THE WOODWORKER

THE WOODWORKER

The Charles H. Hayward Years: 1939-1967

First published by Lost Art Press LLC in 2016
26 Greenbriar Ave., Fort Mitchell, KY 41017, USA
Web: http://lostartpress.com

Title: The Woodworker: The Charles H. Hayward Years
Publisher: Christopher Schwarz
Editor: Megan Fitzpatrick
Design: Linda Watts, Meghan Bates
Research: Megan Fitzpatrick, Phil Hirz, Christopher Schwarz
Digitization: Ty Black
Distribution: John Hoffman

ISBN: 978-0-9906230-8-3
First printing.

This book was printed and bound in the United States.

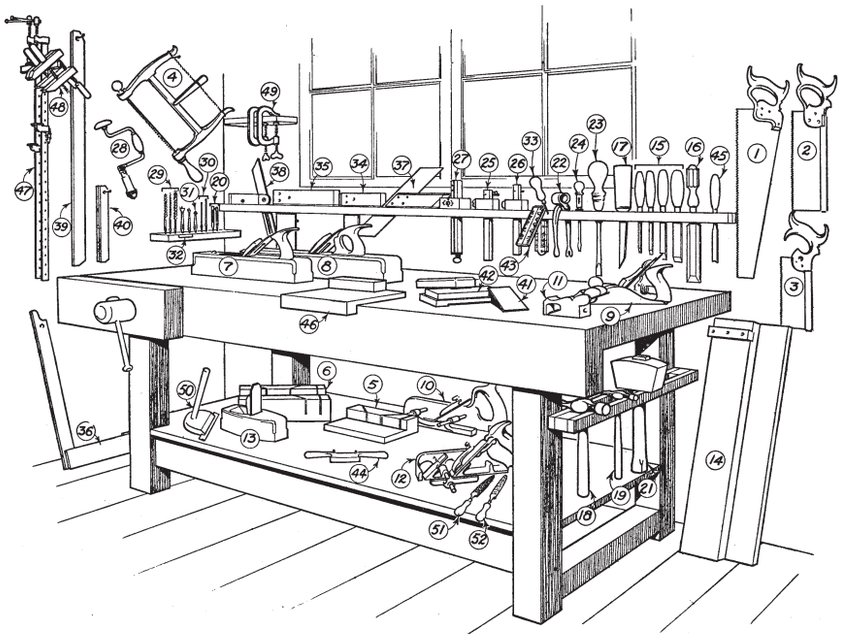
Table of Contents

FOREWORD TO 'THE WOODWORKER: THE CHARLES H. HAYWARD YEARS'

There is little doubt that Charles H. Hayward (1898-1998) was the most important workshop writer and editor of the 20th century. Unlike any person before (and perhaps after) him, Hayward was a trained cabinetmaker and extraordinary illustrator, not to mention an excellent designer, writer, editor and photographer.

Add to all that the fact that Hayward was, according to Robert Wearing, a "workaholic," and you have a good picture as to why we spent almost eight years laboring to bring this book to life to honor his work.

As editor of *The Woodworker* magazine from 1939 to 1967, Hayward oversaw the transformation of the craft from one that was almost entirely hand-tool based to a time where machines were common, inexpensive and had displaced the handplanes, chisels and backsaws of Hayward's training and youth.



While Hayward didn't mind machines (he wrote the book "Light Machines for Woodwork" (Evans Bros. 1952) after all), he never stopped filling the pages of his magazine with information on hand tools, joinery and finishing that is difficult to come by today, even with the Internet to help us.

The early 20th century was an important time in the history of handwork because we finally had automated machines that could turn out well-made woodworking tools at prices that the working class could afford. With these machines, firms such as Stanley and Record flooded the world with tools that allowed almost anyone to be a woodworker. (It was, of course, these automated machines that almost killed hand-tool woodworking, but let's set that aside for a moment.)

Hayward and his contributors took great pains to teach readers how to use these hand tools, whether it was a jack plane, a Stanley 45, a metallic side-rebate plane or a quirk router. This sort of information was rarely written down, and much of it was lost in decaying magazines or cemeteries.

The book you hold in your hands, the first of several volumes, seeks to reprint a small part of the information Hayward published in *The Woodworker* during his time as editor in chief. We have tried to organize it into sections on tools, techniques and projects that you will find useful. But most of all we sought to capture the spirit of Hayward's tenure at *The Woodworker* without excessive editing or watering down of the text.

As a result, you will find stylistic inconsistencies throughout. Should a tool we call a "straightedge" be written as "straightedge," "straight-edge" or "straight edge?" All three appear in the text, as do a thousand other inconsistencies that we could have unified into some homogenous whole.

But we didn't. The English language and the tools it describes are always in flux. And so we reproduced all of the text exactly as it appeared when published. Yes, some of it might seem sexist in the 21st century. Some of the words are spelled oddly. And sometimes simple articles are dropped, as was common at the time ("Take gouge and mark…").

Like it or not, writing is like that. Writing styles, punctuation and even grammar rules change. So we left the text as-is for you to interpret and enjoy.

That is not to say we had an easy time editing this project.

The genesis of this book occurred before John Hoffman and I formed Lost Art Press. We were frustrated with the books

available to teach us the details of handwork. We decided to chase after republishing Robert Wearing's "The Essential Woodworker" and some of Hayward's classic writings. Getting Wearing's book revised and republished was easy – Wearing is still alive and he was happy to help.

But Hayward had died in 1998, so things were more difficult than we could have imagined.

In the end, we made a deal with the current owners of *The Woodworker* magazine to republish the articles in this volume. That was the easy part. Which articles? And how should we present them?

A group of us took on the project on nights and weekends. Megan Fitzpatrick, Phil Hirz and I spent weeks combing through the original texts, compiling the articles that were important and organizing them into something you could read without buying 27 years of rare magazine issues and boiling them down for yourself.

After a couple years of work, Ty Black took on the monumental task of scanning the text and processing all the classic images from the magazines. This process alone took almost a year.

Then we had to double-check all the scanned text and images against the originals. John spent months of his life at the computer comparing the scanned text to the originals from Hayward's typewriter.

And then it needed to be designed so you could easily digest it. Graphic artists Linda Watts and Meghan Bates both spent months puzzling together all of the text and images into what you have here.

There were many more steps, but I won't bore you with them. What's important to know is this: We tried to reproduce faithfully the articles that Hayward wrote and edited. There are stylistic inconsistencies. If you care about these small details, this book is not for you. Return it to us for a full refund.

We hope that you will enjoy "The Woodworker: The Charles Hayward Years." But we mostly hope that it will inspire you to pick up the tools and get busy. As Hayward said in 1980:

"I think that books are useful, but I certainly think that, like anything else, the skill to do comes from actually doing. Books can guide you, explain about techniques, tools, materials, – present ideas, steer you away from pit-falls… Books include a great deal of valuable information but it is up to the reader to apply that information."

We could not agree more. Hayward says his first project was a coffin-shaped bed he built for the family cat as a young boy. And after his eyes had failed him and he could not write, edit or build furniture, he received a visitor in the 1980s who said Hayward was "in his 80s, painting the guttering of his house."

I hope to go to my ultimate reward in the same way.

Christopher Schwarz, publisher
January 2016

Hayward's Life, In Brief

1989: Born Pimlico, London. Apprenticed to the Victoria Street firm Old Times Furnishing Co. with workshops in Bloomburg Street. Hayward spent four years there and then went into the army for three years as a driver in the artillery, riding a horse.

1923: Began his own cabinetmaking business but did not like it. "I was no good at business." Began creating illustrations for "The Wireless Encyclopedia."

1925: Became a contributor to *Handicrafts Magazine* in Kentish Town.

1930: Named editor of *Handicrafts Magazine.*

1935: Named associate editor at *The Woodworker* magazine under J.C.S. Brough.

1936: Writes "English Period Furniture."

1939: War breaks out. Brough flees for Scotland with his ill wife. Hayward named editor of the magazine. He never misses a single issue during the war, despite the lack of raw materials.

1946: Writes "Tools for Woodwork."

1947: Writes "Cabinetmaking for Beginners"

1949: Writes "Woodworkers' Pocketbook"

1967: Hayward retires from *The Woodworker* but continues to write articles for the magazine.

WOODWORKER

TOOLS & TECHNIQUES:
SHARPENING

Chart titles are in italic.

A REALLY SHARP EDGE

Its advantages, how to obtain it, telling when you have it

TO make a quibble, what is a sharp edge? The answer seems obvious, but consider the matter a little. The fine edge you put on a paring chisel; would it be of any use for shaving? Or your razor; would it be successful at chopping wood? Each may be sharp in its way, but neither would be of much use if put to a purpose for which it was not intended. However, here we are concerned only with cutting wood, and we may put down straightway the things that chiefly affect the edge. These are:

1. The steel itself; whether of good quality and correctly tempered.
2. The angle at which it is sharpened.
3. The quality of the edge.

Steel. It is fairly obvious that steel of poor quality is useless. No matter how fine an edge you may put on it, it will quickly become blunt, and all your work will be wasted. With steel like this you can do nothing, and it is better to scrap it straightaway. But even good steel is of no use if not properly tempered, and, although you can do little about correcting badly treated steel, you can always avoid spoiling the temper (drawing it, as it is called) by taking precautions to see that it is ground properly.

Grinding. The enemy of tool steel is heat, and tools for woodwork should always be ground on a wet stone. The water keeps the steel cool. The man who is used to it can generally manage to thin down an edge on a dry grindstone in an emergency, but it is not advisable as a general practice, and in inexperienced hands the steel may be spoilt. If you *have* to use a dry stone, keep a can of cold water handy and dip the tool into it frequently. Equally important, never grind away the steel right up to the extreme edge. Stop well short of it.

Consider what happens. The friction between the steel and the revolving stone causes heat to be generated, and the thin part of the steel (the edge) rapidly heats up. (There is, of course, just as much friction when the wet stone is used, but the heat is absorbed by the water and immediately carried away.) You know how when you put a flame beneath a tapered piece of metal the thin end heats up and becomes red hot first. In the thicker part the heat is absorbed into the body of the metal and thus remains comparatively cool. The same thing happens when the tool is put on the grinding wheel. The thin edge quickly becomes hot—may indeed become red hot—and the temper is drawn.

* * *

A fine edge lasts longer than a coarse one

* * *

The immediate sign of this is that the steel turns blue as in Fig. 1, but it is then too late. The damage has been done. The moral is to dip the steel often into water and to cease grinding well before the edge is reached. Better still, use a wet grindstone, and you can then grind right up to the edge with safety. Incidentally, when you take tools to a grinder insist that they are wet ground. A good grinder will do this automatically, but it *has* been known for a man to put tools on a dry stone.

Most good class tools are made of reliable steel and are properly tempered. Occasionally, however, one comes across a tool which is soft in patches. It may be a fault in the mixture of the steel at one particular point, or it may be due to bad grinding on a dry stone. Often it can be corrected by grinding on a wet stone. The drawing of the temper is generally quite local and caused by the heat generated at the thin edge. If this is ground away— say 1/16 in. or more—it may easily happen that the faulty steel is ground away, bringing good hard steel to the edge. If the whole body of the tool is soft, however, little can be done about it.

Angle. Now comes the angle at which the tool is sharpened, and its shape. In theory the lower the angle the keener the tool, because there is less displacement of the wood being cut. Compare A and B, Fig. 2. At A, as the tool enters the wood after the initial severing of the fibres, the waste has only to be forced slightly out of the way. At B it has to be lifted bodily—in fact it would not deal with a thick shaving at all. You know how much easier it is to knock in a thin, slowly tapered wedge than one which is obtuse. Somewhat of the same applies. In fact, if a thick chip is being removed, the chisel ground at a high angle does not cut in the ordinary sense at all once it has entered the wood. It just lifts the layers purely by wedge action, the wood splitting away ahead of the cutting edge (B).

