

# WHAT TO KNOW ABOUT TOOLS: APPLIANCES USED WITH PLANES

There are many useful additions to the tool kit that the reader can make up for himself. The shooting board, the use of which is described here, is one of them. Details of other equally handy items will appear next month.

In special appliance in its use; an experienced craftsman can manipulate it with perfect success. There are occasions, however, when the use of a specially designed appliance is not only an advantage, but may even be essential. In any case, it will invariably save a great deal of time

#### SHOOTING BOARDS

Perhaps the most obvious of these is the shooting board. It is used for two distinct purposes. The first is in trimming the end of a piece of timber in which it is required that the work must be square in both directions, width and thickness. The second is in planing the edge of a long side in which the edge must be made straight in its length and square in its thickness. I mention these as two distinct uses chiefly because the manipulation of the plane is rather different in the one case from that in the other.

First, however, a word about the shooting board itself. There are many sizes in which it can be usefully made,

and the serious woodworker is advised to set himself up with two at the first convenient opportunity. The one might be, say, 2 ft. long, and the other 5 to 6 ft. (The exact size does not matter.) The small one is used for trimming the ends of timber and for small work generally, whilst the other comes in for long edges.

Fig. 1 shows the general construction. It needs to be fairly heavily built even the small one—because it receives a considerable amount of jolting, especially when end grain is being trimmed. There are two pieces of flat wood fixed



**FIG. 1.** THE SHOOTING BOARD IN USE FOR TRIMMING. Note that the lower corner of the upper board is placed away at a slight angle as at **B**. If this were not provided the dust collecting in the angle might cause the plane to work out of truth.



together, and the inner edge of the top piece is planed at a *slight* angle so that there is no danger of the plane removing shavings from it (see B).

The bottom corner is planed away at about 45 deg. to the extent of about 1/8 in., the purpose of which is to form a dust trap. Dust collecting in the angle might easily throw the plane out of truth. The stop is let into a groove about 3 ins. from the end, and it is screwed in. A good plan is to make both groove and stop slightly tapered so that a good driving fit can be made (A). It is the groove which holds the stop in position. The screws just prevent it from rising. Two or more cross battens should be screwed to the underside to prevent the board from warping.

We may now turn to the two uses of

the board. In the first, that of trimming the ends of wood, since they must be square in both width and thickness, it is obvious that the wood must be held tightly up against the stop so that it is exactly at right angles with the plane. Furthermore, the sole of the plane must slide along the edge of the top board. The wood being trimmed is held against the stop with the left hand and a steady outward pressure maintained so that it is fed up to the plane. Fig. 1 shows the shooting board in use for this kind of work. Since it is generally end grain that

The shooting board is invaluable for thin wood.

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is being planed, precautions have to be taken to prevent splitting out. One of these is to chisel off the back corner, but it often happens that this is impracticable because this would spoil the work. In this case the better plan is to put a spare piece of wood at the back of that being planed as shown in Fig. 1. If anything it should be slightly thicker, and it must obviously be perfectly parallel. Its back corner is chiselled off because the plane removes shavings from it as well as from the work. Its support effectively prevents the latter from splintering out.

Turning now to the second use of the board, that of making the edge straight and square, it is apparent that the stop merely answers the purpose of a stop only—that is, it simply holds the work still whilst the plane is being used. Its squareness is of little importance. Furthermore there is no need for the plane to be guided by the edge of the top part of the board. For one thing it is seldom practicable to hold the work up to the plane and to keep the latter against the edge at the same time, especially when large work is being dealt with. For another, there would be no advantage in doing so since one can *feel* the run of the plane much better when it bears against the work only. It is treated in much the same way as when wood is planed in the vice, shavings being removed from the centre first.

There is one point to note in the use of the shooting board for planing joints. Theoretically the edges should be planed square automatically so that the two parts of the joint should be in alignment when put together. As a practical matter this seldom happens. Possibly the side of the plane is not quite square with the sole, or maybe the board itself is not perfect. Whatever it is, it frequently happens that the edge is a trifle out of square. This, however, does not matter in the case of a joint if the simple precaution is taken of planing the one piece with the face side uppermost, and the other with the face side downwards. In this way the two angles cancel each other out so to speak as shown in Fig. 2.

It will be realised that the great advantage of the shooting board, apart from trimming ends, is in planing the edges of thin wood. If the latter were placed in the vice the plane would inevitably wobble when used, so that it would be extremely difficult to keep the edge square, especially if the wood were extra long. When the shooting board is used, the wood lies flat and the plane is supported on its side. The same obvious advantage maintains when veneer is being trimmed. In this case a flat batten is placed over the veneer to keep it flat and prevent buckling.

