pen.

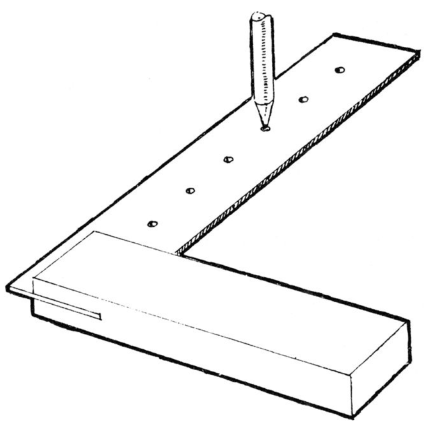


Fig. 5.

Glue-up Square

This useful tool for checking angles when gluing up is simply made from truly flat plywood grooved into a wood stock. It is very robust and should stay accurate. Be sure to wash off any glue it picks up immediately.

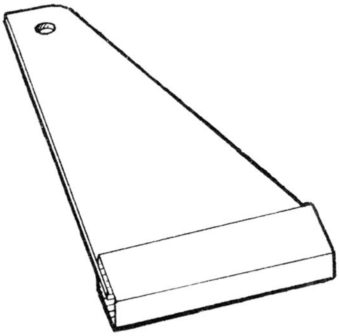


Fig. 6.

Setting Out Square & Gauge

This is useful for setting out full-size designs or full-size details of larger work. The stock can be chopped from the solid or, more accurately, built up. It should be a tight working fit on a 3' (1 m) rigid rule. A hole of about 1" (25 mm) is bored in the top side and a well-fitting plug is turned to fit it. One surface is faced with fine glasspaper. With the rule in place the plug is dropped in, glass-paper down, and a square of thin rubber is glued over the top. This tool can be used either as a T-square or, locked by pressure on the rubber, as a pencil gauge.

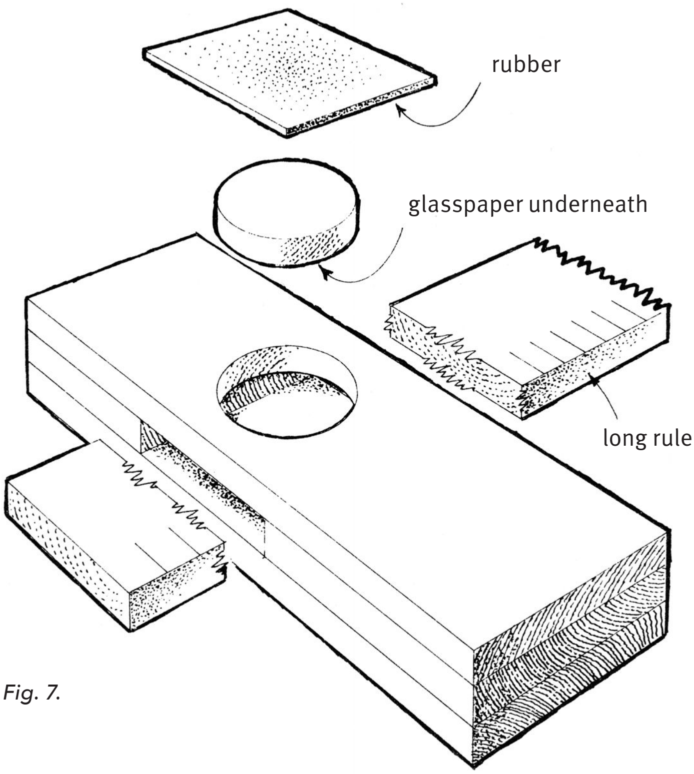


Fig. 7.

Four-way Block Gauge

Made from small pieces of very hard hardwood, having several of these small block gauges proves very handy. Four rebates can be cut, each increasing in size by 1/4" (6 mm). They are used with pencil or ballpoint pen for rough marking out or in situations where the conventional marking gauge is unsuitable.

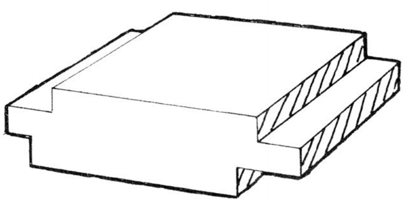


Fig. 8.