At the same time it would not do to make the angle too low because the material of the steel would crumble as in Fig. 3. It is therefore a matter of compromise between the two. The angle must be low enough to give a keen edge, yet not so low that it is liable to crumble. To an extent it depends on the work the tool has to do and the wood it has to cut. A paring chisel used to remove fine shavings can be ground at a lower angle than, say, a mortise chisel which comes in for heavy chopping. In the same way, the man who normally works in tough hardwood would find it necessary to sharpen his chisels at a rather higher angle than the worker who reckons normally to use softwood.

Experience has shown that the general angle for paring chisels is about 30 degrees, and 35 degrees for mortise

FIG. 1. EDGE WHICH HAS BEEN "BLUED" BY DRY GRINDING

FIG. 2. EXAGGERATED EXAMPLES OF SHARPENING ANGLES
The thin edge at A continues to cut, whilst at B the wood is merely forced up, the edge not cutting after the preliminary entry into the wood

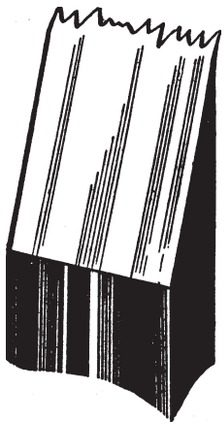


FIG. 3. LIABILITY OF STEEL TO CRUMBLE AT A THIN EDGE

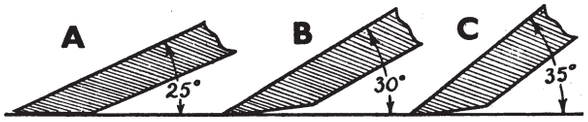


FIG. 4. VARIOUS ANGLES USED IN SHARPENING
A is the grinding angle, B the honing angle for paring chisels, and C the honing angle for chisels for chopping

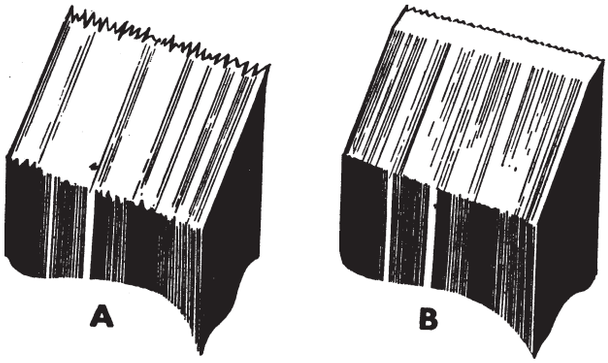


FIG. 5. DIFFERENCE IN QUALITY OF AN EDGE
A shows the coarse "teeth" of a ground edge, and B the fine "teeth" of a honed edge

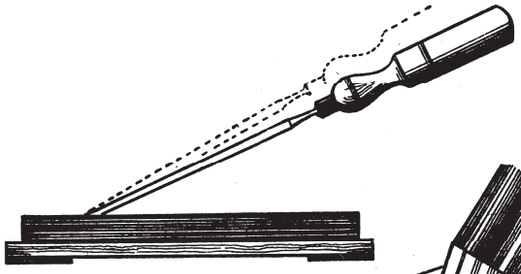


FIG. 6. SHARPENING A CHISEL— ASCERTAINING THE HONING ANGLE

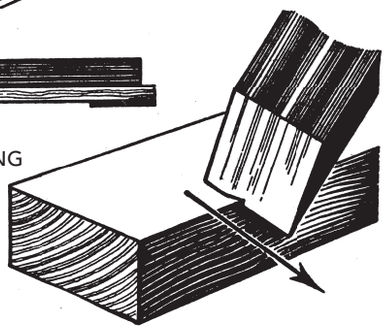


FIG. 7. REMOVING THE BURR ON A BLOCK OF WOOD

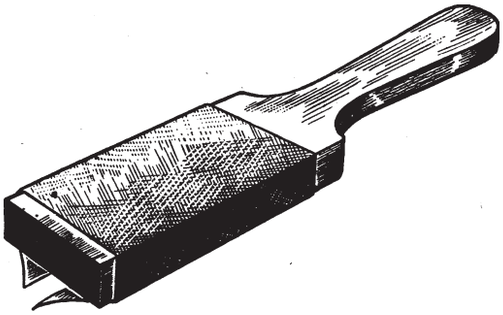


FIG. 8. STROP OF LEATHER GLUED AROUND WOOD BASE

chisels. Both can be ground at a lower angle (25 degrees) because this leaves only the extreme edge to be honed. The idea is shown in Fig. 4.

Quality. By this is meant the fineness of the edge. If you look at the edge of a tool which has been ground it may be sharp in the sense that the grinding has been continued right to the edge, but it is scored with a series of scratches easily visible to the eye, these being caused by the granules of the grindstone which cut their way into the steel. The result so far as the edge is concerned is a jagged line rather like the teeth of an irregularly sharpened saw as at A, Fig. 5.

It is to get rid of these "teeth" that the tool is rubbed on an oilstone, the granules of which are considerably finer than those of the grindstone. This produces the edge shown at B. The "teeth" are very much finer, though they are still there. By rubbing the tool on a still finer stone they are reduced still more, being in fact invisible to the naked eye, though easily discernible under a powerful magnifying glass. It is therefore a matter of using an even finer stone in order to produce a really keen edge, finally passing to a strop dressed with a fine abrasive.

Even so the "teeth" will still be present, but they are so small that for all practical purposes they can be regarded as non-existent. Of course much depends on the use to which the tool is to be put. So fine an edge would be largely wasted on a chisel used for chopping.

There is more in it than just sharpness, however. A tool which has been finished

on a really fine stone and then on a strop will keep its edge longer than one which has been sharpened on a coarse stone. The reason is that the points of the teeth crumble under the cutting strain. As there are clearly many more points in the edge sharpened on the fine stone (B) than in that sharpened on the coarse stone (A), they are able to stand up to the work longer.

Burr. All this, however, is complicated by another detail not yet discussed, that of the burr set up when a tool is sharpened. As the tool is rubbed back and forth on the stone the steel at the extreme end becomes forced up, and can in fact be detected easily by drawing the ball of the thumb *across* the edge at the back. If the tool is reversed flat on the stone the burr will be bent back but will not be detached. Unless it is got rid of it will prevent a sharp edge being produced—even if it *could* be produced it would soon be ruined by the burr being forced back on to the edge as the tool was used. This, however, is a practical matter and is dealt with under the actual sharpening.

The Practical Sharpening. The chisel, having been ground at 25 degrees, is now rubbed on the oilstone. The exact angle is not critical and you can tell when it is approximately right by holding it so that the ground bevel lies flat on the stone, then raising the handle slightly as shown by the dotted lines in Fig. 6. This will bring just the edge in contact with the stone, leaving less steel to be rubbed away and so lessening the work. A fine grade stone of the India, Carborundum, or Unirundum type will give a good edge for most purposes, though for really fine work a still finer stone should be used to finish off. Use a fairly thin lubricating oil, and rub the tool back and forth until you can feel that a burr has been turned up. By drawing the ball of the thumb *across* the edge on the flat side you should be able to detect it.

This is an indication that the edge is sharp, but it does not show the quality of the edge or whether there are any gashes. The best way of testing this is to hold the edge to the light. A sharp edge cannot be seen, whilst a dull one shows up light. If there are gashes the sharpening will have to be continued. When satisfactory hold the back of the tool *flat* on the stone and rub back and forth. This will push the burr back but will not remove it. To ensure the latter draw the edge once or twice across a piece of hardwood as in Fig. 7. This will force the burr away—somewhat to the detriment of the edge, but the subsequent treatment puts this right.

Now rub the bevel once or twice on a really fine oilstone—an Arkansas is ideal—and again reverse flat on the stone. If you have only the one stone you will have to use this. For most purposes it is quite satisfactory, but for a piece of fine paring a fine stone gives a beautiful edge. Finally, to finish off, use a strop. A convenient kind is shown in Fig. 8. It is simply a piece of 3/8 in. wood shaped as shown, with a piece of soft leather stretched around the front and glued at the back. This is dressed with the finest emery powder (such as was used on the old-fashioned knife boards before stainless steel came in) and oil. Alternatively for a medium grade strop use the *fine* paste for finishing when grinding the valves of a car engine. For a really fine finish use crocus powder. Draw the honed bevel flat along the strop twice, then flat on the back. A few rubs in this way will get rid of all traces of burr, and give a superfine edge. It is the method of the wood carver to whom really sharp tools are essential.

To sum up, the attainment of a fine edge involves the following stages:

1. Grinding, in which the unwanted thick part of the bevel is removed on the grindstone.
2. Honing on a medium or fine stone to get rid of the coarseness made by the grindstone.
3. Removing the burr.
4. Honing to a fine edge.
5. Stropping.

It is not necessary to grind (1) every time, or even to carry out (2), (3) and (4). The wood carver, for instance, keeps his tools in order almost entirely by stropping. Only occasionally is it necessary to use the stone. General woodworkers can quite well copy the idea for their paring tools, never letting them become really dull, but giving a few rubs every now and again on the strop.

OBTAINING A KEEN EDGE

Ability to give a keen edge to tools is half the battle in turning out good woodwork—or, to put it more logically, it is practically impossible to do good work with blunt tools

LIKE most things, sharpening edge tools is a matter of compromise. A chisel, say, sharpened at a really low angle would have a fine, keen edge, but it would crumble rapidly in use because it would have little strength. A high angle, although producing a strong edge, would be impossibly laborious to use because of the resistance. The idea is shown in Fig. 2. If only the thin bevel at (A) would retain its edge it would slice its way through the wood. Note how the

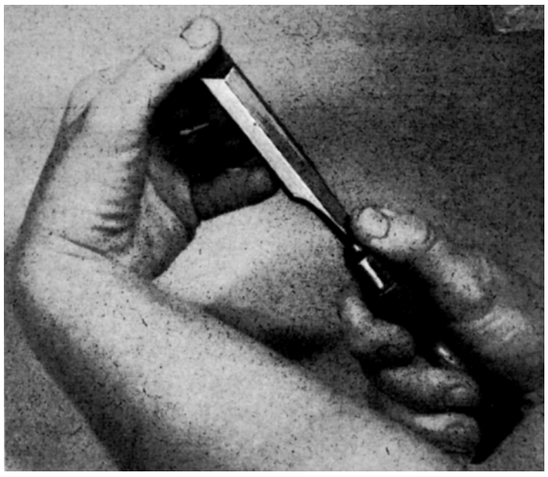


FIG. 1. TESTING AN EDGE FOR SHARPNESS
The thumb is drawn lightly across the edge which if keen will tend to grip the flesh. A blunt edge is smooth and lifeless

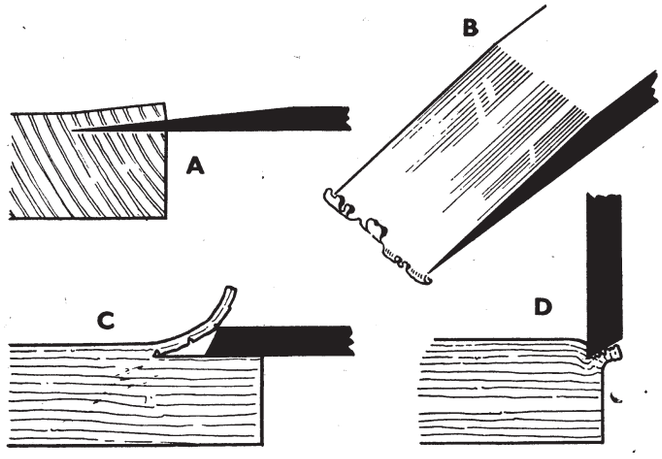


FIG. 2. HOW SHARPENING ANGLE AFFECTS PERFORMANCE
In all cases the angles are shown in exaggeration to make the point clear

actual edge maintains contact with the point of severance. On the other hand, the chisel at (C) has its bevel at a high angle, and, although having a strong edge, it would be practically impossible to use. When used *with* the grain the chip is forced up steeply and a split develops in front of the actual edge, so that it splits the wood as a wedge rather than cuts it (C). If used across the grain as at (D) the wood is crushed by pressure from the bevel. Softwood would merely collapse beneath it.