A pitfall to be avoided is when the wood has warped somewhat. It may throw the angle of the edge rather badly out. Fig. 3 explains the idea. At A the wood leaves board where the plane works so that the edge is bound to be at a false angle. It can be largely corrected by pressing the wood firmly down right at the edge as at B so that the plane sole really runs radially with the curve of board and is thus square.

At C the wood is hollow side

downwards and once again the edge is necessarily out of square. The only method of correction is to press the work heavily down as at D. This flattens it and brings the plane square with the edge.

Sometimes it is necessary to trim the work at an angle other than a right angle. If this should be 45 deg, the mitre shooting board (to be discussed later) is used. For an odd angle, however, the best plan is to place a tapered block against the stop as shown in Fig. 4. The required angle is first planed and the stop then temporarily pinned in position. The pins serve merely to keep it still, the stress being taken by the stop. Any number of pieces can be trimmed to exactly the same angle.

If an edge has to be at an angle in its thickness the device shown in Fig. 5 can be used. A flat board is mounted upon two or more tapered blocks, and the whole thing fixed to the shooting board with screws. A stop must be fixed at the one end in the usual way. It will be realized that a compound angle in which both the width and the thickness are at an angle can be planed by combining the two methods as shown in Fig. 6.

# POINTS TO KNOW ABOUT: - SHOOTING BOARDS -

Although the shooting board is a well-known appliance in the workshop, we are frequently asked by readers for more information about it, and we therefore give here the chief types and their use.

THE purpose of a shooting board is that of planing the edges of thin wood, either to form butt joints, to make the edge straight, to trim an end square, or to form a mitre. Normally the edge is made square, though in special cases it can be at an odd angle, as we shall see. If you tried to plane the edge of a piece of thin wood in the vice it would be difficult to hold the plane square and it would be liable to wobble. When the shooting board is used, the wood is held flat on the upper step, and the plane is worked on its side on the lower step, all wobbling being thus eliminated.

**Types of Shooting Boards**. The simplest form of shooting board for square trimming is given in Fig. 1. It can be of any length from about 18 ins. upwards in accordance with the size of the work to be trimmed. The upper step might be

from 4 ins. up to about 6 ins. wide, and the lower one should project far enough to take the largest plane in use—say, 4 ins. At the far end a stop is fixed, this fitting in a groove. The near end is at right angles with the working edge, but it is tapered in width, partly to simplify fitting, and partly to enable it to be driven in with a dead tight fit. After being knocked in, screws are driven in and any projection is trimmed off flush.

There are one or two points to note.

Firstly the heart sides of the two pieces face each other, so that in the event of shrinkage the twisting tendencies are opposed. Then again, ledges or battens are screwed to the underside, also to help in keeping the parts flat. Along the under-corner of the top platform a chamfer is worked so that any dust which may accumulate will not interfere with the true running of the plane. So far as thickness is concerned, the upper step should bring the work to about the middle of the plane—7/8 in. wood is about right.

A rather more elaborate type of square board is given in Fig. 2. The two parts are fixed to two or more notched crossbattens, a slight gap, say, 1/8 in., being allowed between them to allow dust to escape. Such a board is more likely to keep flat but will not produce better work. If desired, a detachable mitre stop can be fitted with dowels, though generally it is more satisfactory to have a



# VARIOUS TYPES OF SHOOTING BOARDS, SQUARE AND MITRE, AND WAYS IN WHICH THEY ARE USED

- FIG. 1. SIMPLEST FORM OF SQUARE SHOOTING BOARD.
- FIG. 3. MITRE SHOOTING BOARD
- FIG. 5. DONKEY'S EAR MITRE SHOOTING BOARD
- FIG. 7. WASTE PIECE TO PREVENT EDGE FROM SPLITTING
- FIG. 9. WOOD PLANED AT ANGLE IN THICKNESS
- FIG. 2. ALTERNATIVE PATTERN WITH DETACHABLE MITRE STOP
- FIG. 4. SQUARE BOARD WITH ONE END RAISED
- FIG. 6. BOARD FOR WIDE INTERNAL MITRES
- FIG. 8. WOOD PLANED AT ANGLE IN ITS WIDTH
- FIG. 10. ANGLE IN BOTH WIDTH AND THICKNESS

separate mitre shooting board, as in Fig. 3. The construction of this is similar to that of Fig. 1, except that the stop recess is cut in at 45 deg.

Yet a third kind of square board favoured by some workers is that in Fig. 4. In this one end is raised so that as the plane passes forward a different part of the cutter comes into operation, thus spreading the wear over a wider length of edge. It is satisfactory providing the cutter of the plane is sharpened with its edge perfectly straight. Otherwise the shaving will be thicker in one part of the cut than in another.

