WORKSHOP HINTS and TIPS

V and angular faces

By GEOMETER

For the major part, production engineering involves the reproducing of ordinary dimensions and angles as accurately as possible. It is a method which must be followed in both full-scale and miniature practice if results are to be satisfactory.

The professional engineer may have an extensive range of measuring equipment to help him. Basically it consists of slip gauges for linear dimensions, and slip gauges with sine bar and rollers for angles; or there may be a set of angle gauges.

Although the amateur may have only his usual equipment-lathe, micrometer, indicator, protractor, and so forth-with care and skill, and following certain principles, he can achieve a very high standard of accuracy.

A standard set of angle gauges contain s five in all-a large one with angles of 30, 60 and 90 deg., and four with angles of 1 deg., 3 deg., 9 deg. and 14 deg. I do not suggest that all these are necessary for an amateur, but a square in plate material is always useful for marking-off, setting-up or checking parts; and by using it smaller angle gauges can be made. The material can be mild steel or gauge plate, 1/16 in. to 5/32 in. thick, or thicker if desired.

The lathe and indicator are used for checking and comparing angles on an alignment principle, which is similar to that for a V-block in verifying that the vee is true with the base. This is done, as at *A,* by mounting the V-block on the faceplate of the lathe, clamping it with pieces of packmg and setscrews in plates. It is set with a square vertically from the bed, and the top slide is adjusted so that the indicator shows a steady reading when run along the face of the vee . Then the lathe is turned 180 deg. to test the other face. A deviation on the indicator reveals an error of alignment.

To set up a square in plate material on the lathe, you can mount it on the end of a faced block, as at *B* and C, the block being machined in the four-jaw chuck and drilled and tapped for studs. The square is drilled to hold by a nut and washer, and one edge is pressed back to the faceplate. With the block under the square, the slide is set to give a steadv reading on the indicator along length X. Then the lathe is turned 180 deg. and the indicator is repositioned to check along the same length Y. A deviation here shows that the square is not true.

If the square is true, or its error has been rectified, alignment to the base can be tested, as at D, placing the base to the faceplate and using the indicator to run along the edges with the top slide set over, and turning the lathe 180 deg. for the second test. A deviation in reading would then show an error in alignment to the base comparable to an error on the test of a V-block, as at *A.*

Having obtained a true square, we can use the following principle of testing gauges for smaller angles. The square can be clamped to an angle plate on the faceplate and its base set true by indicator. Then a stop bar (E) can be bolted up to one of the 45 deg. edges, and the square removed . Two gauges of 223 deg., clamped to the angle plate, should then give a steady reading on length Z, or when the lathe is rotated. Three gauges would have angles of 15 deg. With accurate gauges at small angles, smaller ones still can be made.

In making a square or smaller gauges preliminary work should he done as accurately as possible by normal means and one edge on each finished by lapping. Two or more gauges should be done together to keep the angles the same. Assuming an error on test C along length Y, you should take half the deviation and mount the gauge on the angle plate on the vertical slide, as at F, for correcting with a cupped grinding wheel.

With two or more gauges on test *E,* the error should be divided between them in setting up for grinding.