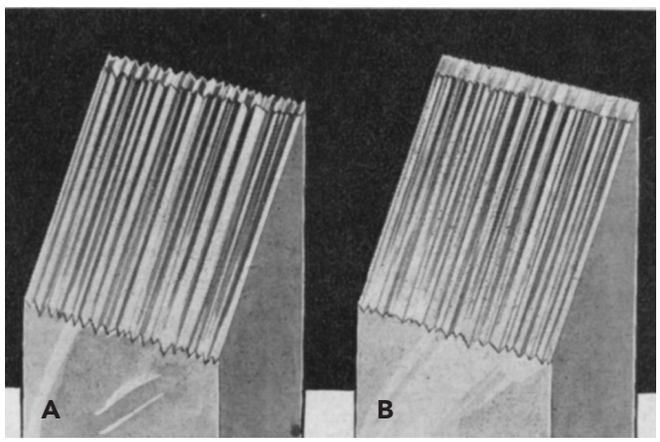
Sharpening Angle. Theoretically, chisels used for paring soft timbers could be sharpened at a lower bevel than those for paring hard woods, because the resistance is less, and the man normally working in such wood could take advantage of the easy working the low bevel gives. Generally, however, only one chisel is available for all woods, and it works out that a honing angle of about 30 deg. gives the best compromise for bench chisels. Mortise chisels and those for chopping generally need an angle nearer 35 deg.

To reduce the labour of sharpening, the main bevel is ground at about 25 deg. so that only the extreme edge needs to be rubbed on the oilstone. Once the honed bevel becomes so wide that sharpening becomes laborious, the tool should be ground afresh.

Fine and Coarse Edges. As the tool is rubbed on the stone a burr is formed at the back, and this can be detected by drawing the thumb *across* the back. Although the presence of this is an indication of sharpness, it does not reveal the quality of the edge or whether it is free from gashes. This question of quality is important because it not only affects the surface of the wood being worked, but also the time that edge lasts. A superfine edge lasts longer than one which is coarse.

If you look at an edge under a powerful magnifying-glass you will see that, far from being a straight line, it consists of a saw-like edge with "teeth" large or small according to its quality. An edge sharpened on a coarse stone has deep, large serrations, and as the tool is used the "points" either crumble or are rapidly

FIG. 3. EDGES UNDER A MAGNIFYING GLASS
Both have the main ground bevel, but A is sharpened on a coarse stone, and B on a fine one



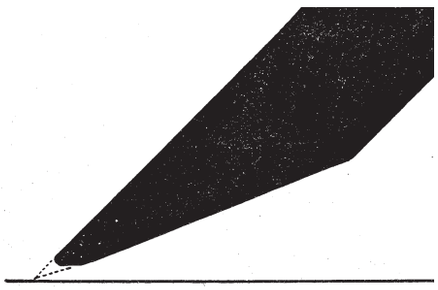


FIG. 4. HOW PLANE IRON LOSES ITS EDGE
Wear is in two main ways: the metal is worn away roughly parallel with the wood surface, and the extreme point is rounded over, both by friction

worn down level with the hollows and so present a series of flats which fail to cut. The same thing happens to an extent, of course, to a fine edge, one finished on, say, an Arkansas oilstone, for this still has serrations, though on a small scale. The "teeth", however, are much smaller, and they are much more numerous. Fig. 3 shows the idea. It is obvious that (B) would give a much finer finish than (A). Furthermore the wear is spread over their greater number.

Gashes (generally due to fouling nails) can be detected by sight. They appear as spots of light on the edge. Much the same thing applies to a dull edge. It shows up as a white line, whereas a sharp edge cannot be seen. Another test is to draw the thumb across the edge, which, if sharp, will grip the flesh. A dull edge appears smooth and lifeless.

Getting rid of the burr is necessary. Rubbing the back turns it in the other direction without removing it. Most craftsmen strop the tool across the palm of the left hand, first one side of the tool then the other. This bends the burr back and forth so that it finally drops off.

Another way is to draw the edge across the edge of a piece of hardwood. For a really fine edge, however, it should afterwards be stropped. An excellent strop can be made from a piece of supple leather, dressed with the finest grade emery powder and lubricating oil. Alternatively, fine grade grinding-in paste, such as is used for motor car valves, can be used. For extra fine edges, such as are required for carving tools, use crocus powder and oil rather than emery.

Many grades of oilstone are available, but the general tendency is to use manufactured rather than natural stones. These have the advantage of constant quality. For cabinet making tools use a *fine* grade stone, though a *medium* or *coarse* grade is handy for quick rubbing down when the edge has been gashed. The finest of stones is the natural Arkansas which gives a splendid edge. It is, however, expensive and is somewhat slow cutting.

When grinding is necessary a wet grindstone should be used if possible, the reason being that the water keeps the tool cold and prevents the temper from being drawn. A dry grinding wheel is convenient, but unless great care is taken there is risk of burning the steel so that it becomes so soft as to be useless. If it is used, a precaution is to have a can of cold water handy and dip the tool into it frequently, especially as the edge of the tool is approached. Large tools are not specially difficult because the heat is conducted away by the thickness of the metal, but small ones are easy burnt. In addition to the constant dipping in water a good plan is to cease grinding before the actual edge is reached, and finish off on the oilstone. In any case, leaving a narrow unground portion does not matter since normal oil-stoning starts a new bevel in any case. The only exception is in turning tools in which there are no separate honing and sharpening bevels.

HOW I SHARPEN MY TOOLS

This article is by a reader who has spent many years in the trade as a practical cabinet maker. What he has to say, therefore, is not a mere theory unbacked by practice, but is the result of experience gained in everyday application in the workshop. The sharpening of tools is clearly a most important part of woodworking, and we gladly pass on an idea which our contributor has proved to be sound

BEFORE modern synthetic oilstones and the fast-cutting natural stones such as Washita were available the honing of a cutter was a slow business. Natural stones were of the Charnley Forest type, and, although they gave a good quality edge, they were very slow cutting. It was because of this that tools were always ground before being sharpened on the oilstone. A grinding angle of approximately 25 degrees and a sharpening angle of 30 to 35 degrees was found to suit the majority of tools. It was realised that freshly ground and sharpened tools gave the best results because, the cutting bevel being very small, the resistance was also very small. Chips curled away at the sharpening bevel and found immediate clearance at the ground portion. Continued sharpening on the oilstone naturally increased the width of the cutting bevel, and the tool not only took longer to sharpen but was more difficult to manipulate owing to the greater wedge resistance. Consequently the craftsman kept his tools well ground and the cutting bevel small.

* * *

Time spent in sharpening tools is well spent

* * *

With the coming of the modern sharpening stones, time spent on honing tools was lessened, and for some

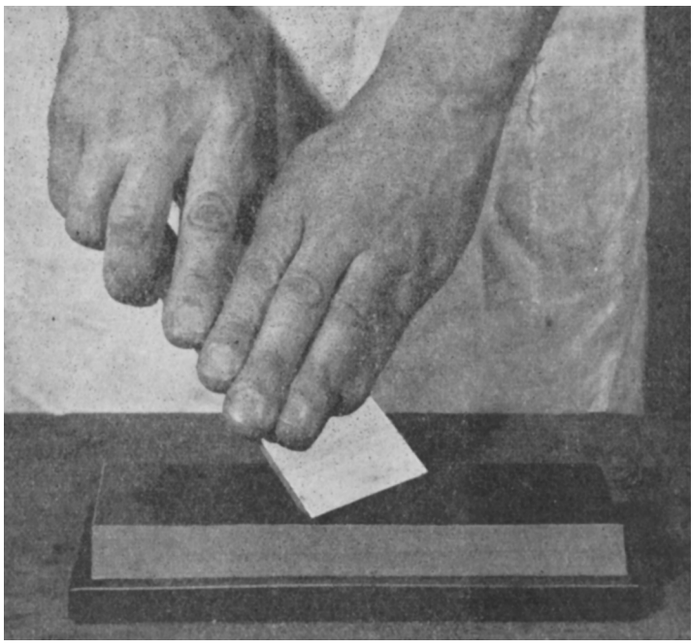


FIG. 1. "HOW I HOLD A PLANE IRON WHEN HONING"
The oilstone is parallel with the edge of the bench, and I work the iron with a circular movement over the whole area of the stone, so equalising wear

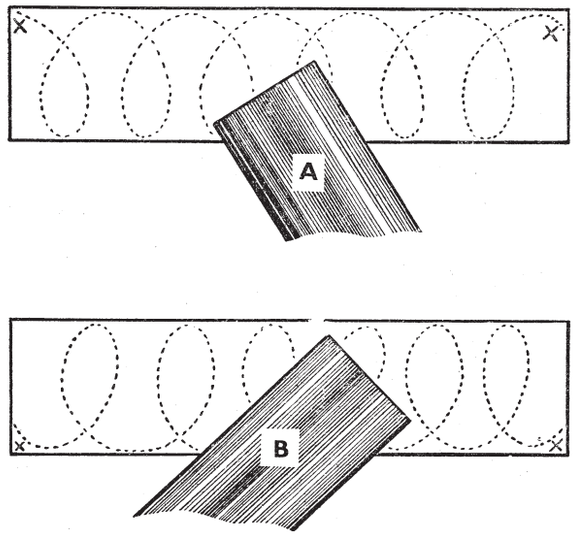


FIG. 2. MOVEMENT OF CUTTER WHEN HONING

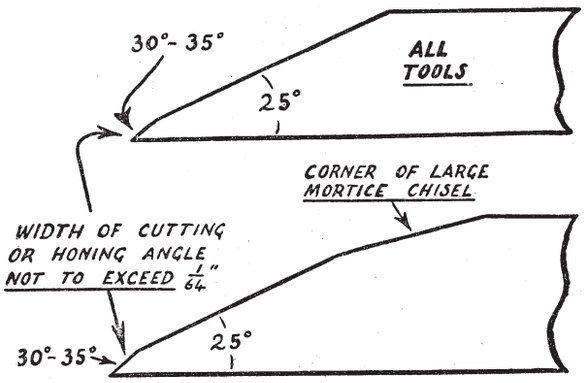


FIG. 3. GRINDING AND HONING ANGLES

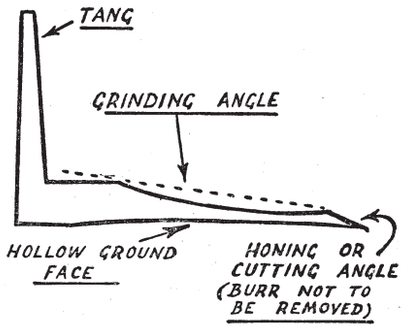


FIG. 4. WOOD SPOKESHAVE CUTTER AND HOW IT IS SHARPENED

reason or other the two angles gradually merged into one which seems to vary from 30 degrees to 40 degrees. In the trade this was possibly the result of piecework, although the writer, after years of piecework, still finds the two-angle sharpening better. A plane iron will stand up to 2½ hours hard work before becoming blunt, and by keeping four irons to a plane these can be prepared at leisure. This two-angle sharpening suits all tools; it gives a cleaner cut and greater control.

Method of Sharpening. The following is the method of sharpening. The grinding angle is made on a coarse India oilstone or a rough grit carborundum, the angle about 25 degrees. Only the bevel should be rubbed on this stone as it is far too coarse for the back. The tool is held at an oblique angle to the oilstone and moved with an elliptical movement as at A and B, Fig. 2. In this way the entire area of the stone is worked and so keeps flat.