The Double Chamfer Gauge

This is similar in style to the block gauge. Rebates are cut with an allowance for pencil thickness. The corners are rounded to a quarter circle to mark stopped chamfers.

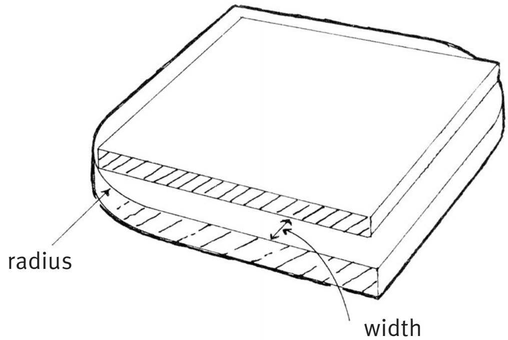


Fig. 9.

Depth Gauge

This can be made in various sizes and fitted with a dowel, pencil or ballpoint pen. Alternative clampings are shown in **A**, **B** and **C**. The larger sizes are handy to gauge the depth when turning bowls. Small versions fitted with a ballpoint pen or pencil are useful with a router. In making housings, as at **D**, the cut is continually increased until the gauge will no longer mark.

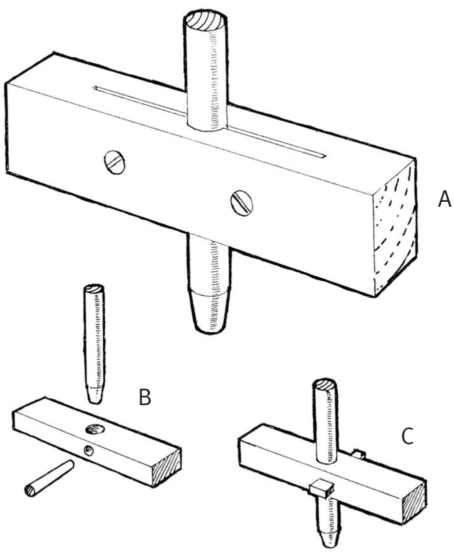
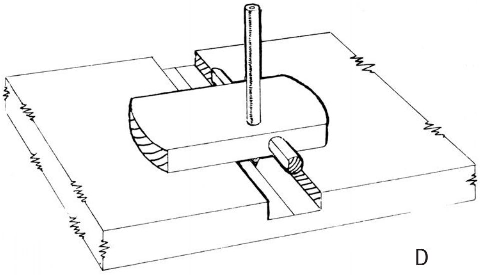


Fig. 10.



Special Gauges

The common marking gauge can be modified by the addition of two half-round guide strips, **A**. These permit the gauge to operate successfully on curved edges.

A rule gauge for pencil work, **B**. The sliding block can either be cut out or built up. This device is particularly useful for marking out wide sheet material.

A small steel cutter shaped to fit the end of a normal marking gauge and screwed into place permits marking in otherwise inaccessible places such as corners, **C**.

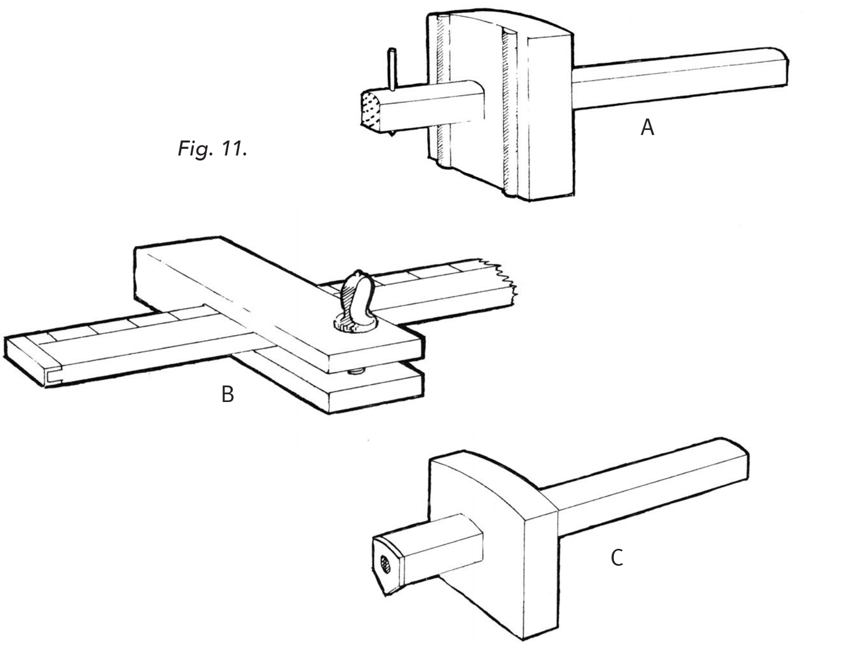


Fig. 11.