Mitre Shooting Boards. The board normally used for small mouldings and for wood mitred in its width has already been dealt with in Fig. 3. When wood is mitred in its thickness, however (as in the case of, say, a plinth) the donkey's ear board in Fig. 5 is used. The construction is obvious from the illustration. The piece beneath, running along the length, is to enable the board to be held in the bench vice. External mitres are trimmed in this way, the wood being held so that the plane always cuts into the moulding, so avoiding splitting out. Internal mitres need the board in Fig. 6. The stop of this could with advantage be fixed in the middle instead of at the end so that the

moulding could be placed at either side of the stop, enabling the plane to work into it. Note the dust groove.

Use of the Shooting Board. When the end of a piece of wood has to be trimmed square it is held against the stop, and the plane worked so that its sole bears against the edge of the upper, step. As the plane is worked, the wood is pressed steadily against the plane. To prevent the far corner from splitting, the corner can be chiselled off. Should, however, the wood not be wide enough to permit this, a waste piece with its corner chiselled can be held against the stop as in Fig. 7. Thus the far corner of the wood is supported and is so prevented from splitting. Note that the waste piece should be somewhat thicker than the wood being planed.

In the case of a joint being planed the method is somewhat different. The wood should overhang the edge of the upper step by about 1/4 in. or so. The joint is planed true by virtue of the trueness of the plane itself. The latter does not touch the upper step. Remove shavings from the centre of the wood until the plane ceases to cut, and then take a couple of shavings right through. If the plane is accurate (and is long enough) the joint will be straight. It may be necessary to take an extra shaving where needed, but it will not be much out. It is better to rely on the truth of the plane rather than to keep it running along the step unless the wood is quite short.

Incidentally, always have one board face side uppermost and the other face side downwards. In this way the two will go together in alignment, because if the edge is not dead square (possibly owing to the plane side not being square with the sole) the two angles will cancel out, so to speak.

**Odd Angles**. Sometimes several ends have to be trimmed at an odd angle, and, when the angle runs across the width, a piece of wood planed to the required angle can be placed against the stop as in Fig. 8. Thus any number of pieces can be planed to the same angle.

When the angle is across the thickness, an angle piece can be used as in Fig. 9, the wood being placed above it. Fig. 10 shows how compound angles which occur in both width and thickness can be dealt with. The two angle pieces are prepared to the required angles first, and the wood placed as shown.

# STOP GAUGE FOR SHOOTING BOARD

A reader is engaged on a piece of Work which involves trimming fairly large numbers of rails all to the same length, and enquires whether there is a simple way of doing this without a lot of measuring and testing. As it only involves simple additions to the mitre block and shooting board, and as the idea will prove useful on many occasions, we give it here in detail.

Assuming that the rail stuff is prepared in long lengths it is necessary first to cross-cut it with sufficient allowance for trimming. To the underside of the mitre block screw an extension or arm at the free end of which is fixed a stop and a support on which the wood can rest. The position of the arm can be so arranged that when the wood is crosscut there is comfortable allowance for trimming (see Fig. 1). It is then merely a matter of holding the wood against the stop and sawing.

Fig. 2 shows the simple device for trimming. The arm is let into and screwed



**FIG. 1.** DEVICE FOR SAWING WOOD TO A COMMON LENGTH



FIG. 2. ADDITION TO SHOOTING BOARD FOR TRIMMING

to the shooting board. To form a stop a piece of wood is rebated at the underside and fixed in the required position with a thumbscrew. First trim one end of all

the rails without using the stop. Then, holding one rail with its trimmed end against the stop, adjust the latter so that two or three shavings with the plane will trim the rail to exact length. All the rails can then be trimmed.

### - NEW FORM OF SHOOTING BOARD

We have made up a shooting board from particulars supplied by a South African reader, and, as it has proved successful, we pass on the idea. It is specially suitable for beginners in that it automatically gives square shooting both horizontally as well as vertically, and there is no danger of the corner splitting when a shaving is taken right across end grain.

T will be seen that the chief feature of this board is that the plane is fixed to a panel which is free to slide back and forth in grooves. Its movement is therefore controlled. It can move in a straight line only, and always at right angles with the stop block. Thus, when an end is being trimmed it is bound to be square providing that the wood is held firmly against the stop block. When an edge is being planed, as when making a butt joint in thin wood, it is only necessary to maintain side pressure on the wood so that it is kept up against the sole of the plane and is fed across as shavings are removed.