Wipe the tool clean and place on a medium India oilstone, rubbing the grinding bevel in the same manner as for the previous stage. This smooths the grinding angle. Now tilt slightly and put on the cutting bevel, turning the tool over to remove the burr. Repeat the operation but do not allow the cutting bevel to exceed 1/64 in. width. Finally hone tool on a Washita or Arkansas stone. This will remove any sign of burr still left. When stoning the back of a tool always keep fingers on top of tool as this prevents lifting which would cause dubbing.

The writer finds that the circular movement when sharpening tends to grind the bevels and back much flatter than a back and forth movement and keeps the stone flat as well. He has oilstones that have been in constant use over ten years and are perfectly flat although all types of tools have been sharpened on them.

It is sometimes thought that to continually stone the back of a tool removes the backing but this so-called backing extends at least to the centre of the tool, sometimes right through in the case of cast steel tools. This back is part of the cutting angle and for the tool to be efficient it must be flat to the edge. Hold the back of the tool to the light. If a bright line near the edge can be seen, rub the back on medium oilstone till this disappears, and finish off on the hone.

Thick and Thin Tools. A freshly ground tool with a fine cutting angle is known as a thin tool and is easy to use and control. If the cutting edge is allowed to increase in width through successive sharpening it is known as a thick tool. Each sharpening takes a little longer and more surface of metal is offered to the surface of the cut so that more effort is needed to work the tool. At the same time it should be realised that a thin tool is delicate, and should not be tossed on to the bench. Felt holdalls should be made for chisels, and planes should be laid on edge and protected from knocks. It will be found that the coarse stone is not always necessary for the grinding angle. This angle can be maintained on the medium stone, specially with small tools, but if you happen to catch a nail the coarse stone is desirable.

Just a word on combination stones. This is most convenient when you can have one stone only, but two, fine and coarse, are to be preferred because the grit from the coarse side is liable to get on to the fine side. It works round with the dirty oil.

The Wood Spokeshave. The cutter of this tool should be ground and sharpened on the inside only. Grinding angle is 25 degrees, and cutting angle about 30 degrees. The cutting edge should be thin. The most important point to remember is that the hollow-ground face must *never* be touched with the oilstone. You will find that the burr at the edge helps and cuts better than one without, providing that the hollow-ground face has not been touched. This burr must not be overdone however. After grinding, only a fine slip stone should be used to put on the cutting angle. The burr should be just enough to be felt.

HOLLOW-GROUND CUTTING EDGES

Although professionally ground cutters are treated on a wet grindstone so that there is no risk of overheating, there is a growing tendency for men to use a geared emery or carborundum grindstone in the workshop. This is quite satisfactory if the tool is frequently dipped into water to keep it cool. The writer of this article considers that the hollow grinding which results from using the small diameter bench grindstone has advantages over the flat bevel more usual in tools

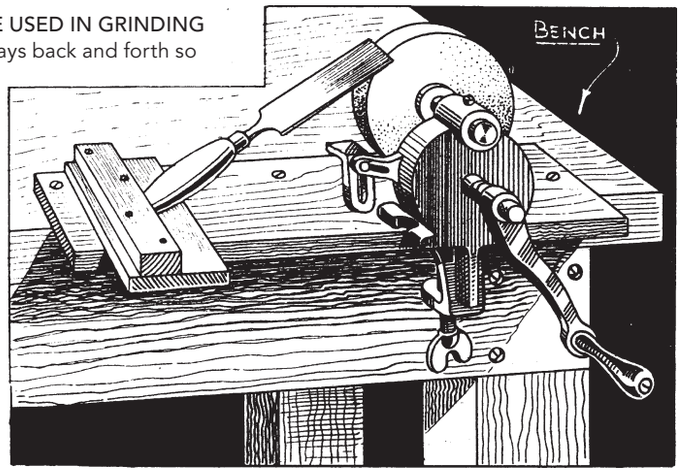


FIG. 1. TOOL FENCE USED IN GRINDING
The tool is slid sideways back and forth so that every part of the bevel is ground equally. This device renders assistance unnecessary

WHEN grinding the cutting edges of tools on a geared (bench) grindstone, most woodworkers use the tool-rest as the sole means of support. Such a procedure is inadvisable, particularly as regards the cutting irons of smoothing planes, try-planes, jack-planes, etc. A neat, straight, flat bevel is obtainable, of course, but one generally needs an assistant to turn the handle so that both hands are free to hold the edge of the tool against the stone properly. Moreover, the grinding is slow, great care being needed to get the bevel straight;

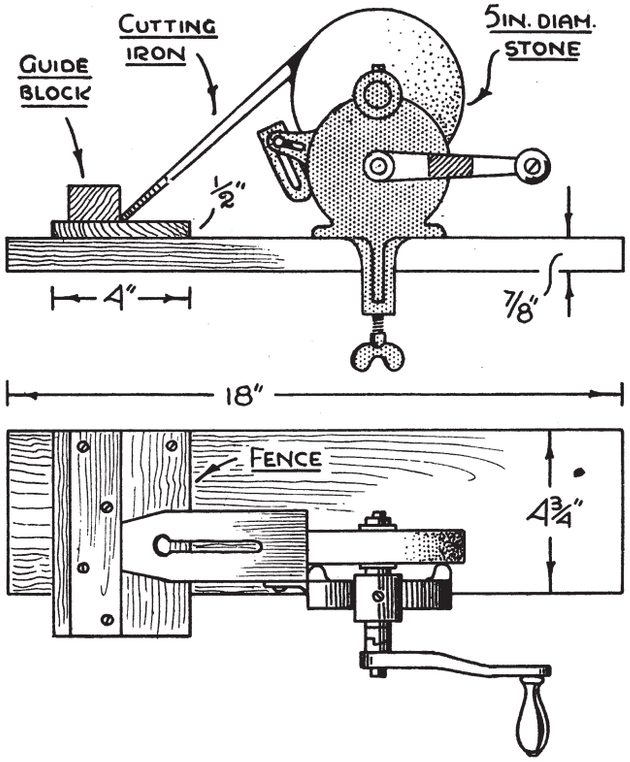


FIG. 2. ELEVATION AND PLAN SHOWING GRINDING OF A PLANE IRON

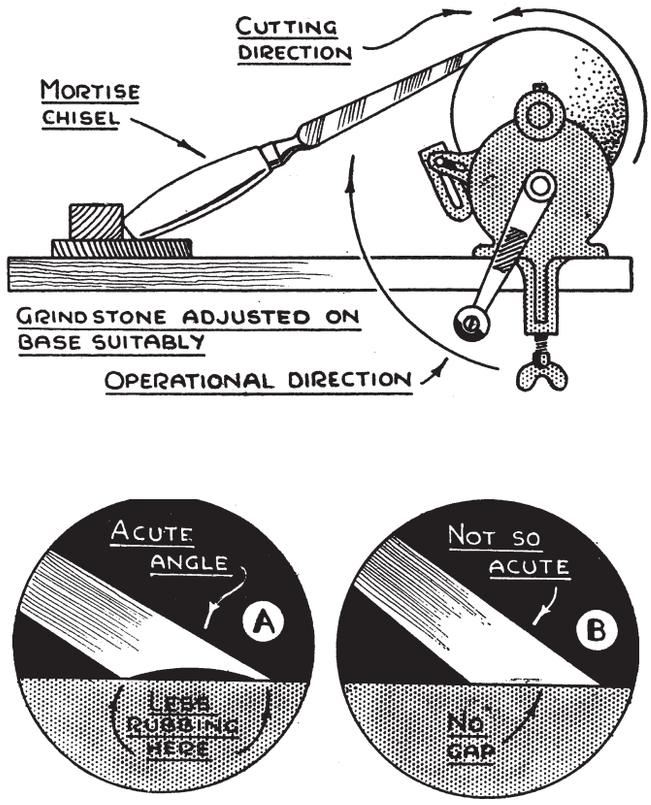


FIG. 3. MORTISE CHISEL BEING GROUND
There is less rubbing required on the oilstone when the bevel is hollow ground as shown at A

the time required is longer if one works unaided.

Another point in respect of grinding is: why aim at a *flat* bevel? Obviously, a *hollow* bevel is more desirable, for it means less rubbing when sharpening the cutting edge on an oilstone. Firmer and mortise chisels are vastly improved by the slight hollowness in the bevels; it is a real treat to chop out dovetails, mortises, etc., with them.

A Tool Fence. To facilitate grinding, i.e. to operate the grindstone unaided and obtain a neat, straight, hollow-ground bevel a tool fence should be made, the whole arrangement being illustrated in Fig. 1. To make the fence, a piece of 7/8 in. flooring 18 ins. long by 4 3/4 ins. wide provides the base. A small fence, rather like a bench-hook, is arranged at one end as in Fig. 2. It is a permanent fixture, for the grindstone itself is adjustable along the front edge of the base.

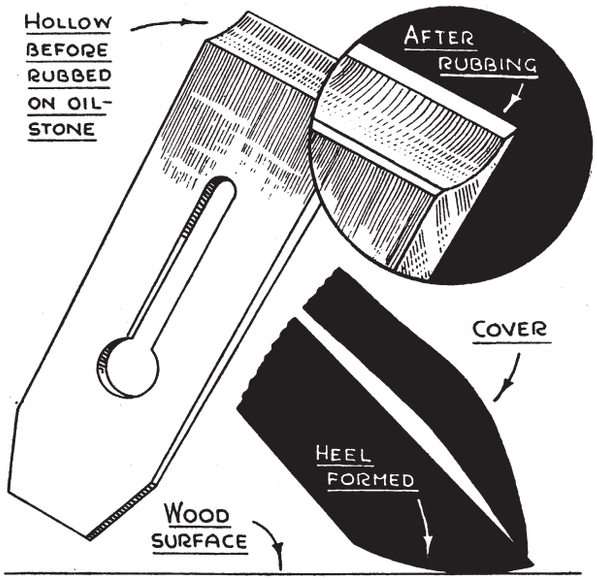


FIG. 4. HOLLOW-GROUND PLANE IRON
The result of dubbing over the edge when sharpening on the oilstone is shown below. Note the heel formed

Now, the usual diameter of bench grindstone wheels is from 6 ins. to 4 ins. Naturally, the small wheel gives a more acute concave bevel, but by holding the tool at a more acute slant a quite good hollow-ground bevel can be obtained on larger wheels.

A Smoothing Plane Cutter. A 7 in. long smoothing plane cutter is shown in the side elevation in Fig. 2, and the amount of tilt can be noted. For tools of greater length, such as mortise chisels, the grindstone is shifted farther away, as in Fig. 3.

Assuming, however, you wish to grind a smoothing plane cutter, screw—or clamp—the fence to the bench top, set the cutter against the guide of the fence, and bring the grindstone over until the correct slant is found. The circumference edge of the emery wheel must, of course, be true in relation with the fence so the entire surface bites into the metal with each revolution.

Hold the cutting iron against the wheel firmly with the left hand and operate the grindstone with the other hand, turning the handle slowly at first until you get into the rhythm of the action. The iron, once you get going properly, is slowly moved from side to side across the revolving stone by sliding its opposite end along the fence.

Should this end be rather battered about with sharp, hammered edges (due to setting in the plane) this roughness should be ground off to make the end smooth and straight; otherwise the end may stick in the corner formed by the guide block and make the movement difficult.

Avoid Over-Heating. Geared grinders have a ratio of about 7 to 1. In other words, one turn of the handle causes the emery wheel to revolve seven times. Therefore, as the grinding is constant, there is a risk of over-heating the iron.

One must not turn the handle too quickly, or alternatively, lean too heavily on the cutting iron. Keep a tin of cold water handy so the iron can be cooled in it frequently. An over-heated cutting edge turns a bluish-black colour. The ultimate result is a softening of the temper at the edge where, of course, there is not so much metal, and a softened edge renders the iron useless.

