SHRINK FITS

WORKSHOP HINTS and TIPS

By Geometer

With heat taking an active part in bringing it about, a shrink fit can have certain advantages in component assembly over a normal interference fit, in which no account is taken of heat and it is assumed both components (the " shaft " and the " hole " as they may be conveniently termed) are at the same temperature.

Obviously, by varying the dimensions of shafts and holes, a range of interference is possible. This 'is aided by the fact that metals possess elasticity and compressibility, a fact which has long been covertly recognised in such terms as " light driving fit." " heavy driving fit," " press fit," etc.

The difference in dimensions between components providing these different fits may be quite small; so the limit is soon reached at which an excessive amount of force would be required in assembly. it is then that the shrink fit, if it is practicable, has advantages. Little physical force may be required for it; and components can be put together more firmly than they wuld by solely mechanical means, in which there would also be the risk of scoring or abrasion.

Phenomenon **of expansion**

The shrink fit functions, of course, on the dimensional difference between metals in the cold and hot states- a rod, as at A, lengthening as it is heated. Normally, such expansion passes unnoticed; but it becomes marked if a rod held in the vice is heated with a welding torch. It will stretch and bend away from the source of heat. The principle has a certain effect in hot-riveting, besides permitting improved swelling of the shank and facilitating formation of the head. Cooling, the rivet tends to contract lengthwise and draw the plates more firmly together-if the process is speedily performed.

It operates similarly in the case of " shaft and hole " as at ***B*** with the hole in a disc or collar tod small to pass on to the shaft with both at the same temperature. But with the disc or collar heated, the shaft can enter easily, and the two lock together as their temperatures equalise. In some instances, a fmal tap or press may be necessary should a slight gap be left between the disc and shoulder.

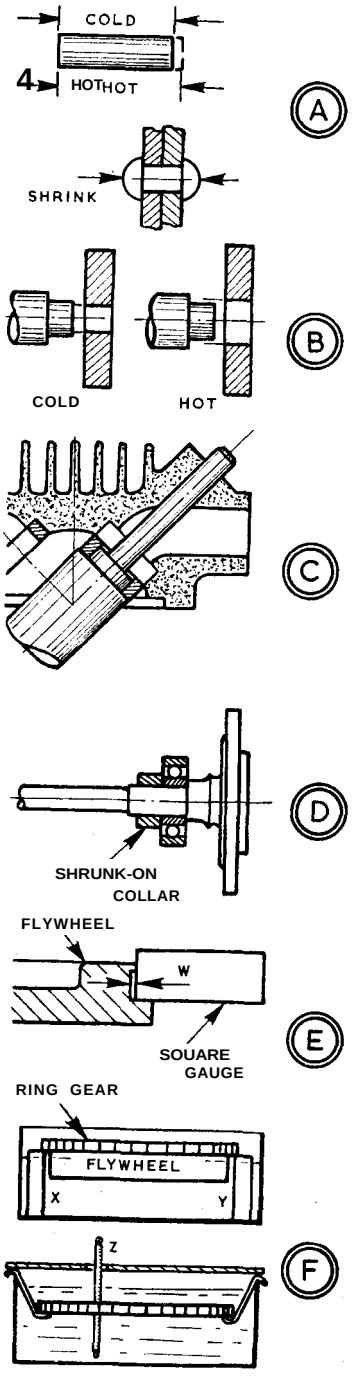
With two metals having different rates of expansion, the larger rate being with that forming the " hole " perhaps subject to heat in normal working, a shrink fit may be virtually essential, as in the case of an aluminium alloy cylinder head fitted with bronze valve seat inserts. Then it is ad visable to arrange the dimensons so the inserts can only just be fitted (or with light force) when the head alone is heated. A steel mandrel carrying the insert, as at C, is needed for speedy work when the head has been heated in oil.

Locating collar

The efficacy of a shrink fit is such that it can be used on components in vital situations. The bearing of each rear axle shaft on one model of a well known make of car is located by a shrunk-on collar, as at ***D;*** and when bearing or oil seal has to be renewed, the collar must be cut through or turned off in a lathe. In assembling the new one, it is heated to dark blue (about 300 deg. C.), dropped and driven on. Another maker has an alternative thread and nut at the same position.

The ring gear of a car flywheel is usually shrunk on; and as at ***E,*** the seating may be behind a lip, showing a space ***W*** about 0.008 in. to a square gauge.

Removal is effected on a set-up as at ***F,*** supporting the ring gear on blocks XY, just clear of the water in which the flywheel is submerged, heating with a welding torch, and letting the flywheel drop out. To fit the new ring gear, it is expanded supported on hooks in engine oil (at 200 deg. C. or 392 deg. F., checked with thermometer Z), then lifted out and dropped-and tapped if necessary -on the flywheel. El



OVER 260 hints and gadgets for improving workshop efficiency are contained in Aids to *Workshop Practice.* by C. T. Bower (Odhams, 18s.). Among the subjects dealt with are assembly methods, marking out,. clamping, electrical work, power transmission and lathe work. Most of the ideas and devices are applicable to the requirements of both amateur and professional craftsmen, and though the emphasis is on metalwork, many of the methods can be adapted to woodwork and other allied crafts.-E.T.W.