To prevent the plane from removing shavings from the edge of the upper board, a thin strip is screwed to the sliding panel where it also provides a second



**FIG. 1.** USE OF THE SHOOTING BOARD FOR TRIMMING END GRAIN Note that the plane is a fixture on the sliding panel, though it is easily released when necessary. It can move in a straight line only since the sliding panel controls its movement



shoulder and reduces wear at the groove. This means that the plane stands away from the upper board by the width of the strip (1/4 in.), and, to allow for this, the stop block is made adjustable so that it can be set level with the plane sole. Thus the wood being trimmed is supported right up to the corner so that shavings can be taken off end grain without the corner splintering out.

Screwed to the sliding panel are thin pieces shaped to coincide with the shape of the plane. The rear piece has one screw only so that it can pivot away from the plane when it is necessary to remove the latter. It grips the plane when the cam (Fig. 2) is turned. A bolt passing through the front shaped piece and the sliding panel holds the plane rigidly down, a flange or wide washer bearing on the side of the plane.

The exact sizes of the board are not important; nowadays it is largely a matter of what material is available. In the board shown here 3/4 in. stuff is used for the upper board, sliding panel, and guide strip, but 7/8 in. would do quite well. The important point to note is that the grooves in the upper board and guide strip are so arranged that the sliding panel stands up by at least 1/16 in. as in the section in Fig. 3. This ensures that it clears the cross-pieces which hold the whole thing together. It is an excellent plan to draw a cross section of the board in full size so that the groove positions can be marked in exactly.

The Main Board, Begin with the upper board which is 2 ft. 6 in. long by 5 in. wide by 3/4 in. thick. Plane it true and glue and screw to the lower side the thicknessing piece, setting the screws back so that they clear the groove to be worked at the edge. Once again plane the jointed edge, testing to see that it is dead straight and square. Prepare also the sliding panel and guide strip, making both perfectly true. With the mortise gauge mark the positions of the grooves and tongues. Note that the tongue which fits into the upper board is barefaced at the top. As the sliding panel has to stand up from the cross-pieces by at least 1/16 in., the groove to take the

tongue will have to cut into the joint by at least 1/16 in., as shown in Fig. 3. The position of the other tongue and groove is so arranged that the sliding panel has the same clearance throughout its width. It is better to arrange the groove somewhat above the centre. Plough the grooves and form the tongues by working rebates. Fit them so that the sliding panel moves freely but without any play.

The stop block fits in a groove about 1/8 in. deep. The block might be about 1-1/4 in. square. Clearly the groove must be dead square, and to ensure this the marks should be cut in with chisel and square. If a sloping groove is chiselled on the waste side a groove is formed in which the saw can run.

Chisel the bulk of the waste and finish off with the router. The fixing bolt (about 3/16 in. diam.) passes upwards through the groove, the square or hexagonal head being recessed. To allow for adjustment the stop block has a slot about 1/2 in. long instead of just a single round hole. The best way is to bore a hole at each end and chisel away the slot to join them. Mark out the end hole positions and square round to the underside so that the holes meet in the thickness of the wood. A washer is needed beneath the nut to prevent the latter from biting into the wood.

Assembling. Cut out the three crosspieces, sawing the notch and trimming with the bullnose plane. Screw the whole thing together with the sliding panel in position to give the correct distance apart. It is advisable to cramp the crosspieces so that they are square when the screws are inserted. Carry out any final fitting in the sliding panel and screw on the 1/4 in. by 3/16 in. strip level with the upper board. Candle grease rubbed on the bearing surfaces is a good lubricant.

Two shaped pieces have now to be prepared to hold the plane in position on the sliding panel. They can be about 1/4 in. thick. That at the front is screwed rigidly down, but the other has a single screw near the rear so that it can be turned when the plane has to be released. This necessitates the back corner being rounded so that it clears the thin strip against which it bears. A cam is pivoted nearby, and when this is turned it forces the back shaped piece up against the plane. The fixing bolt is right at the curved edge of the front shaped piece. A wide washer or flange beneath the nut holds the plane in position.

One last point to note is that the sides of some planes are not perfectly at right angles with the sole, and this would naturally prevent the work from being square. It can be corrected either by planing the top surface of the sliding pane or by inserting a strip of veneer to tilt the plane.

### USEFUL FORM OF SHOOTING BOARD

This combined shooting board, mitre shoot, and "donkey's ear" can he a real asset to the craftsman. It will last a lifetime and prove invaluable in the construction of small photograph frames, and for bench work generally. Skill in its various uses quickly comes with practice, and the parts are easily interchanged.