Hollow Grinding Features. The difference between a hollow-ground bevel and a flat bevel are shown at A and B, Fig. 3. When rubbing on the oilstone there is much less metal to be removed in the sharpening of the hollow-ground cutter and consequently less labour is involved. The drawing of a hollow-ground smoothing plane iron at Fig. 4 shows up the advantages of the feature. Regarding chisels, such a bevel enables the cutting edge to slice its way deeply into the wood.

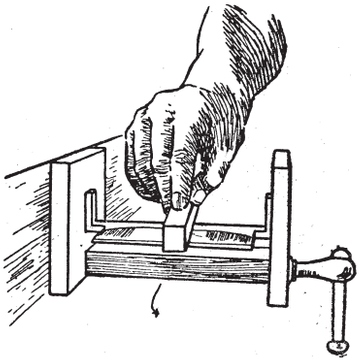
SHARPENING YOUR TOOLS: CAN YOU PRODUCE A KEEN EDGE?

A properly sharpened edge lasts much longer than one only roughly put into condition

POSSIBLY the title of this article sounds a little obvious; it seems clear that a tool must be sharp if it is to do its work properly. Yet the probability is that many men do not know how to put a really keen edge on a chisel, plane iron, or whatever it may be. There is more in it than is immediately apparent. For instance there is the question of the quality of the steel itself, the angle at which it is sharpened, the quality of the stone on which it is rubbed, and the further treatment after rubbing down (if any).

Sharpening Angle. Let us consider an edge tool, say a chisel. It is virtually a wedge which displaces the wood, and, regarded from this aspect only, the lower the angle at which it is sharpened the higher its efficiency, because there is less displacement of the wood as shown in Fig, 1. Unfortunately no known steel will stand up to the strain of so thin an edge. It just crumbles under the pressure (A). If it is tempered more highly to stiffen it it becomes brittle and breaks off.

Now take a chisel sharpened at a high angle as in Fig. 2. The edge is very strong, but the displacement of the wood is so great as to make it entirely impracticable in use. A softwood would probably be merely crushed under the pressure instead of being cut. It is clear then that a compromise has to be effected so that its cutting property is not sacrificed unduly for the sake of strength, and *vice versa*. In an ideal state, tools used for



SHARPENING WOOD SPOKESHAVE CUTTER IN VICE WITH OILSTONE SLIP

FIG. 1. SHARPENING ANGLE TOO LOW
FIG. 2. ANGLE FAR TOO HIGH
FIG. 3. CORRECT GRINDING AND SHARPENING ANGLES
FIG. 4. SECTIONS THROUGH PLANES SHOWING ANGLES
FIG. 5. COMPARISON OF SINGLE-IRON PLANE
FIG. 6. SAW-LIKE EDGE SHOWN IN EXAGGERATION
FIG. 7. USEFUL STROP FOR TOOLS
FIG. 8. HOW BURR OR WIRE EDGE IS FORMED
FIGS. 9 AND 10. STROPPING EDGE ON HAND

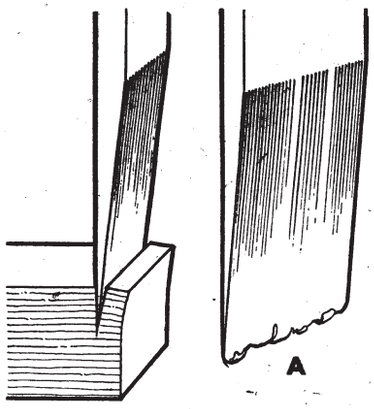


FIG. 1

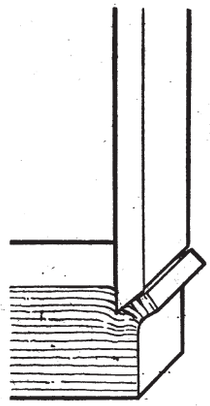


FIG. 2

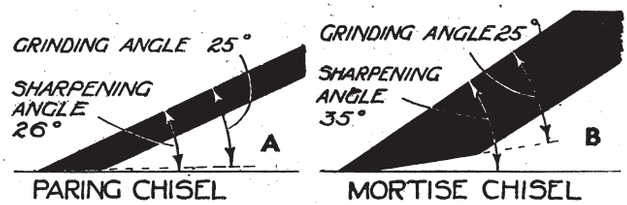


FIG. 3

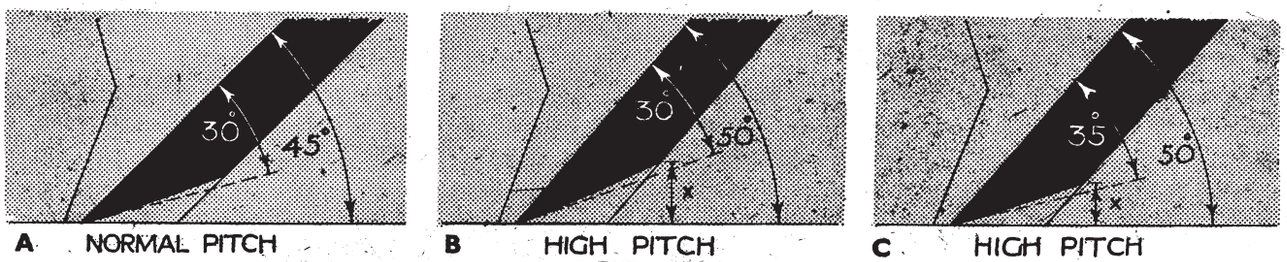


FIG. 4

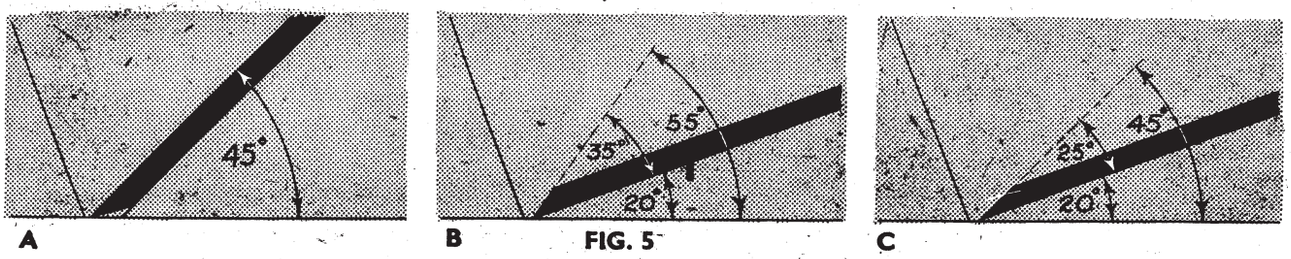


FIG. 5

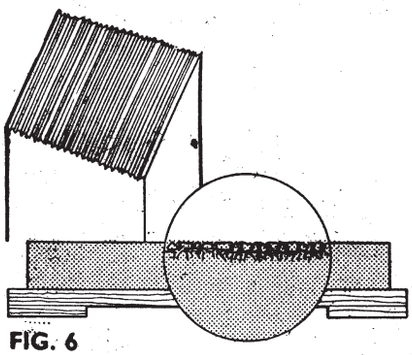


FIG. 6

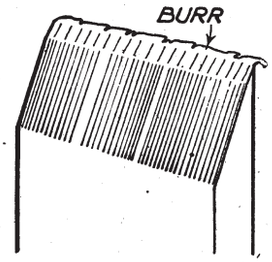


FIG. 8

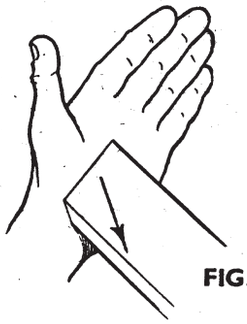


FIG. 9

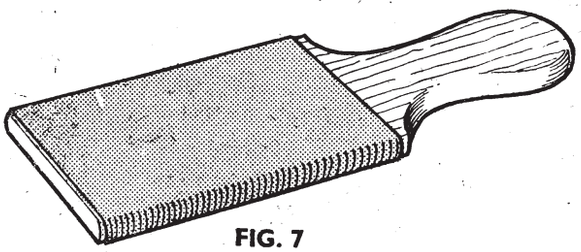


FIG. 7

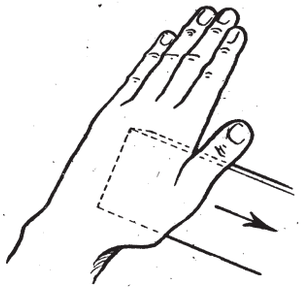


FIG. 10

softwood could be sharpened at a lower angle than those for hardwood. Unfortunately few of us are inclined to have a double kit of tools!

At the same time it is possible to follow out the idea in accordance with the particular chisel and the work it normally does. For instance a mortise chisel or a heavy firmer chisel which is used for chopping only should be sharpened at an angle of 30 to 35 degrees. Any lower angle than this would make too weak an edge—at any rate for hardwood. On the other hand a fine bevelled-edge chisel used entirely for paring and never struck with the mallet could be sharpened at 25 degrees or a little more. These points are shown diagramatically in Fig, 3, which also shows the normal grinding angle of 25 degrees or a little less.

Plane Cutters. So much for chisels. How about plane cutters? For normal bench planes experience has shown that a sharpening angle of 30 degrees is the most successful compromise, the grinding angle being 25 degrees. This applies to the average plane, the cutter of which is set at 45 degrees with the sole. But some smoothing planes are set at 50 degrees or even more to lessen the liability of the grain to tear out. It is frequently found that such planes are liable to chatter, and this is usually because the cutter is sharpened at too low an angle. This shown at B, Fig. 4. Sharpening at a higher angle, say 35 degrees, usually corrects the fault as at C. Note how the cutter is supported much lower down in C than in B.

Another point in connection with planes is that applying to those with single cutters with the bevel uppermost, frequently used for end grain. It should be remembered that it is the sharpening angle which is the effective angle. The fact that the cutter is set at low pitch does not alter the effective angle unless the cutter is sharpened accordingly. Glance at Fig. 5, which shows a normal bench plane (A), together with a block plane (B). It is clear that, although the cutter is set at only 20 degrees, the effective angle is actually greater owing to its being sharpened at 35 degrees. It is thus really less suitable for end grain. To make it suitable for its purpose it should be sharpened at a low angle, not more than 25 degrees.

Quality of Edge. Now let us come to the quality of the edge. If any cutting edge could be examined through a powerful magnifying glass it would appear something like Fig. 6, a ragged saw-like edge. This is due, of course, to the oilstone which removes the steel by an abrasive action. The degree of coarseness is dependent entirely upon the oilstone. Now for carpentry work a medium stone such as a medium Indian or Carborundum gives sufficiently fine an edge for the class of work. For cabinet work, however, a finer stone is essential, at any rate for finishing off, and a fine Indian, Carborundum, Washita, or Arkansas is necessary.

* * *

Always use a fine stone to finish off an edge

* * *

There is more in it than this, however. Turn again to Fig. 6. It is clear that it is the points which do the main cutting, and it is inevitable that these will soon crumble and so leave a dull edge. If a fine stone is used the scratches or indentations left by the stone will be much smaller, and there will therefore be a great many more smaller points. Thus it follows that the finer the stone the longer the edge will last because there are more points to resist the wear.

You can carry the idea farther by always stropping the tool after honing. All you want is a piece of wood shaped as in Fig. 7 with a piece of leather glued to the face and turned around the edges. Dress the leather with *fine* emery powder and oil or the mixture used for grinding in the valves of motor cars. Stropping the cutter on both sides makes the edge still finer and so makes it last longer as well as giving a finer finish. Remember to preserve the bevel and to keep the back flat on the strop.

This stropping is an invaluable idea for chisels. You can always keep an edge with a strop, rubbing down on the stone only occasionally. Remember that carvers rely upon stropping to keep a good edge. You can't always be taking the cutter out of a plane, but you can strop it after honing.

