Parting Tools and Their Habits

By A. W. E. Weatherall

THE writer makes no apologies; for this article on parting tools, as, judging by the number of "casualties" among this class of lathe tool in his own shops, it must, improperly handled (and ground), surely be the most "pesky" tool for apprentices or even improvers to use.

Incidentally, most of the troubles occur among the lighter types of lathes, say from 9" centres downwards. Above this size, the tools can generally be made of sufficiently deep section and proportionately wide to hold their own.

Wherever possible, as wide a blade as is economical should be used. For example, when parting down 3-1/2" to 4" material, a tool width of 1/4" to 5/16" would not be out of place, but would obviously be out of all proportion on 1" diameter and, smaller, throwing needless strain on the stock operated on, to say nothing of waste of good material. A tool 1/8" wide should be ample on this size, and owing to its smaller cutting surface would probably cut quicker, or at any rate easier.

Always part off as close to the chuck as possible, using an offset tool—see Fig. 1—if necessary to accomplish this end. Headstock bearings should have the last bit of shake adjusted up.

It has been the writer's experience that it is very important to keep the front rake as stiff as possible, never exceeding about 3°, the tool set dead on the centre of the stock. Excessive front rake often causes chatter, owing to lack of support under the cutting edge.

As regards general shape, a good deal depends on the finish required on the sides of the article parted off. For a good, clean finish, such as, say, washers or collars, the writer prefers a tool with the usual side clearance (about 3° each side), but nearly parallel in plan from front to back, not more than, say, 0.005" smaller at back than front of blade, about 5° top rake and 3° front rake, as shown in Fig. 2.

For faster cutting where finish is not so essential, then a lip is, on steel, very beneficial, also more back clearance can be given. The lip can be ground in the top of the blade (see Fig. 3); or another good method (especially when using parting tool blades in a holder, which are parallel in their length) is to heat the end of the blade sufficiently to be able to tap up the extreme end with a hammer, as shown in Fig. 4. This latter is the practice on at least one type of cutting-off machine that the writer has seen, cutting off stock 3" diam. and, more in this instance, the tools being fixed in a rotating head and the stock remaining stationary, the tools being fed in automatically.

To get back to lathe tools, however. The lip should always be an easy curve, so that the swarf comes off in coils. If the lip is ground, as in Fig. 5, the swarf will probably break and jam in the groove. (Operators at this point generally offer up a small thanksgiving service.) Dealing again with lip, the main thing is to get the swarf out of the parting groove. If the radius of the lip is too small, it has a tendency to make the swarf coil too tightly in the groove. This can cause a sudden jam when least expected, especially when the tool is a good way into the work, and either stalls the machine or breaks the tool.

Another very satisfactory shape of tool which the writer has used, especially on large diameter work, say from 4" upwards, is one used upside down with the headstock motion reversed, either
through reverse-gear in the headstock or crossing the step-cone belt. It is forged out and ground in shape like a reap-hook, as shown in Fig. 6. Owing to the nice easy curved top or more rightly under-rake, plus the upside-down position which usually damps out any tendency to chatter, these tools are fast cutters and easy to handle. For brass, any top rake at all is asking for trouble; in fact, a slight negative rake is often beneficial. The writer has found that a short stocky parting tool is very useful on brass or gunmetal for straight turning and shouldering down. The tool is best set with one corner slightly leading, as shown in Fig. 7; not much, only a question of a thou. or so A job as per Fig. 7-shouldered studs would be produced without changing tools. Rough down stud to within about 0.005, and then take a shaving cut to size to produce a good finish. And now a few tips on using that nice lipped parting tool, Mr. Apprentice. Do not be over cautious and hesitant when feeding the tool in, as this will often start chatter as quickly as anything. Run the tool up to the work; use plenty of cutting compound, and feed in steadily and firmly as though you meant business. When it starts cutting cleanly, keep it on the run, but do not forget to watch out for tightly packed coils in the groove and be ready to stop feeding immediately it seems like jamming.