MANY home craftsmen do not bother about the shooting board, but no man who has experienced its use would be without one. This design of board serves several purposes. It is as well to make it of prime timber. Rift sawn stuff is the best, as it resists abrasion better, and tends to stay flatter. Possibly a



**FIG. 1.** EXPLODED VIEW OF THE BOARD If well made this board should give many years of reliable use

couple of short ends may be procured from firms specialising in flooring timbers. Note how the annual rings run in rift sawn timber (Fig. 5, C). Fig. 1 is an exploded drawing of the shooting board, giving main sizes. The length may be increased if desired.

The 3-in. wide board (A) takes the bearing of the plane. Its top surface must be planed absolutely true and checked with winding strips. Three bearing pieces are tenoned into the board (A), and it is as well to run the mortises right through the board. Fit the bearers (B) and glue and cramp them home, securing by wedges from the front edge if the mortises have been taken right through (A). When the framework is dry, plane it flat and check its truth again with winding strips.

If board (C) is planed true and even in thickness, its top surface should form a plane parallel with that of board (A) when it is fastened to the runners. To secure board (C) in place insert screws through holes and slots in the bearers as shown in Fig. 1. It is inadvisable to make a shooting board by simply attaching a narrow board to a wide one, since air is excluded from the contacting surfaces and twisting or warping may result.

Furthermore the three bearers (B) act as clamps to board (C) holding it flat.

Stop. The slot for the stop D is a diminished dovetailed housing, details of which are given in Fig. 5 (A), and (B). The stop itself is made longer than the width of the board, fitted, and tapped tightly home. The end that overhangs board (A) is then cut so that the stop fits flush with the edge of board (C). Do not be satisfied until a good fit is obtained. Check the squareness of the stop with the edge of board (C). This may be done with the try-square if you know your square to be accurate, but woodworkers' squares are notoriously "near enough" and if in doubt a celluloid set-square can be used. Now fit a batten to the underside of the three bearers in order that the shooting board may be held in a vice. This is shown in Fig. 2.

**Mitre Shoot**. So much for the plain shooting board; the adapting block for the mitre shoot is shown in Fig. 3. This

should also be checked with a 45° set square as shown. The block is screwed to board (C) from underneath, and should be tight against the stop.

Donkey's Ear. Fig. 4 shows the adaptation for the donkey's ear. This consists of a built-up block (A) with a piece (B) screwed to its end to act as a stop. 1-in. timber is suitable for the block, the pieces being glued and screwed together. The width of the timber need be only 4 or 5 in. It is as well to make the block longer than required, and saw it to size and shape. The bottom face is most difficult to true, and should be planed first and checked for truth with winding strips. Next plane the far end square and vertical to the base, and true the slant-face last. The piece (B) is screwed to the end of the block and, by fitting against the main stop of the shooting board, is reinforced to take the thrust of



FIG. 5. DOVETAIL GROOVE TO HOLD STOP

the plane. Screws fasten the block to the board as before.

The donkey's ear must be true in two directions. The 45° angle may be checked with the set square against the sole of the plane. The 90° angle, i.e. the angle between the stop and the sole of the plane, can also be checked with the set square.



### AN IMPROVED SHOOTING BOARD

We are indebted to a reader, Mr. E. W. Harding of Bromley, Kent, for this suggested adaptation of an ordinary shooting board.

MANY users of shooting boards have no doubt found that the sideways pressure on the plane when in

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use causes it to tilt slightly as shown in (C), Fig. 1. This, in turn, planes away the face of the stop so that eventually

it cannot effectively prevent splitting of the end grain when this is being planed, and stuff cannot be planed dead-square.





The device shown in Fig. 1 consists of a rail, either 1-1/4 in. square, or rectangular section, which is screwed on top of two blocks. As seen from (A), the device is assembled in the first instance with the faces of the rail, the stop and the board all in one vertical plane. To render the apparatus effective, a cut is made with the plane in the normal position and this creates a wide channel as shown at (B). The width of this channel will be the width of the cutting iron, and the depth the amount by which the cutting iron is set. Once this channel has been planed out, no further planing away is possible. A 2-3/8 in. steel jack or fore plane is recommended for use and the device should be made to fit it. Such a plane enables wood up to 1-5/8 in. thick to be planed comfortably and also provides a good weight behind the cut when planing end grain.

It is obvious that squareness is assured by adopting this method, and as the stop is fixed hard against the block, there is no need to hold a waste piece when planing end grain. A quantity of shooting boards were adapted ten years ago and they are still in good condition although used daily,

Lastly, the strip screwed to the underside of the device (shown in A), runs the whole length and is held in the vice when in use, the board being also held against the bench stop.