

## Accurate length machining

By GEOMETER

**A**S IN THE CASE OF diameters, there is not always the need for precision on width and length measurements-but when it is demanded accuracy is no less important on the one than the other. Given a micrometer, diameters can easily be checked as work proceeds; but if width and length measurements have habitually been made with a rule-with all the variations that that implies-the need for greater precision may find one unprepared. Yet accuracy when machining widths and lengths is relatively easy to achieve.

On a lathe having a topslide feed with graduated collar readings can be taken from this for positioning tools for facing cuts, and in some instances longer lengths can be obtained using the leading screw.

Again, very accurate work can be done using simple gauges for setting tools, and this is often practised as occasion demands even on lathes fitted with feed collars.

For old-type lathes without feed collars, or on which screws are worn, the use of gauges is virtually imperative to ensure precision and speed up production.

The principle is as illustrated at A, where a piece of material is turned with two shoulders. The lengths could be measured with a rule; but a much more precise and speedier way is to machine the lengths slightly oversize then employ two gauges X1, X2, to set the tool for finishing cuts. With the lathe stopped, a gauge is held to its respective shoulder and the tool set just to touch; then the gauge is removed and the cut taken at the precise position.

In most workshops there are numerous objects of reasonable pre-

cision, such as drill shanks, silver-steel rod, pieces of ground tool steel, etc., in standard sizes which can be used as gauges. If a micrometer is available material may also be turned or filed to size, and then it is possible to add to or delete from nominal dimensions for particular fits.

For example, if a flange is nominally 1/8 in. wide, but for a clearance fit 0.002 in. endplay is desirable, then the gauge could be made 1/8 in. minus 0.002 in. Again, if necessary, widths and lengths can be obtained falling between inch fractions, which would demand estimation on a rule.

The chuck face or a jaw can be used as a datum for gauges, but one extra is required since the two gauges, Y1, Y2, only locate the end face and one shoulder; another would be needed for the second shoulder. Besides this, the gauges are in general longer and would require to be made specially.

On second operations, however, measurements can be made from the chuck face or jaws, though when a holder is used it is best to work from its face which, as at B, should be flat and large enough to take the gauges squarely.

As at C, a recess can be machined to depth by finishing the interior over-length, then using a gauge to set the tool for the outside facing cut. Where a groove must be accurately located from the end face, either of two methods can be employed. The tool edge may be set flush with the end face, then taken in by feed collar reading, or a step gauge can be used, C.

The principle is applicable to back-facing flanges, as at D, where the gauge is a simple adjustable type set by using a block of suitable thickness in conjunction with a straight-edge.

A variation of such a step gauge -snipped or sawn, then filed from sheet metal-is as at E for obtaining the over-all dimension of a pair of flanges on a shaft machined between centres.

Beyond the flanges, the shorter lengths can be obtained with other gauges. Locating from the saddle, as at F, an adjustable stop can be fitted to the headstock to take gauges in the space, Z.

