

ALBION GEARBOX REBUILD

In this part of our gearbox rebuild, Don Morley guides us through primary/final chain adjustment — the obvious causes of poor transmission and then the clutch stripdown and inspection. Any likely trouble spots are highlighted and will be dealt with later in more detail.

ROYAL Enfields never did enjoy knife through butter gear changing, primarily because of Messrs Albion's somewhat agricultural gearbox and an unusual design clutch. A component which was, and probably still is, likely to be running out of true.

Thus, no amount of maintenance will persuade this set up to run quite so sweetly as a good AMC or Burman arrangement, but then no Enfield should suffer notchy, noisy, heavy or sloppy gear changing. Neither should it have difficult neutral selection nor jump out of bottom gear when the engine is on the over-run.

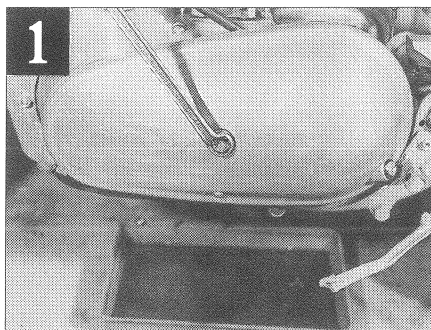
These and other problems can rear their ugly heads all too easily on Enfields. So despite the Albion transmission components being over engineered, it only takes such as the massive duplex primary chain to be running slightly out of true and it will wreck the clutch action, which in turn totally screws up the gearchange.

Obviously, regular maintenance and careful checks are the answer to curing or avoiding such problems, so a good tip before contemplating any major strip down is to check that everything is running to tolerance.

- The first task is to check the primary chain tension.

- Place a large drip tray under primary chain case on nearside of

machine. Remove nearside footrest and detach rear brake rod so its pedal swings down out of the way under its own weight. Undo the single sleeve bolt (**pic one**) which holds the outer primary chaincase on.

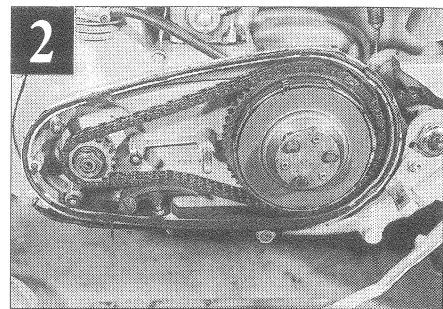


- The latter will probably stick to the inner half via its rubber sealing ring, and is also located to the rear half via a dowel situated centre front. It will probably need a few very gentle taps along the outer case's top and bottom edges to break this seal and dislodge the outer casing from the dowel. Use a hide or nylon faced mallet which will not cause any damage.

- If the rubber sealing ring can be dislodged from its groove intact, it can be cleaned with petrol or turps, etc and re-

used. Press it back into place by finger pressure. Provided the rubber stands at least partially proud it will continue making a good and well sealed joint.

- Grasp the primary chain mid-way between the engine sprocket and clutch chain wheel and check how much slack or lift is present. This must be done with the engine trully cold to avoid any possible expansion. The minimum amount of primary chain slack or lift on any big Enfield when measured at a point half way on the chain's top run between the engine sprocket and clutch (**pic two**) should be no less than $\frac{1}{4}$ " and preferably no more.



