Pinion and crown wheel adjustments

WORKSHOP HINTS AND TIPS

By GEOMETER

FOR meshing adjustments giving correct tooth markings and quiet running of a pair of gears, there are no better examples than the means employed in automobile rear axles. Speed and loading here can be extremely high; and a fault, developing, can make itself apparent audibly in any degree from a loud hum on drive or over-run to a very obtrusive " mangling." The margin between correct meshing giving quiet running, and wrong meshing with objectionable noise, is often extremely small-which means correct bearings and fitting, and fine adjustments are essential.

Where thrust loads (which can be very heavy) are involved, bearings must be special ball or taper roller type. Ordinary journal loads can be taken by ball bearings (races) or parallel roller bearings. Plain bearings are not normally used for pinion and crown wheel, but occur in the differential where relative rubbing speeds are lower. Faulty bearings, of course, give rise to symptoms similar to those where the defect is incorrect meshing -so sound bearings are presumed.

There is variety in the way pinion adjustments are made while fulfilling the mechanical requirements. As at ***A.*** upper diagram, the pinion shaft may be an assembly, with its bearings, contained in a sleeve fitted separately to the axle casing. At the front the sleeve has a flange, abuts to the casing, and is held by setscrews. Shims between the flange and the face of the casing provide for varying endwise location fractionally, by inserting a shim or taking one out.

Detaching the propeller shaft, removing the setscrews round the flange, and tapping the assembly forward, one has access to the shims, which may be in halves for easy extraction. In removing such half-shims, however, care is required. Both must be the same thickness, and all shims in a pack are not necessarily the same, some of the thinner ones being perhaps 0.003 in. and others 0.005 in. thick.

Screw adjustment for a pinion shaft can be provided as at ***A,*** lower diagram. The bearing next to the pinion is a parallel roller type, and the other is a special ball- journal-and-thrust pattern, located endwise between two threaded rings S and ***T.*** Both these have serrated edges; and the front is locked by a washer, and the inner by a plate with an internal tongue screwed on the casing.

To make adjustment, locking washer and plate are removed? front ring S is slackened, and inner rmg ***T*** turned by punch or screwdriver. The plate with tongue is fitted to hold this ring, then the other tightened and locked. The ball bearing is thus moved bodily in the casing, while the rollers move endwise in the outer track of the inner bearing.

A simpler arrangement for manufacturing, but more difficult to adjust, is the use of shims or collars on the pinion shaft, or against the cup of a taper roller bearing-when the pinion shaft usually has two taper roller bearings and a spacing sleeve.

Endwise adjustment can be made, as at ***B,*** either by spacing collars of different thickness behind the pinion at U, or by shims at the shoulder ***V*** in the casing where abuts the cup of the bearing. A gauge may be necessary to verify the setting of the pinion endwise, and a selection of collars or shims to make adjustment-with the whole assembly dismantled.

A crown wheel can have adjustment of a similar type, as at C. A bolted-on cap secures each cup of the taper roller bearings in the casing; and a " spreader " is used to "splay" the casing fractionally when fitting or removing the crown wheel complete with bearings.

Shims at ***W*** and X between the differential and the bearings, provide for bearing adjustment and crown wheel meshing. Simply adding shims at one position or the other will take up play in the bearings; but to mesh the crown wheel more deeply to the pinion, a shim or shims must be transferred from X to W-and a puller is needed to remove the bearings.

Where there are nuts with locking washers, as at ***D,*** adjustment is simple. For deeper meshing, nut Y is slackened, and nut ***Z*** tightened a similar amount. To take thrust properly, the special bearings must be fitted as shown. ❑