

Small Twist Drills

A SIMPLE SHARPENING DEVICE

By Len Brown

I AM aware that there has been a considerable amount of discussion relating to the sharpening of twist drills, and the somewhat involved geometrical formulae associated therewith. I trust this will not prevent the publication of details of a more down-to-earth solution of this ever-present difficulty experienced by many users of drills. Personally, I have found it impossible to attain the necessary skill accurately to repoint and sharpen drills free-hand, more especially the smaller sizes under 1/8 in., so that they cut freely and form holes reasonably accurate to size.

These are, of course, the sizes that are not covered by the several drill grinding jigs at present available, some of them at considerable expense.

I have been using my device for some two years with entire satisfaction; formerly I was compelled to admit to failure when required to perform on a small diameter drill.

My device consists essentially of a small vice in which the drill is gripped whilst the two cutting edges are formed by honing on an oilstone.

The material required is mild-steel or cast-iron, approx. 1-1/4 in. X 2 in. section, in a length of 2-1/4 in., this to be faced up accurately to the form and dimensions of sketch.

Particular accuracy is required in forming the 118 deg. inclusive angle, and in forming the two small "V" grooves at 90 deg. to base and exactly bisecting the apex angle.

The block is drilled, say 3/8 in. diameter, lengthways, for two clamping bolts,

it is then sawn into the two vice elements, the sawn faces being accurately machined.

The clamping bolts are a press-fit into one of the vice jaws, or cross pinned, the other having the holes reamed to a sliding fit on the bolts.

Suitably knurled nuts for the finger tightening of the jaws are required. The exact size and threading of these bolts can be as convenient; 3/8 in. B.S.F. is suggested.

The sliding jaw has the "V" grooves in which the drill is located, and as stated these must be very accurately formed, clean cut at 90 deg. to the base and exactly cutting the apex angle 118 deg. inclusive.

This sliding jaw, if the job is reasonably accurately formed, is reversible, so that either of the two "V" grooves can be brought into operation. One groove, it is suggested, should be small enough to enable the smallest drill used to be clamped, and the other to take say 1/16 in. to 1/8 in. diameter.

Now as to the manner of using the device; arrange the drill in the groove, lightly clamped, with the point protruding only just enough to allow for the formation of a new point, in order to minimise the amount of honing required.

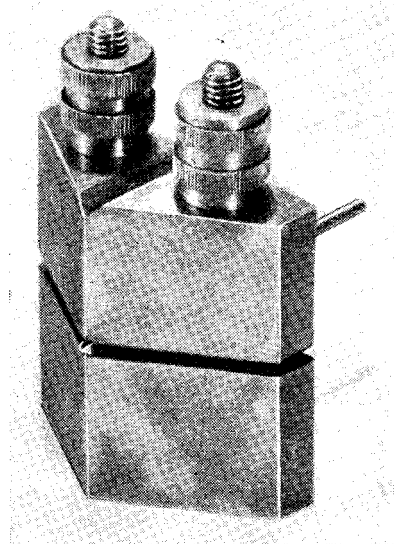
The only other operation required is to align the centre of one flute of the drill point with the line of the apex of the device, and slightly to rotate the drill anti-clockwise by finger pressure, or with small gripping pliers.

The amount of this offset determines the backing-off angle of the cutting

edges, and should be confined to the minimum that will enable the drill to cut freely. This will very quickly be found by a few trials.

For the very small sizes, a good glass will be necessary, or at least a help.

The clamping screws are now tightened, and one face rubbed on the stone until a straight-edge or rule will



The special vice, with small drill in position

pass over the surface without obstruction from the drill point, the other face is then dealt with in the same way.

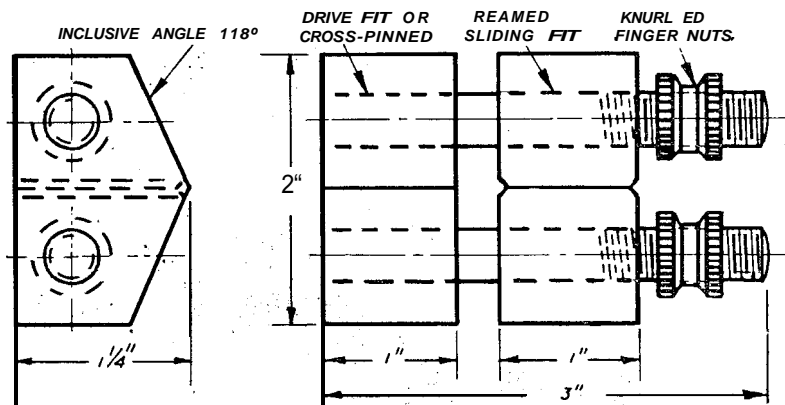
It is particularly noted that both edges are formed on the drill at the one setting thus ensuring correct angle of point, and exactly equal length of the two cutting edges—perhaps the two most essential features of drill pointing. You also have a definite control of the backing-off or relief of the cutting edges.

Of course, you have a flat backing-off; this will, no doubt, horrify the purist and the experts, who can produce the above features free-hand with the addition of a perfectly formed conical point. The fact, however, remains that for all practical purposes of the amateur or model engineer, drills with flat reliefs will cut at least as well and as accurately as those supplied by the makers of drills.

In the very small sizes, drills have always had this flat relief. All I can suggest is that a careful trial is carried out.

I am satisfied from my experience that this device will give extreme satisfaction to anyone who has had any difficulty with drill pointing, but only provided the tool is made accurately in the features emphasised, and care is taken with the setting in the "V" grooves.

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I have made large models with grooves to take up to 1/2 in. drills, and have used these in conjunction with an angle-shaped fence or guide fixed parallel to the side face of a grinding wheel. The drill is set in the "V" groove in the same manner as described above, but projecting sufficiently to cover the gap between the guide fence and the wheel. One angle face of the tool is held against the fence and the drill point traversed against the wheel until grinding stops; the other face is then presented to the grinding wheel, and results in a perfectly angled point, with exactly equal cutting edges and with a controllable angle of relief. I am unable to detect any difference in the cutting properties or the accuracy of even large diameter drills ground in this way, as compared with the normal. The chief value, however, is in connection with the smaller drills, which are not otherwise catered for. It should be remembered that all other cutting tools except twist drills have always had a flat relief as

accepted practice, including the old spade-pointed drills, "D" bits, and spot-facers, Slocum centre drills, etc.

My conclusion is that it is only where maximum length of life between grindings is necessary that the conical point is required and shows any practical advantage. With this tool to assist me in the pointing and sharpening business, I am not really concerned with obtaining the maximum possible cutting life, between grindings. In any event, it is a pleasant little item to make up, and the cost is practically confined to the time and effort expended.

Beyond the few general constructional suggestions given, together with the sketch and photograph, no further details should be necessary.

A refinement is a short length of compression spring over one of the clamping bolts, to give a spring operated opening motion to the jaws. A recess must be counter-bored in the fixed jaw to receive the spring when clamps are fully tightened.