

# FLATFACES BY GEOMETER

**T**HERE are few components without at least one functional flat face among their features. As simple examples, plain washers are flat each side. Nuts are flat on their undersides, bolt heads flat at their shoulders. It goes without saying, of course, that important faces like those of surface plates should be flat. The same is true for the bases of surface gauges, and the faces of micrometer anvil and spindles. Yet flatness is a quality which cannot be taken for granted.

There are washers-not neatly parted off-which are improved by rubbing on a flat file or a Swiss file, according to their size. This occasionally applies to nuts-which should be fitted flat side down on their bolts or studs. As for bolts or screws in quantity, one can always-as with apples-be at pains to pick out the good ones.

In the preservation of flat faces, care constantly exercised is very important-particularly for tools. Automatically, one should wipe, with a clean rag, surface plates, slides and the undersides of surface gauges. When micrometers are to be closed to zero, notepaper should first be gripped lightly between their anvils and spindles, and then drawn out, leaving the faces clean.

In machining flat faces on the lathe, numerous factors influence the results. They include the shape and sharpness of tools, the rate of feed, the rotational speed of work, and good adjustment of slides. Except for light facing cuts on small parts, the saddle should always be locked to the bed. This can be done by engaging the leadscrew nut in the absence of other provision; and the topslid screw should be turned to eliminate backlash. For a large facing job, optimum resistance to thrust is obtained from a bar bolted across the bed behind the saddle.

Given basic accuracy, the correct butting together of two flat faces can still be made impossible by inattention to detail features. A sharp corner should be machined where a flat face joins an outside diameter (the

spigot on a cylinder cover, for example); while the corresponding bore (end of cylinder) should have a chamfer. Both outside edges or diameters should be lightly chamfered, as should the mouths of holes that are tapped, and the ends of holes which are drilled to pass studs or bolts.

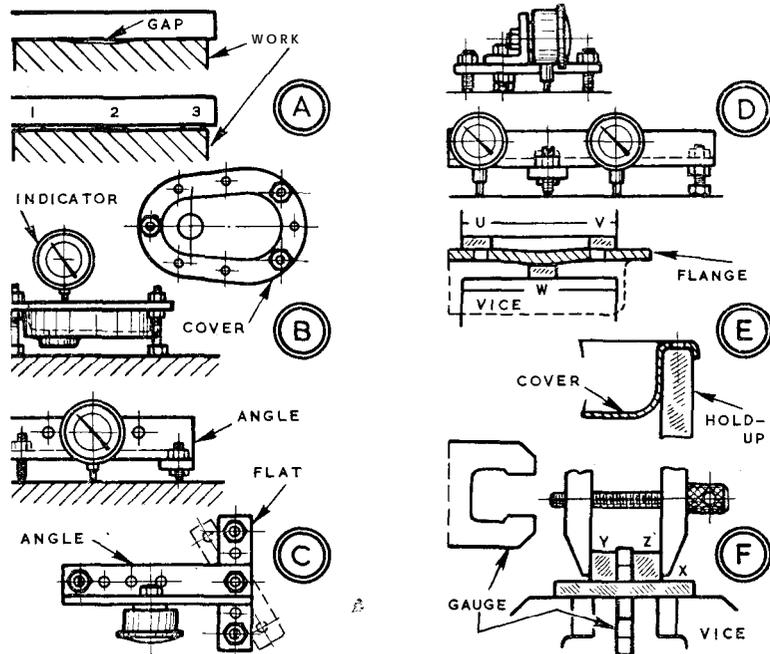
The facing of surfaces which are not quite flat can often be done by rubbing them on a smooth file. They may also be rubbed on a sheet of emery cloth

With a surface plate, and with suitable setting up of the work, a surface gauge and indicator afford an excellent means for testing flatness. One example, as at *B*, is the flange of a cover, which can be supported and levelled by three bolts. Then the indicator can be run round.

On occasion, it is necessary to check the accuracy of the surface which supports testing equipment-the cylinder block of an engine, for example. For this, the indicator should have a low support, which can be provided through angle iron and a flat strip bolted together, with three screws for feet, as at *C*. The flat strip may be angled to clear bores or waterways.

A large surface plate (sheet of glass to be packed) can be verified on a similar principle, with a device, as at *D*, employing two indicators, one beyond the feet.

Corrective measures for truing faces include straightening the flange of a



on a surface plate. Fine finishes are obtained by lapping.

A thin film of fitter's blue, or red lead and oil, on a face will reveal the contact areas of a mated one, for correction by filing or scraping. Alternatively a straightedge can be placed on work, as at *A*, to check for gaps against a strong light. Again, strips of paper, 1, 2, 3, should be equally gripped on a good surface.

cover, as at *E*, with blocks (UVW) stuck by adhesive tape to the vice. The flange of a sheet metal cover can be hammered on a rectangular hold-up.

To keep a small face flat in lapping, as on a gauge, guard block should be clamped each side, as a *F*. To keep all level, a flat piece (X) is laid on the vice; then gauge and blocks (YZ) are pressed on it and clamped. □