Panel Gauge

It is customary for panel gauges to run on a rebate as it is not the practice to roll the gauge over, as is the method with the marking gauge. Three possible stem ends are shown. When using a gauge point, **A**, the end is thickened with a section of wood to match up with the rebate. If a pencil is used this is not necessary. The pencil may be held with a machine screw, **B**, or a wooden wedge, **C**. In the latter case it is convenient to slot the end on the circular saw and fill in to make the sloping mortice. The stem can be locked either with a wedge, **D**, or a screw, **E**. If the screw is chosen it must grip on a brass shoe as shown.

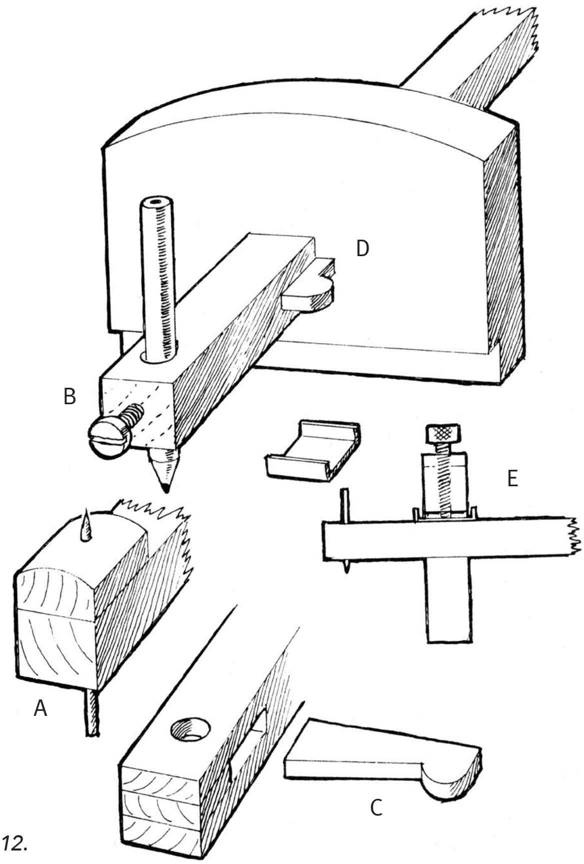


Fig. 12.

Chapter 4

CRAMPS

There can be few readers who enjoy buying cramps. Unlike some other tools they do not make anything. Nevertheless, they are essential. Generally they are bought and used as four of a size. The major disadvantage is that good iron G cramps are very expensive for what they do, and because four are required, that cost is multiplied four-fold. Apart from the cost, iron G cramps have another disadvantage. They can easily damage the work; consequently wood blocks must be used to prevent this. Juggling these while the glue sets can be a problem for the single-handed worker. The G cramp with its swivelling foot cannot give that light nip at the very tip as can many of the cramps illustrated later. Though obviously G cramps have very great strength, it should be remembered that good joints require only to be pulled, not crushed together.

Simple Handscrew

These tools are much less common than they were a generation ago. Nevertheless they have several advantages over the much more numerous G cramps. They are lighter in weight, they do not damage the work and, of course, they can be made. Jaw length can vary between 12" (300 mm) and 4" (100 mm). They are usually square in section and are made from any close-grained hardwood. The screws can be of wood, if a wood screw box is available, or can be of bought metal screwed rod. The latter would be of a smaller size. The metal screws can be screwed, glued and even pinned into chisel-type handles and wood screws can be similarly fitted if it is required to cut out some of the woodturning.

It must be stressed that both the threaded holes are in the same jaw, in this illustration the lower one. In use the through screw makes the preliminary grip then the second shorter one screws into a cavity in the upper jaw, thus increasing the pressure.