The Wire Edge. A last point is that sharpening on the stone always turns up a wire edge or burr shown in exaggeration in Fig. 8. This is pressed back when the back is rubbed flat on the stone, but it must be removed before the tool can be used properly, because otherwise the burr is pressed back into the edge and so ruins it. Bending it back and forth until it drops off is the best way. The hand is the best for this; draw the tool across the palm of the left hand first one side and then the other as shown in Figs. 9 and 10. You may take a little time to get into the stroke, but try it slowly at first, and remember that it is the *alternate* bending back and forth that removes the burr. Afterwards strop on the leather.

When Is It Sharp? Now a word on detecting when an edge is sharp. Drawing the thumb across the back of the cutter enables the burr to be felt, and this is an indication that an edge has been given. It does not show that it is free from gashes, however, and to be sure of this you should hold it to the light. A sharp edge cannot be seen, whilst a dull one reflects a thin line of light. Gashes can be detected in this way. Some workers draw the thumb lightly *along* the edge. A sharp one grips the flesh, whilst a dull one is lifeless. Take care if it is your first experience, however. It is easy to cut yourself.

WHEN YOUR PLANE NEEDS SHARPENING

Can you tell by looking at it when your plane needs sharpening? After rubbing on the oilstone can you detect whether it is really keen? Do you know what has happened when it has become blunt? If you are uncertain this article will put you right

YOU know that dull, lifeless feeling a plane begins to develop after it has been in use for a while. It requires extra pressure to keep it down on to the wood at all; it needs extra power to push it; and the shavings (when they occur at all) are uneven; and you feel tempted to give the cutter a tap to make it cut. Obviously it needs sharpening; you can tell from the feel of the plane. But if you picked up a plane in a strange workshop, could you tell without using it whether it was fit for use? In other words, can you tell a keen edge by sight?

Testing. Take out the cutter, remove the back iron, and hold it to the light. You cannot see a really sharp edge—there just isn't anything to reflect the light. A dull edge on the other hand shows a line of white, the width of which will vary according to how badly it is in need of sharpening. Fig. 1 shows what it looks like in exaggeration, the magnifying glass revealing the worn and gashed edge.

What has happened is that continuous friction over the surface has worn away the edge as shown in Fig. 2, the wear being parallel with the sole of the plane. The front of the edge has deteriorated to an extent, but the main wear is underneath. If you have a fairly powerful magnifying glass it is worth examining your plane cutter next time it needs sharpening. You will find this wear clearly shown.

How Burr is Formed. When you rub the cutter on the stone you wear away the worn part, and the bevel is able to meet the back of the cutter in a sharp, clearly defined angle. But something else has happened. The rubbing on the stone wears away the steel, and, although the bulk of the minute filings pass to the stone, being carried away by the oil, that at the extreme edge is not detached, but hangs on and is pressed backwards. This is what is commonly known as the burr or wire edge, and it can be detected by drawing the thumb across the edge at the back. It is shown in exaggeration in Fig. 3. This feeling for the burr is an indication that the edge may be sharp, but as a test by itself it is of no great value as will appear later.

Removing the Burr. This burr must be got rid of for two reasons; it would leave the wood rough, and it would cause the edge to deteriorate rapidly owing to the steel being forced back against it where it would cause gashes. It would be like planing over small nails. Rubbing the back of the cutter flat on the stone helps to loosen it, but to get rid of it altogether stropping is necessary.

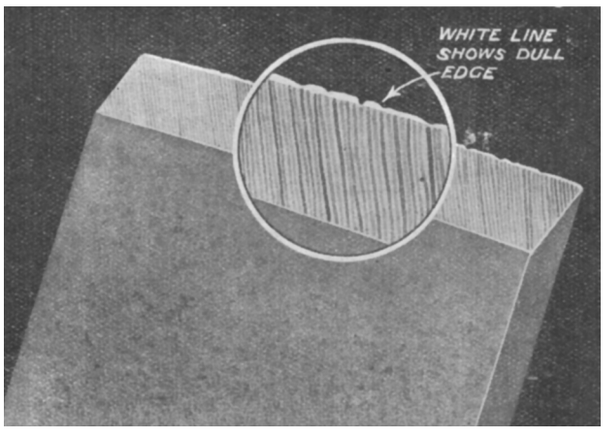


FIG. 1. PLANE CUTTER IN NEED OF SHARPENING
The bluntness is revealed by the line of white at the extreme edge. In the circle it is magnified. A really sharp edge cannot be seen. There is nothing to reflect the light

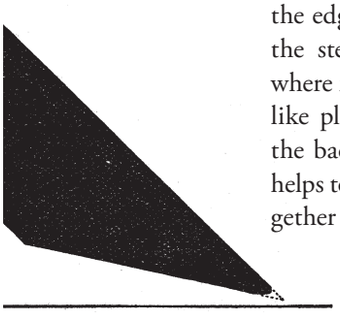


FIG. 2. HOW WEAR TAKES PLACE
The dotted line at the extreme point shows the original shape before being worn away

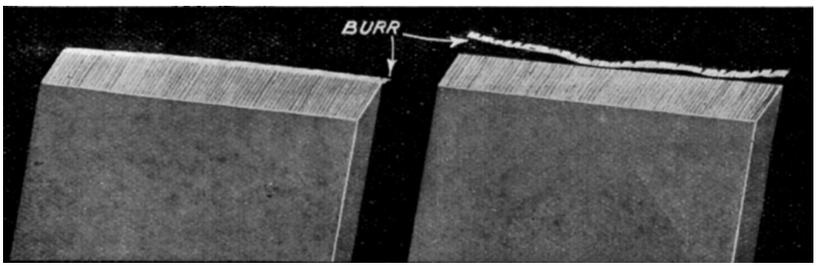


FIG. 3. BURR FORMED AT EDGE
This is formed when the cutter is rubbed on the oilstone. The right-hand view shows how it is detached when stropped on leather or on the hand. If it is not removed it will be forced back against the edge, so gashing it

A piece of leather dressed with fine emery powder and oil or the paste such as is used for grinding in the valves of motor cars can be used. Rub the bevel on it a few times, then the back, keeping it flat. Apart from helping to remove the burr it helps to give a still finer edge to the cutter since the strop acts virtually as a fine stone.

It will be realised, however, that to get rid of the burr properly it must be bent back and forth—like breaking a piece of wire. To do this on the strop would be an awkward job because of the necessity of turning over the cutter at each stroke. Consequently most men use the hand as a strop as in Fig. 4. The cutter is drawn bevel downwards across the palm of the left hand as shown by the arrow. The left hand is then turned palm downwards and the cutter drawn upwards across the palm again, but with the back touching the palm. This enables a rapid movement to be made in which each stroke bends the burr the opposite way.

For a Super Fine Edge. Even then there will probably be a certain amount of roughness where the burr breaks off, and when a really fine, keen edge is needed the latter should be drawn along a piece of wood. This will finally get rid of the burr, but may leave a slight roughness owing to the remains of the burr being pressed against the edge. If, however, the cutter is now stropped a few times on the leather the edge is soon restored.

* * *

A fine stone makes the edge last longer and gives a cleaner finish

* * *

The Edge Magnified. Examining an edge under a magnifying glass reveals some curious features, chief amongst which is that an apparently keen edge is really more like a saw. Even a razor has a finely serrated edge when seen under a powerful glass. It is all due to the scratches made by the stone in sharpening, and the size of the "teeth" depends upon the coarseness of the stone. It follows, then, that for an important job, say, cleaning up a table top, a fine stone should always be used—at any rate for finishing off. It has two advantages; it gives a cleaner result, and the edge lasts longer.

Look at it this way. When a coarse stone is used there are just a number of points at the edge and these are soon worn away. With a fine stone there are at least double the number of points to resist wear. And with a superfine stone followed by stropping the points are so fine (and therefore so many) that the edge is practically resolved into a straight line.

Fig. 5 shows under magnification two edges (A and B), one finished on a coarse, and the other on a medium stone. At C the edge has been well stropped so that the points have virtually disappeared.

Further Tests. We have already mentioned that drawing the thumb *across* the edge to feel for the burr is not a sufficient test of sharpness itself. It indicates that the dullness has been worn away, and that the edge *may* be sharp, but it is no indication of the quality of the edge (coarse or fine), neither does it reveal the presence of any gashes.

Sight is a test for both, but many men draw the thumb lightly *along* the edge. A keen edge grips the flesh without cutting, whilst a dull edge merely slides smoothly along.

You can also tell by drawing the thumb at right angles *across* the edge. Here again the sharp edge grips, whilst over the dull one the thumb just slides. The real value of feeling for the burr is that it is a quick first test. You know that the edge cannot be sharp until the burr has been turned, and until this happens there is no need to examine the edge closely.

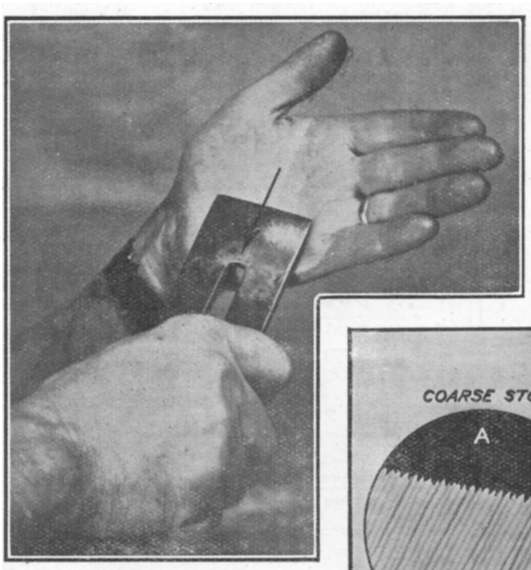
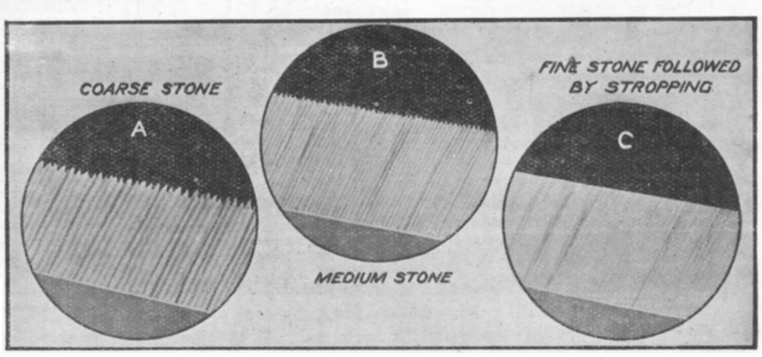


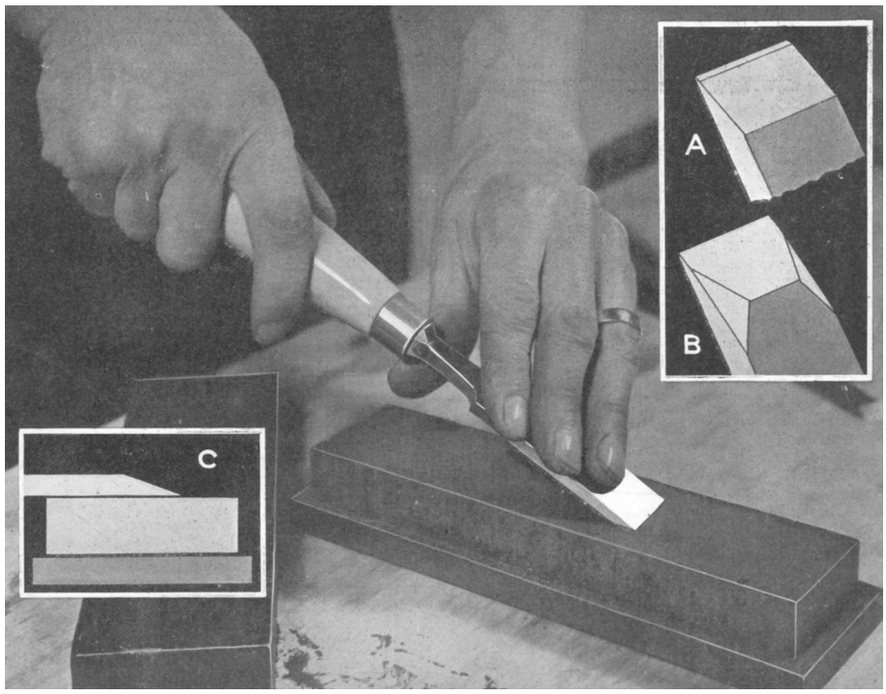
FIG. 4 *(above)*. STROPPING THE CUTTER ON THE HAND
First one side, then the other is drawn across the palm

