

## Selection and use of files

GEOMETER indicates which file to use for a specific task and gives a few hints on their maintenance

**T**HE PROCESSES of marking-off, drilling and sawing, described in previous articles, often precede filing operations. To save time and effort surplus material should, so far as possible, be reduced to a minimum in these previous operations.

An attempt should be made when sawing metal to keep a distance of 1/32 in. to 1/16 in. If the metal is thick make sure that the saw does not bend or run. After sawing it is a question of choosing and using files.

### File sections

The diagrams show the more common file sections, choice of which is often settled by the physical limitations of the work. To elongate a drilled hole, for example, a round file, A, would be used, while to square it, a square-section file, B, would be used. The corners then might be finished with a three-cornered (three-square) file, C-this type has sharper corners.

Flat surfaces and outside curves can be produced with the ordinary flat or rectangular-section file, D. Normally, this has one smooth edge to run against shoulders without damaging them. A round-edged or joint file, E, will produce a radius against a flat surface, though it can be used for general filing.

### For use on flat surfaces

A half-round or D-section file, F, may be used for flat surfaces or to produce internal curves when they are of large radii. A knife file, G, will go into sharp corners or between segments-such as those of commutators of dynamos or automobile starter motors.

A file may be single-cut, H, or double-cut, Z, depending upon whether it has one or two series of grooves forming teeth. Freer and more rapid cutting is obtained from double-cut files, although the finish tends to be poorer than that produced by single-cut varieties.

Terms rough (or coarse), second-cut, smooth, and dead-smooth in-

dicating broadly pitches of teeth. A rough file may be 20 t.p.i., a second-cut about 40-, a smooth about 60-, a dead-smooth 100- or more.

The general principle is to use the coarser files for the softer materials and roughing out, and the finer ones for harder materials and finishing. Another fairly common practice, is to use new files for brass or hard alloys, then to use them on to mild steels.

### The right length

For general use when choosing the length-when it is not already settled by the size, a blade length of 12 in. maximum for a large file, and 5 in. minimum for a small one will be the most economical. A long, coarse file will not necessarily remove metal quicker than a shorter and finer one, since important factors are the comfortable swing of the arms and the pressure which can be applied. On the other hand, a very short file, even on small work, can be restrictive.

It is always wise to fit a handle to the file, gripping this with one hand and holding the tip of the blade with the other. For cavities or holes, the file will have to be used with two hands on the handle.

### Avoiding scratches

All metals tend to clog the teeth of files, the softer ones more than the harder. These include aluminium, iron, certain mild steels and, of course, lead and solder. For these, a coarse pitch of tooth should be chosen and light pressure applied to the file. Chalk may be applied to the file to reduce clogging; once pieces have started to adhere in the teeth, work should be stopped and the file cleaned otherwise the surface will be scratched and scored.

A wire brush or "file carding" can be used to clean out adhering fragments, though a spiked instrument such as a sharpened piece of rod is necessary for stubborn pieces deeply embedded.

When working on line surfaces, even on tool steels, it is important to keep the file clean as the work approaches completion, otherwise

scratches will appear on the finished article. The file is best cleaned with a piece of brass or mild steel about 1/2 in. to 3/4 in. wide sharpened to a chisel edge; this is pushed into the teeth and moved diagonally across the file, clearing fragmented metal before it. This is the only practicable method of cleaning smooth and dead-smooth files.

Draw filing-as illustrated in J-holding the file flat on the work and drawing with both hands can be employed to finish substantial flat surfaces. Flat pieces on which a straight edge is required should be filed from the end, at the finish, K; very small components can often be rubbed on the file to produce a better final flat surface.

Sections of the most common files and an illustration of draw-filing