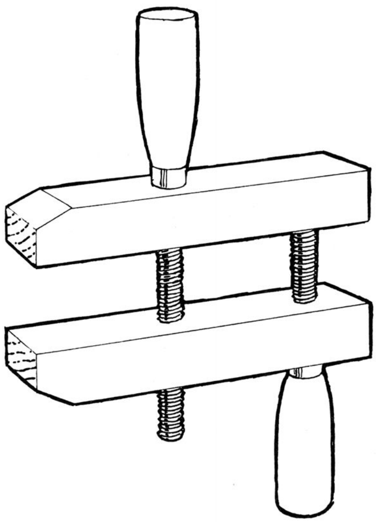


Fig. 1.

Another Simple Handscrew

This derives directly from the traditional wooden handscrew, and from the metalworkers' "Toolmakers' clamp." In addition to the advantages already stated, the handscrew can grip in a depression or confined space, particularly useful in repair work. A variety of sizes is possible using threads of 5/16" (8 mm) or 3/8" (10 mm). The positions of the screw holes in relation to the sizes of block is shown in Fig. 2.

Prepare a piece of dense hardwood for the jaws. This should be just over twice the jaw length and planed to the finished width and thickness. Saw to produce the two jaws and square one end of each by shooting board or disc sander. Cramp them together and mark the centre lines for the holes. Separate and square the lines onto all four faces. On one jaw gauge the centres for the cylindrical nuts. Note the positions of these centres. They are not central in the jaws. Drill these holes using a sawtooth, dowel or lip and spur bit. The en-

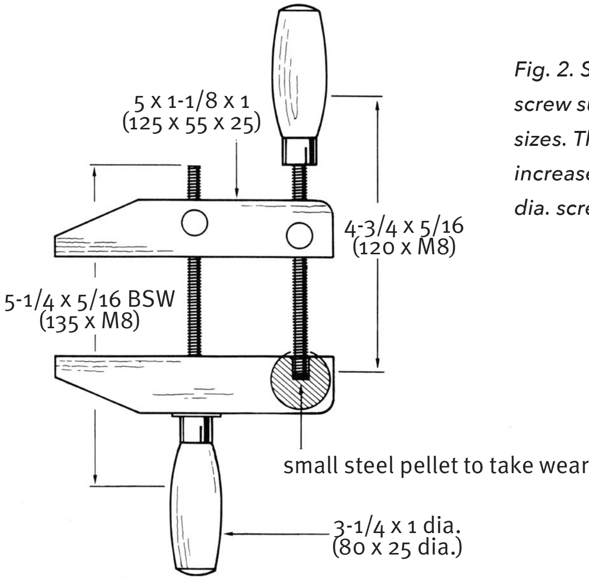
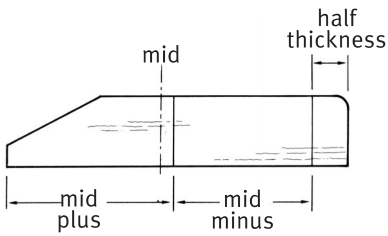
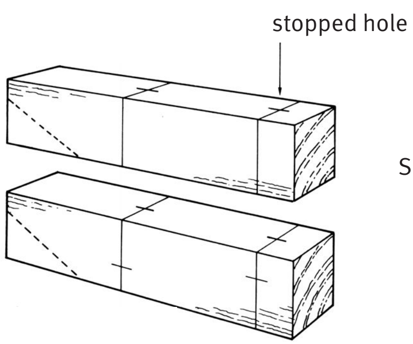


Fig. 2. Simple hand-screw suggested sizes. These may be increased using larger dia. screwed rod



Planning handscrew jaws



Simple handscrew, marking out

gineers' twist drill will not start accurately enough. If this is the only tool available, put through a small pilot drill first. If working entirely by hand, bore from both sides to ensure squareness and avoid later twist when the tool is assembled.

The holes for the screws are marked centrally on the other (top) face then drilled. Note that one hole does not go through. Saw and plane the tapered jaws and round off the back corner slightly. The wood jaws, now complete, can be treated with linseed oil or given several coats of shellac or polyurethane varnish.