FIG. 5 *(below)*. QUALITY OF THE EDGE
If examined under a powerful glass the edge is more like a saw. Even a razor shows fine serrations. The finer the stone the smaller the "teeth." The fine edge lasts longer as well as giving a better finish. It may be unnecessary for rough work, but is essential for fine smoothing



SHARPENING THE CHISEL

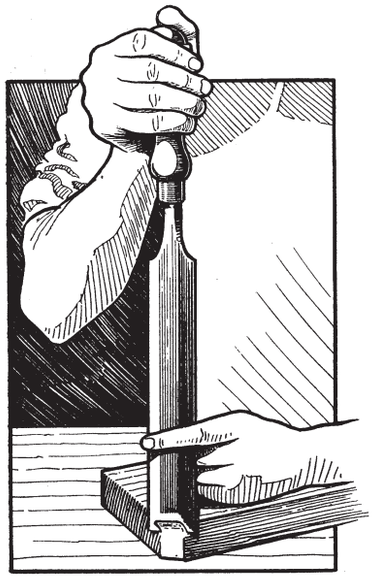
PLACE the chisel with the bevel flat on the stone and raise the hands slightly. This will give approximately the correct angle of 30 degrees (the grinding angle is about 25 degrees). (A) shows the two bevels. Work the chisel towards the sides of the stone to avoid making the latter hollow. When a burr has been turned up, reverse the chisel flat on the stone (C) and rub once or twice. Get rid of the burr by stropping the edge on a piece of leather dressed with fine emery powder and oil. Alternatively the hand can be used for stropping. When the chisel is being ground it is an advantage to have the corners ground off, as at B, as this enables it to work in awkward angles, as when dovetailing.



GETTING THE BEST OUT OF YOUR WORK: YOUR TOOLS

THE probability is that most hand tools have reached a stage of finality. They have come into their present form as the result of what men have found to be effective over many years, and no one is able to suggest any serious alteration that would improve their efficiency. It is rather like the case of the bicycle. When first invented there were all sorts of queer types about, but they were gradually eliminated, or merged into one common pattern, so that for the past fifty years there have not been any fundamental changes in its general design.

The same thing applies largely to hand tools. Take, for instance, the wood plane. Craftsmen back in early Victorian times used a jack plane practically identical with that made to-day. Small alterations occasionally creep in—you can buy a wood jack plane to-day with adjustment for the cutter—but in general form it has not altered for the best part of a century. The same thing is true of most other tools.



SAFETY FIRST IN CHISELLING
No matter what the operation, the left hand is always kept behind the cutting edge. Note how the index finger guides the blade

The reason that I mention this is that something of the sort applies also to the methods of handling tools. Men who use tools every day, and whose livelihood depends upon their using them successfully, rapidly find out how to get the best out of them, and soon acquire an uncanny knack in handling them. I believe myself that if a young man with no previous training were given a handsaw and were required to use it accurately every day, he would soon find out the value of pointing his index finger along the handle, even though no

one ever suggested its advantage to him. So far as I know, there is no picture of a workshop of, say, Chippendale's time showing men engaged in sawing, but I have no doubt that the cabinet makers of that time were up to the dodge, and pointed their fingers along their saws just as any capable craftsman does today.

Now, to find out things for oneself in the grim school of experience has its advantages—possibly it is the best training one can have—but life is short, and to have these tricks pointed out to one saves many a mistake and certainly a great deal of time. And, after all, it is only what has happened in craftsmanship during the centuries. Just when a man found out the value of pointing his finger along the saw handle (to use the same example) nobody knows, but it is a thing that has been handed down for centuries. It is part of a great trade tradition.

It is for this reason that the Editor has asked me to point out some of the chisel practices that belong to good craftsmanship. Possibly not every craftsman will agree entirely with my own particular methods, but I can only say that the suggestions I shall offer will be based on what experience has shown me to be sound and reliable practice.

* * *

Do not use a chisel for work for which it is unsuitable

* * *

The Chisel. I suppose that most of us gradually acquire a collection of chisels which we have found from experience to be most suitable for the work we normally do. The commoner ones we buy in the quite early days, and the odd sizes when we happen to have a job to do needing a special size or kind. Now, this question of picking a chisel suitable for the work it is required to do seems to me of some importance. Let me give an instance. A friend of mine is a tool maker, and one of his chief jobs is that of making wood planes in beech. When he has chopped away the bulk of the wood at the escapement he pares down in long, even cuts, the frog on which the cutter lies. Obviously it has to be dead true, and this necessitates a wide chisel (his is 2 ins. wide).

Now have you ever tried to pare a piece of hard timber, almost at end grain, and taking a cut 2 in. wide, using the normal bevelled edge chisel? I don't say it can't be done, but what invariably happens is that the pressure needed causes the chisel to bend a trifle, and spring with a sort of chatter, and once this happens it is almost impossible to cut a true surface. It is because of this that the plane maker's chisel is very thick, and is sharpened with a moderate bevel which will stand up to the heavy work it has to do without the edge crumbling. It is a point worth bearing in mind because it shows that, although the bevelled edge chisel

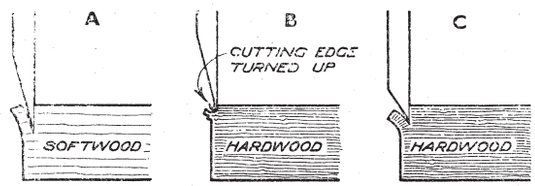


FIG. 1. HOW ANGLE OF BEVEL AFFECTS CUTTING ACTION
Whilst a long, thin bevel will cut is way through softwood (A), its edge will rapidly crumble as at (B) if used for hardwood

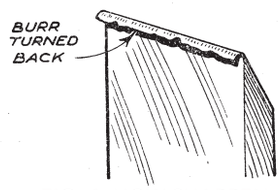


FIG. 4. HOW SHARPENING FORMS A BURR

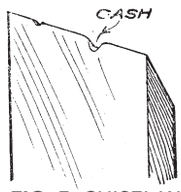


FIG. 5. CHISEL WITH GASHED EDGE

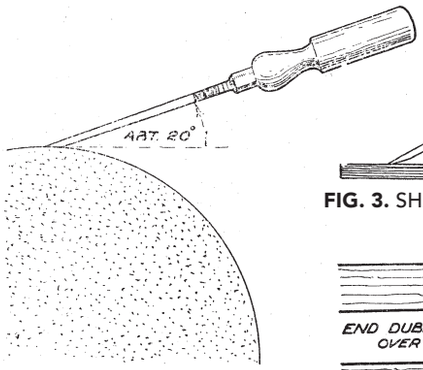


FIG. 2. GRINDING ANGLE
This varies from about 15 degrees up to about 25 degrees. For average work 20 degrees is about right

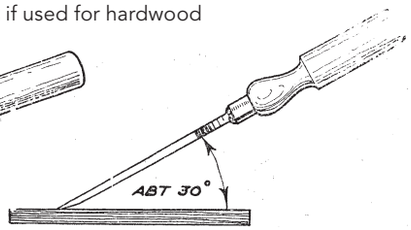


FIG. 3. SHARPENING ANGLE

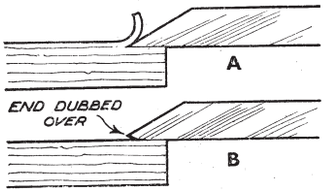


FIG. 6. CUTTING ACTION
Showing the necessity for avoiding a dubbed edge

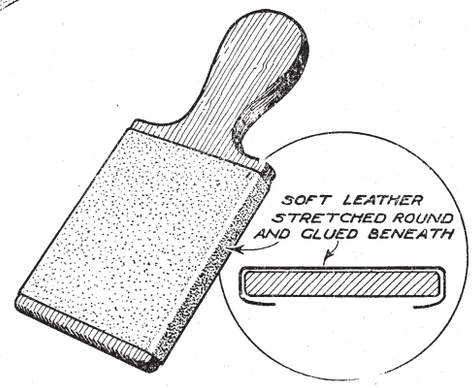


FIG. 7. USEFUL STROP FOR CHISELS
Any piece of soft leather is suitable. It is dressed with an abrazive such as pummice or emery powder

is usually reserved (and is most suitable) for paring, there are paring jobs for which the heavier firmer chisel is better.

On the other hand, when I had some very delicate model work to do some time back, I went to my tool dealer's for a 1/2 in. bevelled edge chisel, and was lucky enough to select one which for thinness and delicacy I have never seen equalled. It is a sheer joy to use for light, close work. One would not dare to put any extent of pressure upon it or to give anything but the lightest taps, but for the purpose for which it is intended it is ideal.

Choice of Chisels. In the ordinary way, presumably, one cannot be so fastidious, especially when one's work varies. One buys a 1/2 in. chisel, or whatever it may be, and it simply has to do for everything. That is why a medium is struck in most tools; the bevelled edge chisel, for example, being sufficiently robust to withstand reasonably hard usage.

If I were buying some chisels and my normal work were for, say, furniture making, I think I should select a 1 1/2 in. or 1 1/4 in. bevelled edge long chisel to use for general paring; a 1 in. firmer chisel for heavy bench work; also a 3/4 in. and a 1/2 in. firmer chisel for chopping dovetails, occasional mortises, and similar jobs; a 1/4 in. firmer chisel I should also want for small work and for cleaning out 5/16 in. mortises (the most common size); and after that it would all depend upon the general class of work I went in for. For instance, a 1/8 in. chisel is often a necessity, and a 1/16 in. size is also useful (though I never yet saw one 1/16 in. wide, they are invariably nearer 3/32 in.).

Angle of Bevel. Apart from the choice in the type of chisel, there is also the question of sharpening it, and it is usually necessary to strike a medium. The ideal for softwoods is a long, thin bevel producing a keen edge which will cut its way through the wood easily as at A, Fig. 1. At the other extreme is the chisel needed to cut heavy, dense woods (C). A fairly thick bevel is essential to enable the edge to cut without crumbling. If one did always one kind of work there would be no difficulty because the chisels could be sharpened accordingly. The average cabinet maker, however, works in both softwoods and hardwoods, and, short of keeping a double set of chisels, there is no option but to adopt a bevel of medium angle.

The correct sharpening of a chisel is of considerable importance, and we may therefore dwell for a moment on it. When first obtained the edge is ground, but requires to be given a keen finish on the oilstone. The grinding angle is from 15 to 25 degrees (Fig. 2), but this is too thin for sharpening, except for use on the softest of woods. The best plan therefore is to place the chisel with the bevel flat on the stone, and raise the handle a trifle so that the angle is about 30 degrees (Fig. 3). For a chisel kept for heavy work this could be increased to about 35 degrees. A mortise chisel is an example.

* * *

Always have your chisels ground on a wet grindstone

* * *

This sharpening turns up a burr at the back as in Fig. 4, and it can be detected by drawing the thumb *across* the edge of the back. It is an indication that the chisel is sharp, but it takes no account of whether the edge is gashed. The simplest way of telling this is to hold it up to the light. A sharp edge is invisible; a dull one shows up as a white line, and in the same way any gashes show up as little spots of white (see Fig. 5). To get rid of the burr the chisel is reversed on the stone and held *flat*. One or two rubs are sufficient.

