Free-hand contour turning

By GEOMETER

To turn a contour by the hand control of lathe slides is an accomplishment of the skilled turner. Usually it comes of practice in which the movements of the hands have been co-ordinated with the shape which you have in your eye.

Initial skill varies considerably between individuals, as was found in the war, when one of the tests for lathe recruits was to trace geometrical figures with a point controlled by a pair of slides at right-angles.

A small proportion of newcomers could do this immediately. The others had to practise to succeed. All except a few-who had no aptitude--eventually achieved a good standard.

Taking the average as the example, anyone who is used to

It can be in a thin metal like mild steel made by carefully filing and scraping to a scribed line. Placed on the work, the prolile shows the high spots against a light background, such as white paper. You chalk the humps with the lathe running ,slowly. Then you turn them down with the round-nosed tool and test again. It is a lengthy and rather tricky process until you get its measure, for you are continually turning off the chalk marks and having to renew them.
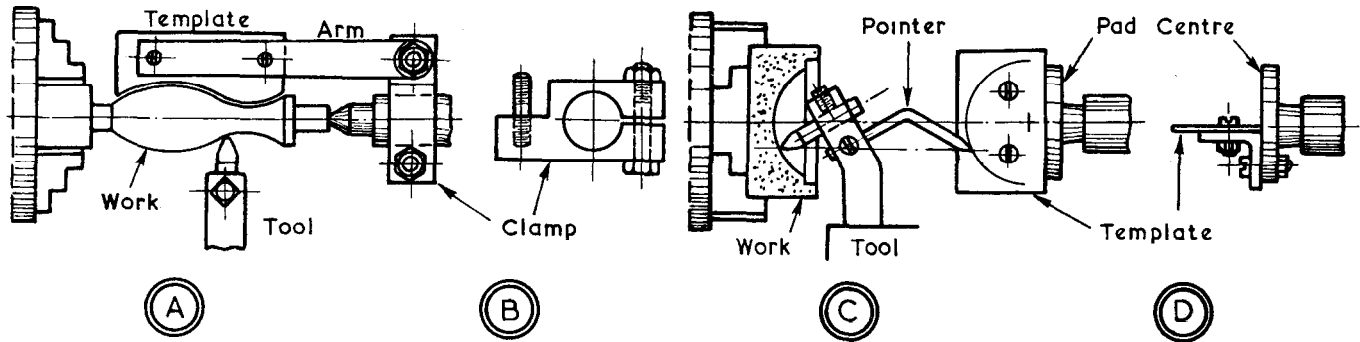
As you work, the thought occurs to you that you need a third hand to hold the template near to the work, so that you can see the humps and where to traverse the tooL At any rate that is what happened with *me.* My solution to one problem is shown at *A* and *B.*

You make a clamp for the tailstock barrel, fix an arm to it by a stud and nut, or a bolt, and attach the template to the free end by *screws* and nuts. For the preliminary operations and rough-turning the profile, the template is swung at right-angles to the tailstock; for finishing it is brought round close to the work. An improved alternative to the simple hinged arm is a double or multiple-jointed one, which allows the template to be brought squarely to the work at any diameter.

Normal practice is to turn the top diameters on the work to calipers or micrometer and then use the round-nosed tool to machine the hollows, keeping the template close as the profile nears its finished form. Swarf should be brushed or blown away, as should filings when the profile is being smoothed. With care, blanks for form cutters can be made like this.

By adapting the principle, I solved a problem of machining an inside radius without a spherical turning slide. Tool and set-up are shown at C and *D. The* radius had a reasonable tolerance so that it could be finished by scraper and emery-cloth to a plate gauge, which I turned from mild steel.

I had a pad centre which I drilled to take a piece of angle iron and a template which carried a scribed radius the same

plain turning can, by practice, obtain passable results in free-hand contour turning; and once you have the knack, it is like riding a bicycle-you never really lose it again.

A one-off operation, such as a ball handle, can always be tackled with confidence, to say nothing of the non-fitting radii which are specified on many components. For these and similar features which do not mate with other parts, a tolerance of plus or minus 0.010 in. is accepted in commercial work. Some engineers call it an "air fitting." After the turning, form is improved by careful filing; emerycloth gives a smooth finish.

Adherence to *a* designed shape, and consistent results *on* a number of parts, demand a contour gauge or template.

as that in the work. I set it to height with a surface gauge before twisting the centre round for the template to lie horizontally. The tool holder carried a pointer whose end I was at pains to set in the same plane as the tool point. By traversing the tip of this pointer round the radius on the template, using the topslide and the cross-slide, I made the tool point describe a radius in the work.

'Several cuts were needed to get to full depth after the centre of the work had been relieved by drilling. It was convenient, I found, to bring them outwards from the centre for roughing, and to take them inwards towards the centre for finishing, the template being moved up a little for each one. I3