Hardy Spicer Joints

By GEOMETER

IN Commercial **use** there is perhaps no universal joint better known and more widely applied than the Hardy Spicer type. The normal car employs two-one at each end of the propeller shaft-while a vehicle with de Dion or independent rear suspension requires four, two for each rear wheel driving shaft.

The joint is also often used on racing cars or specials for transmitting motion from the steering wheel to the steering box through shafts disposed at angles to clear the engine-where it is impossible to use a simple straight shaft or column.

Essentially, a Hardy Spicer joint consists of two forks, as at ***A,*** engaging with a cross or spider, as at B, via sleeves and needle roller bearings-a simple enough arrangement in principle, but with the details very well contrived.

The forks are not subject to wear and are not hardened. Each has two bores in line; and near the outer end of each bore is a circlip groove. The spider is hardened and accurately ground on its four journal surfaces. The sleeve bearings have blank ends and, like the needle rollers, are hardened.

In assembly, the large bores in the forks permit the spider to be entered at an angle; then the sleeves with needle rollers can be fitted in the forks from the outside, tapped down just beyond the circlip grooves and held in place by fitting circlips.

The sleeves having blank ends, the lubricant cannot be flung out by centrifugal force; while a cork seal in a steel retainer on each journal of the spider closes the open end. On renewal, a boxed kit of parts is available, consisting of the spider with seals, four sleeve bearings with needle rollers, and four circlips.

On a propeller shaft the universal joints can be checked by hand for lift and rotational play in themselves -ignoring, for this purpose, the play in the differential. Wear in the joints can result in a " clonk " as the drive is taken up, a rattle when the drive is over-running, or a periodic vibration when the shaft runs off-centre and wobbles.

In conjunction with a faulty clutch, worn joints cause. the propeller shaft to rattle and vibrate on starting.

For renewing the joints on a propeller shaft, it should be removed complete. This involves taking **out.** eight bolts-four from each flange each end-the flanges having been dot-marked for re-assembly, as at ***A.*** The sliding part of the shaft with internal splines can be detached by unscrewing a ring nut.

Paint and dirt on the joints should be scraped from the open ends of the bores, and the four circlips removed, using small round-nosed pliers. This is followed by a further clearing of odd specks of paint and dirt, since the well-fitting sleeve bearings will not pass over such obstructions. Note should be made of the fitting of any greasers in the spiders, so there should be no mistake in assembly.

To dismantle, a fork can be tapped with a copper or lead hammer, as at C, point X. This drives the fork down and the sleeve bearing emerges. Alternatively, or additionally, a thin punch and hammer can be used on the open end of the sleeve, supporting the fork on a block or piece of tubing. Then, when the sleeves are about half out, they can be gripped with enclosing-jaw pliers and twisted and removed.

To assemble, the sleeves with needle rollers are drawn from the spider, and this is placed within a fork. Light grease holds rollers for sleeves to be entered, as at ***D,*** and press-fitting with the vice is less liable to disturb them than tapping with a hammer. Either way, the sleeves must enter squarely and, meanwhile, the spider can be moved from side to side to check that the rollers are in place.

Circlips follow when the sleeves are home, and the process is repeated for the other fork. Assembly of the sliding part must bring the forks on the shaft in line, as at ***Y-Z.*** ❑