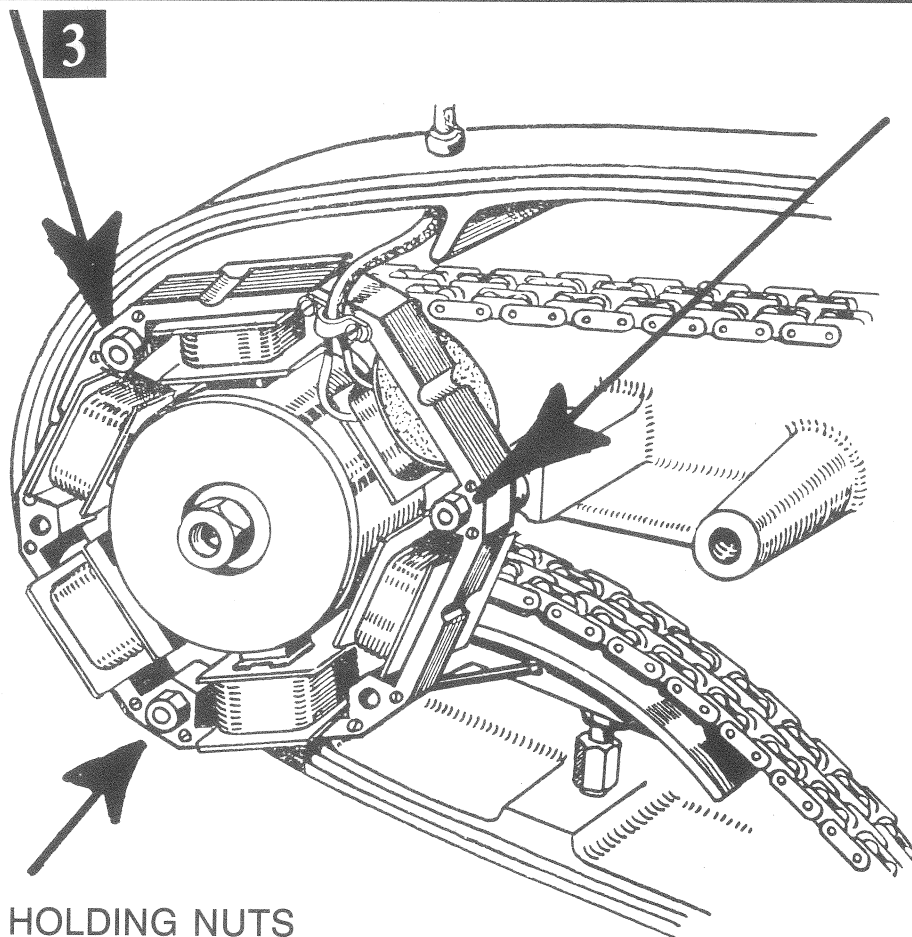
- All chains suffer tight and slack points even when new, so it is vital to turn the engine over several times to find the tightest and slackest points. This should be done with the spark plugs removed and, for safety's sake, with a socket spanner on the engine mainshaft nut, and with all fingers well clear of the chain area.

- Final adjustment is made by slackening the locknut on the chain tensioner slipper pad which is located at the bottom of the inner chaincase. Screwing its adjuster up or down attains that vital minimum of $\frac{1}{4}$ " slack. There's likely to be more slack at other points, but this is better than putting undue side thrust load on either the clutch or gearbox main bearings, which would soon cry enough!

- Now check the rear chain tension. Do this with the bike on the centre stand so the rear dampers are not compressed. It also means the rear wheel can be easily rotated to find the chain's tightest spot. This should be measured centrally on the chain's bottom run, and must not be less, and preferably no more than $\frac{1}{2}$ ".

- Check for chain wear and sprocket hooking. If replacements are needed, replace the lot for if one item is worn and left in place it will rapidly reduce any other replacements to scrap value.

- Rear chain adjustment is made by slackening the back wheel nuts and then nudging the snail cams fitted behind them backwards or forwards accordingly. Do not assume these sided cams have identical dimensions for they often don't. Neither can one guarantee the correct positioning of their abutment stops. To be absolutely certain take a careful look down the rear chain's top run while the rear wheel is spun over. This will establish whether the chain is running



HOLDING NUTS

square and true to the sprockets or whipping and snaking. If the latter happens it will also be transmitting snatch back to the gearbox via its mainshaft and the clutch. This in turn will destroy any further hopes of clean clutch lift or pleasant gear changes.

- With the former items successfully adjusted the next task is to firmly grasp the clutch assembly to feel for any untoward up or down movement, and if so to establish whether this slack or play lies within the clutch itself or comes from the gearbox mainshaft bearings. Do remember that approximately 1/32" side rock is acceptable at the chain wheel's very outer edge, though with no more than a few thousands of an inch actual up and down lift, nor any significant amount of backwards and forwards end float when the unit is either pushed or pulled.

- Any greater amount of up and down play suggests the gearbox main bearing has failed, or that the clutch holding nut may have become dangerously loose, and/or the entire assembly on the gearbox mainshaft splines. Any surplus push or pull end float can likewise be caused by the latter or if one or more of the box's internal bearings have worked loose. To find out it will, of course, require a complete transmission strip down.

- Assuming so far that this is not required, check that the clutch body is running square and true to its drive shaft. Also check the individual internal plates

stay reasonably parallel to each other when the handlebar lever is pulled in. These points are easiest to inspect with the aid of a helper turning the dead engine kickstart with the clutch lever held in, leaving you free to make the necessary inspection.