Turn or file up two cylindrical nuts slightly shorter than the jaw thickness. Drill centrally then tap for the selected thread. Cut the screws to length and clean up the ends. Clear any burr here by running on an ordinary nut. Make a small metal pellet and drive this into the blind hole.

The handles may be turned or benchmade to a hexagonal form. They are best drilled in the lathe. Grip the handles in the vice and cut the internal thread using the taper tap only. Force in the screwed rod, using two locked nuts. Turned handles can now have two flats planed on them. Assembly is quite straightforward. Finally, close the jaws and trim off any projecting end.

In use try to keep the jaws parallel. First tighten the centre or clamping screw. Then apply pressure with the outer or pressure screw. With a little experience, the operation is quite quick. Grip the centre handle with the left hand and the outer one with the right. Now clockwise rotation of the right hand tightens the jaws.

Two Easy Cramps

The following two cramps, the "Handscrew" and "An Adjustable Cramp," are both easy and cheap to make yet are really useful cramps to have about the workshop. Furthermore, they need neither special equipment nor skill in metalworking. All the requirements can be bought from a good hardware or DIY store. The reader is recommended to make these cramps four at a time.

The materials to be purchased for these cramps are lengths of screwed rod, 3/8" BSW or M10, hexagon nuts and washers to suit and 4" file handles.

Handscrew

Fig. 3 closely follows "Another Simple Handscrew." Produce the jaws, accurately square and to size. Having cramped them together, mark the hole centres. First complete the top jaw of the drawing. Preferably using a sawtooth bit or a flatbit, bore the two holes for the nuts. These are 5/8" (16 mm) which is the size across the flats of the nut. The depth is slightly more than the nut thickness. On the same centre, drill through with a 3/8" wood drill. Enlarge these through-holes to give a loose fit either with a large twist drill or with a round file. Using a piece of the screwed rod, a hexagon nut and a large-diameter washer, force a nut into each hole.

The lower jaw has one oversized through-hole and one blind hole – the hole into which a 3/8" steel pellet is forced.

The file handles are best bored in the lathe. Tap them 3/8" (M10) to a depth of 1-1/2" (40 mm). A tap suitable for a limited use in wood can be made by filing four tapered flats on a piece of screwed rod and then fitting two lock-nuts, very firmly tightened. With two lock-nuts temporarily on each screwed rod, two handles can be forced on. Assembly is straightforward. Remember that the scrap screw needs a washer under the ferrule.

It is unlikely that the nuts will work loose. If this does happen, thoroughly de-grease and return with a dab of epoxy resin glue. In use, aim to keep the jaws parallel for the most effective grip.

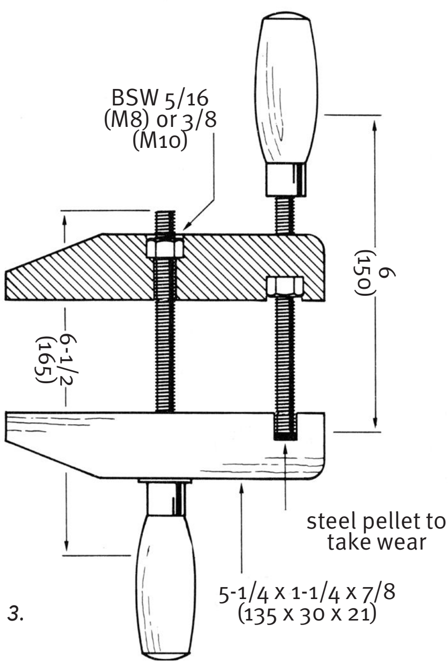


Fig. 3.

Light Board Cramps

The tool detailed at **A** was originally designed to be used as in **B** to prevent spelching or splitting off when planing end grain. It is lighter, more convenient and more effective than struggling with a heavy sash cramp. The hardwood block is slightly drilled to take the screw end. A refinement is to put a steel disc at the bottom of the hole to prevent wear.

Light boards can also be glued up, using two or three of these cramps as in **C**. Lengths can vary to suit the work most commonly done and 3/4" (20 mm) and 1" (25 mm) capacities are probably the most convenient. Suggested dimensions are shown at **D**.