Stropping the Chisel. Personally I always like to strop a chisel. It gets rid finally of the burr, and it gives an extra fine edge. What I use is a piece of fine, supple leather glued to a piece of hardwood as shown in Fig. 7. It can be dressed with any fine abrasive—the finest emery powder or pummice powder mixed to a paste with Vaseline, or a valve grinding paste (used in the motor trade) does excellently. Crocus powder such as is used by carvers, though excellent for carving tools, is somewhat too fine for chisels. The coarser abrasive does its work far more quickly.

One point to remember is that the back must be held flat on the strop. Otherwise the edge will be dubbed over, and it will be impossible to pare properly; the chisel will simply rise over any lumps on the surface of the wood instead of cutting into the grain (Fig. 6).

A second advantage of the strop is that a keen edge can often be restored without the necessity of rubbing down on the stone; though of course the latter is necessary after several stroppings, or if the edge is gashed.

Stropping on the Hand. Another excellent way of getting rid of the burr is to strop the chisel on the hand; in fact, personally I always do this first before using the leather strop. It gets rid of the burr more quickly than the latter because first one side then the other is drawn across the hand, and the burr, in being bent back and forth is soon loosened. The leather strop has rather the effect of giving a keen edge than of removing the burr. Fig. 8 shows how the hand stropping is done; note how the palm of the left hand is turned at each stroke to allow the chisel to be drawn across it.

It is obvious that sharpening the chisel on the stone necessarily starts a new bevel, and continuous sharpening gradually causes this bevel to become wider and wider, so that eventually it takes a long time to sharpen because so much metal has to be removed. Fig. 9 explains the idea. It is then time to have it re-ground so that a few rubs alone are needed to produce an edge. Incidentally this sharpening question is always somewhat of a bone of contention. There are

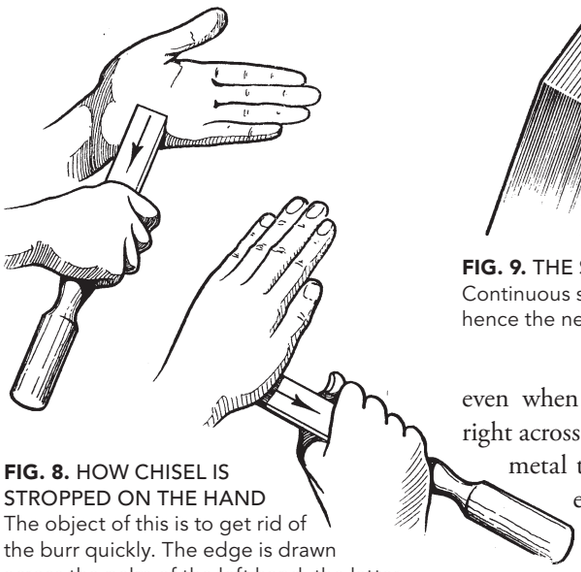


FIG. 8. HOW CHISEL IS STROPPED ON THE HAND
The object of this is to get rid of the burr quickly. The edge is drawn across the palm of the left hand, the latter being reversed as shown so that both sides of the chisel are stropped

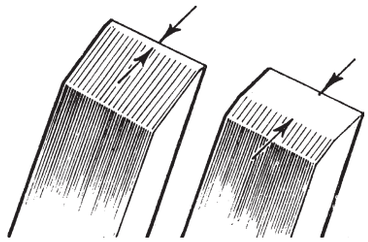


FIG. 9. THE SHARPENING BEVEL
Continuous sharpening makes a wide bevel, hence the necessity for grinding

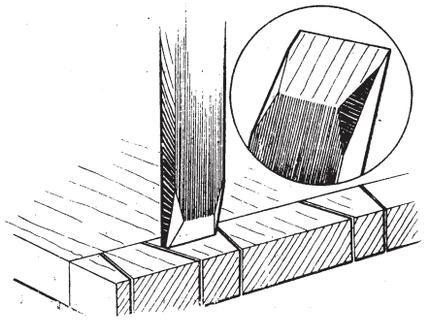


FIG. 10. CORNERS GROUND OFF
This is easily done when grinding, and enables the chisel to be used in awkward corners as shown

some craftsmen who never have a chisel ground. They begin to sharpen it at the bevel they require and keep it always at the same. In the case of a narrow chisel, say, 1/2 in. or less, I can understand that, even when the sharpening bevel runs right across the chisel, there is not much metal to remove, so that it is fairly easy to put on an edge without a great deal of unnecessary rubbing. But wider chisels to my mind take too long to rub down when the bevel becomes wide, and I prefer to have them ground.

On this question of grinding, always insist that a wet stone is used. A reputable grinder would not use anything else. But I have known of cases when a carborundum wheel has been used, and, this being used dry, the temper of the chisel is almost inevitably ruined. One last point on the grinding question is that it is an excellent plan to have the corners ground as shown in Fig. 10. Its great advantage is in such work as chopping dovetails for which a firmer chisel must be used. The ground corner enables the tool to be used much closer up to the saw cuts as shown.

SHARPENING YOUR TOOLS: WOOD CARVING

To be successful in carving your tools must be razor-like in the quality of their edges. You can't do good work with blunt tools

DIFFERING from ordinary woodworking tools, carving tools are sharpened on both sides. In fact there is almost as much bevel on the inside of a gouge as the outside. Consequently it takes a long time to put new tools into condition. The outside bevel already exists, but it takes many sharpenings with the oilstone slip to produce the bevel inside. With new tools, then, once a satisfactory outside bevel has been attained, any subsequent sharpening should be done inside with the slip until eventually a good bevel has been produced here.

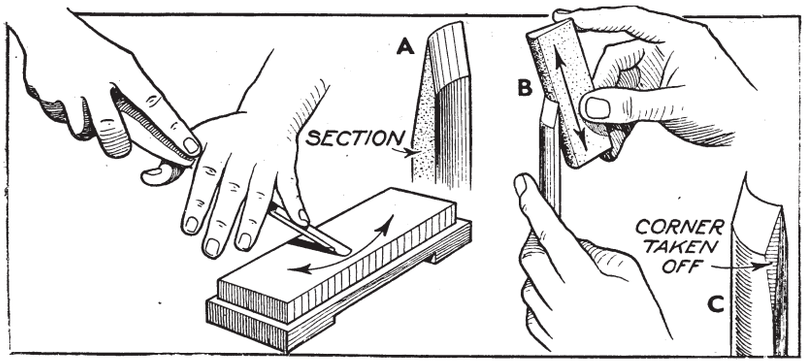


FIG. 1. STAGES IN SHARPENING A GOUGE WITH OILSTONE AND SLIP
To the left the outside bevel is being rubbed down. A is a section showing the inside bevel. B. Forming the inside bevel with the oilstone slip. C. How outer corners are taken off to reduce the thickness

The Gouge. Let us take an ordinary gouge; the size is immaterial as the principle is the same for all. Rub it on the oilstone as shown in Fig. 1, using a rocking movement so that every part of the bevel is rubbed. The stone should be fine, but a coarse one can be used providing the tool is finished on a fine grade. The angle is low—about 15 deg. When a burr has been turned up a stone slip of the same curvature as the gouge or a little less is rubbed inside as at B, Fig. 1. Be careful to keep the edge square and rub the tool equally along its entire edge.

A shows the extent of the bevel that is ultimately formed. This shows the bevels clearly defined for clearness, but in actual practice they should curve into the body of the tool gradually. It is a good plan to take off the corners of the gouge as at C, as it reduces a thickness which is often in the way when working in sharp angles and corners.

When a tool has become gashed or its edge is out of shape it should be stood vertically on the stone and be rubbed until it is square, or the gash has been removed. The flat so formed gives a definite line up to which to work when sharpening afresh.

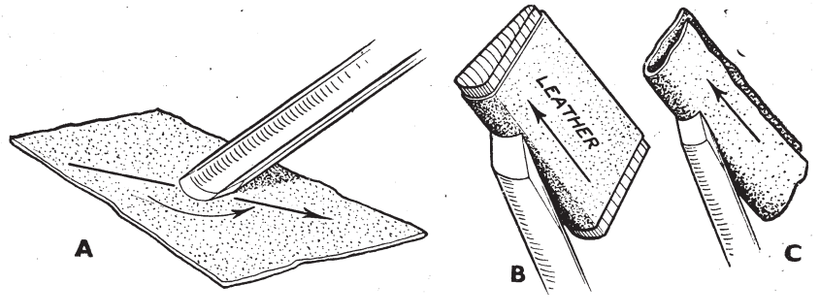


FIG. 2. METHOD OF STROPPING. STROP IS DRESSED WITH OIL AND FINE EMERY
A shows the outer bevel being stropped. The strop lies flat on the bench. B. Use of special strop for inside bevel. C. Strop folded for use on inside bevel

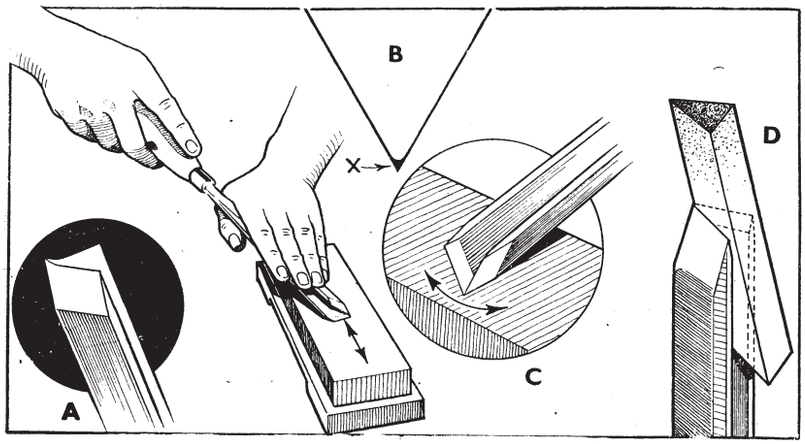


FIG. 3. SHARPENING V TOOL ON OILSTONE, AND USING SLIP
A. How point is formed at corner of V tool. B. Reason why the point occurs. It is owing to the inner thickness at X. C. Rubbing corner of tool to remove the point. D. Using slip to give inside bevel

Stropping. To produce the superfine edge necessary for good work stropping is necessary. Obtain a piece of leather about 8 ins. by 3 ins., oil it to make it soft and pliable, and dress it with a mixture of oil and the finest emery powder. It should be kept under cover because large grit which may fall upon it will soon ruin the edges of tools.

Fig. 2 shows the first process, that of rubbing the bevelled side. Maintain the same angle and revolve the tool as it is drawn diagonally backwards so that every part of the edge is reached. Never dub over the edge in order to reach the edge quickly. It is false economy in the long run because soon the strop will fail to produce an edge, and rubbing down on the stone becomes necessary. Actually a carving tool will go for weeks or months with no other attention than that of stropping providing it is properly used.

The inside of the tool is stropped also, and a piece of leather glued round a suitably shaped block is excellent (see B). The curvature of the block should be rather less than that of the tool. Another plan which is particularly useful for smaller tools is to fold up the strop as at C, or even use just the edge to fit into acute shapes.

V Tools. These in a way may be regarded as two chisels joined together at an angle, except that the inside surfaces have to be sharpened as in the case of the gouge. Fig. 3 shows how each bevel is rubbed down in turn, and the inside then dealt with as at D. There is one important point to watch, however. If the bevels are just rubbed flat on the stone and nothing more, a curious point will be found at the corner as at A. This is because the inside of the V tool, although theoretically a sharp corner, is in reality slightly rounded (see B at X). To get rid of this point the corner of the tool must be rubbed lightly with a rocking movement as at C. It will be realised that one reason why the inside corner is slightly rounded is that the oilstone slip (see D) used for the inside bevel is bound to lose its sharp corner, and this causes a round rather than a sharp angle.

* * *

Sharp tools are essential to good work

* * *