CRACK DETECTION and PREVENTION

WORKSHOP HINTS and TIPS

By GEOMETER

APART from direct observation there are two simple ways in which cracks can be detected in components, depending on the size and type. One way is to "ring " the component with a tap from a hammer, the other to soak the component in warm oil such as thin lubricating oil or paraffin, remove and dry, and paint thickly with whitewash. When dry -and particularly if the component is warmed-the oil exudes and stains the surface along the line of the crack which otherwise might be virtually invisible.

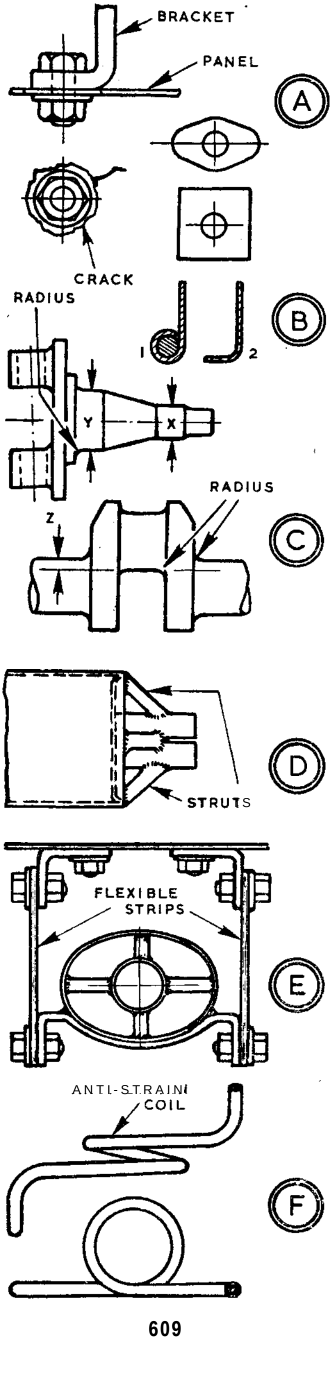
The method is applicable to all sorts of components and engine parts. It is, perhaps, the best substitute for a proper magnetic crack test which is not always possible, and usually beyond amateur scope.

Not always apparent

In some instances, though cracks may be suspected they may not be readily apparent except under working conditions. This can be so with hot parts like exhaust manifolds, or where there is pressure as in lever type hydraulic shock absorbers. Evidence may be a trace of soot on a manifold, or persistent loss of shock absorber fluid. Warming the removed manifold with a blow-lamp may be helpful in opening up the crack: while for shock absorbers, the whitewash method is effective-paint scraped off, and the lever worked to create pressure. If stains appear, it means a new shock absorber.

Parts subjected to unusual strain should be inspected from time to time when convenient. These include steering arms on cars, which may have to be scraped and cleaned with emerycloth, and the front forks of cycles-where these join the internal head tube, and where breakage sometimes occurs.

Often, of course, cracks can be prevented by good design. Sheet metalwork which is subjected to strain and vibration can be verv prone to cracking; and unless there is some support for a panel at a bracket, a crack may completely encircle a bolt, as at *A*. In these circumstances large washers can effectively distribute strain over a wide area. They may be round, oval or square.



Much can be done in design to distribute strain and increase the resistance of parts to cracking and failure, sometimes with less effort or weight than formerly. The edge of a panel, for example, may be stiffened by rolling over a wire, or simply by flanging-as at Bl and B2. Oddly perhaps, the latter construction is much stronger and less liable to cracking than the former when used for mudguards on vehicles.

Axles and crankshafts

Cantilever-type components like swivel axles, are smaller at the outer end x than at the inner end y, wbere the strain is greater. An overlap of crankpin and mainshaft, Z, on a crankshaft, as at C, greatly Increases strength and allows the use of narrower webs. A radius at the junction of a diameter and a flange or web is always advantageous.

Where there is flexibility and insufficient support for a component, cracking can be a problem. This frequently occurs in the exhaust systems of vehicles, with the endplates of silencers breaking out. An effective way of overcoming it is to weld struts made from pieces of 1/4 in. rod from the body to inlet and outlet pipes, as at D, leaving sufficient clearance for applying clamps. The alternative would be some sort of large washer on the endplate, which might not always be effective.

The problem can be increased if the silencer has no supporting bracket. One can be provided, as at *E*, by welding a strip centrally under the silencer, and bolting it to flexible strips such as narrow belting, which transmit neither noise nor vibration.

Ordinary small pipes, of course, can be given an anti-strain or vibration coil, as at *F*, which is commonly used for petrol pipes-when for gravity feed, the coil should lie horizontally. ❑