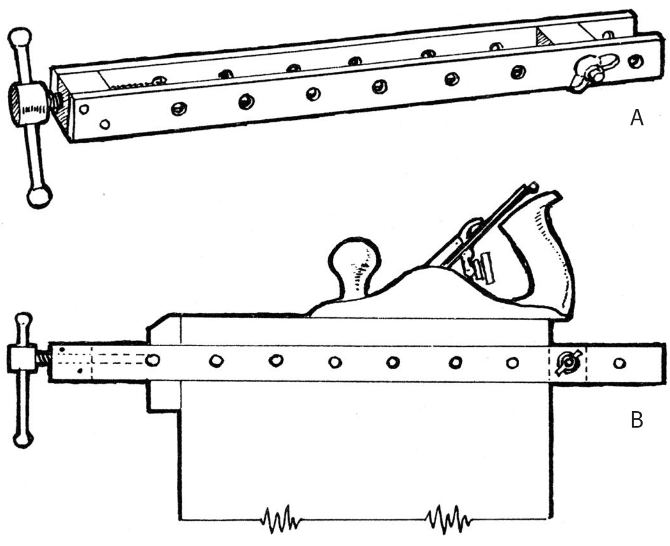
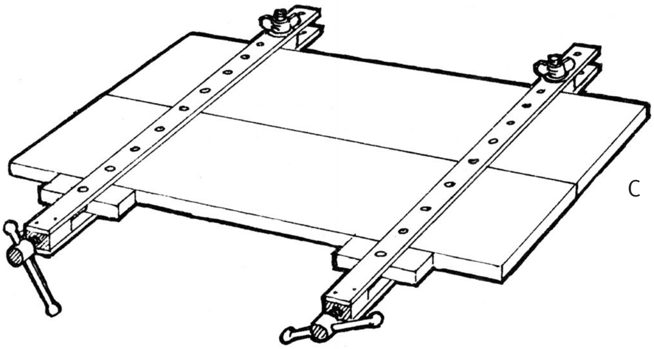
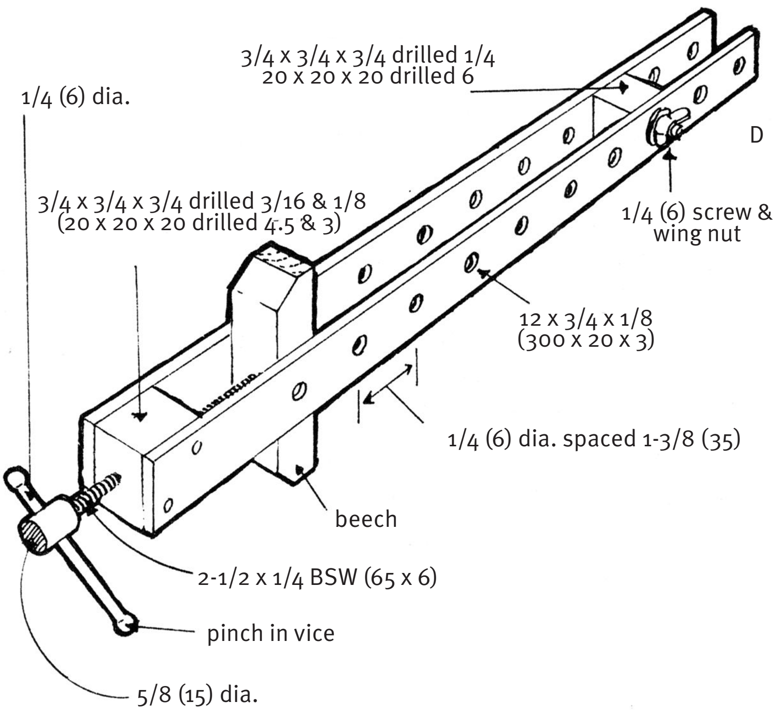


Fig. 8.



C



3/4 x 3/4 x 3/4 drilled 1/4
20 x 20 x 20 drilled 6
1/4 (6) dia.
D
3/4 x 3/4 x 3/4 drilled 3/16 & 1/8
(20 x 20 x 20 drilled 4.5 & 3)
1/4 (6) screw &
wing nut
12 x 3/4 x 1/8
(300 x 20 x 3)
1/4 (6) dia. spaced 1-3/8 (35)
beech
2-1/2 x 1/4 BSW (65 x 6)
pinch in vice
5/8 (15) dia.