

## Machining simple. crankshafts

By GEOMETER

**D**EPENDING on its construction and the type of engine in which it will be fitted, the single-web crankshaft can be made in various ways. In a first-attempt small steam-engine everything may be arranged in the easiest manner, taking what might be regarded as a mechanical liberty, but excusable in the circumstances.

At the other extreme, in the case of a fast high-compression petrol engine, "correct" engineering principles in regard to the type of component must be followed-for to do otherwise would be courting disaster.

Making the crankshaft as simply

as possible, flat plate material can be employed for the web, holes can be drilled and, if necessary, tapped for the mainshaft and crankpin. Then these two parts, to fit in the web, can be shouldered by turning in a lathe-from which it follows the essential aliment of the finished crankshaft will depend partly on the truth of the holes? but mostly on the shoulders abutting firmly to the parallel web material.

Using thick plate material for the web, basic alignment of mainshaft and crankpin holes is vital; so the holes should be drilled and bored with the material clamped to the lathe faceplate, or sub-faceplate--and this principle is extended to the more complicated constructions with separate webs.

But when for any reason, whether to further mechanical design or as an essay in turning skill, it is desired to machine a crankshaft from solid material, or true a brazed-up or welded-up type by light machining cuts, then the problem of mounting on the lathe finally reduces to achieving a suitable set-up for machining the crankpin in alignment with the

mainshaft-since the mainshaft can be dealt with by centring the material each end and turning between centres. Thus, using round material for a machined-from-the-solid construction, there is after the first operation the finished mainshaft with a thick "web" at the end in which the crankpin is contained.

For the second operation, to machine the crankpin, either the mainshaft or the flat back of the web can be employed for setting up, the one requiring an angle-plate on the faceplate, as at *A* and *B*, the other a sub-faceplate, as at *C* and *D*.

For the angle-plate set-up, two pieces of plate material can be used, comprising the base and the cap. The base should be bolted separately to the angle-plate and the cap attached by two or four studs to the base. To accept the mainshaft, the cap should be fitted with paper to the base (the paper finally, being left out for the cap to grip) and the two drilled and bored on the joint line, as at *A*.

Where the crankpin will come, the angle-plate or base can be drilled for a small driving pin fitting in a hole in the back of the web. Then, with the crankpin centre marked on the front of the web, the shaft can be fitted and the angle-plate adjusted on the faceplate, as at *B*.

For the sub-faceplate set-up, any square or disc of plate material can be used-not less than about 1/4in. thick. Projection from the main faceplate can be achieved by equal-height metal blocks, or pieces of stiff tubing faced off to the same length for bolts; but for preference, blocks or parallel packing should be used. The sub-faceplate is bored to accept the mainshaft-and may also be faced for the web. As before, a driving pin can be fitted-where the crankpin will come, the crankpin centre marked, and the shaft fitted. Then the sub-faceplate can be appropriately adjusted.

The shaft mounting can be in either of two ways. Parts of the web to be removed can be drilled for counter-sunk screws, as at *C*, *X*, *Y*, and nuts used to the sub-faceplate. When the shaft has a thread, however, this can be used, as at *D*.

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