- No helper? Then kick the bike over several times yourself with the clutch out, looking over the bike's saddle down to the clutch and primary chain top run. Note whether the clutch body seems to be running true or is joggling about. This might indicate either a bent gearbox mainshaft, or more likely that yours is yet another abused clutch with a distorted back plate.

- Don't be too worried about even a fair degree of movement, as most well set up clutches still move about slightly. However, any more than a few thousands of an inch run out needs investigating and curing if the bike is not to suffer permanent clutch drag, which in turn will ultimately damage the chains and sprockets and wreck what otherwise might have been a perfectly pleasant feeling gear change.

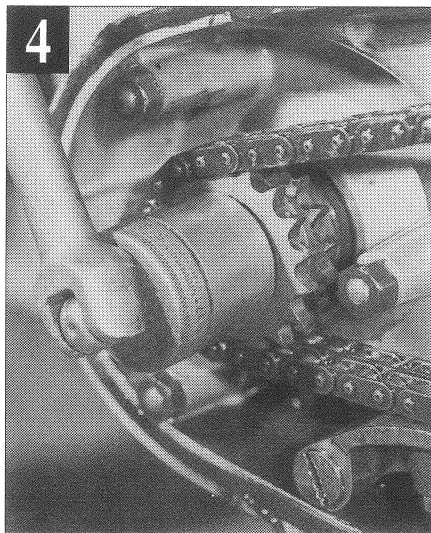
- The next clutch test job for the lone mechanic is to tie or tape up the clutch lever into the clutch-in position. With the primary transmission now free, kick the kickstarter over several more times and check the run out and degree of wobble between the outer plate and main chain wheel. In my experience, the odds on finding them all running properly and true to each other are about a thousand to

one!

- Dealing with any of the problems mentioned so far is not difficult, but will, nonetheless be dealt with separately and more fully in the next article, when we shall also look at making a few very simple modifications which collectively can transform any Royal Enfield's transmission to be even better than new.

- Stripping the entire primary transmission however is a prerequisite to these and any other major ensuing work on the gearbox itself, so for now we shall continue. Disconnect the alternator stator electrical lead and undo the latter unit's three outer retaining nuts (**pic three**). Thread the lead through and out of the inner chaincase and remove the alternator stator. At this stage, leave its matched rotor in situ.

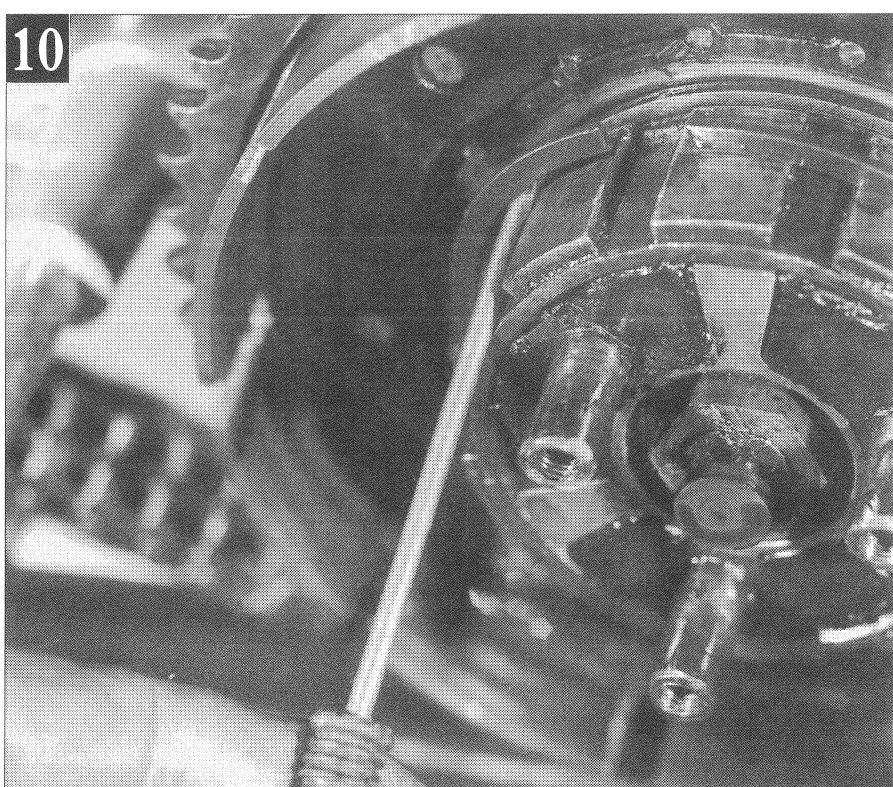
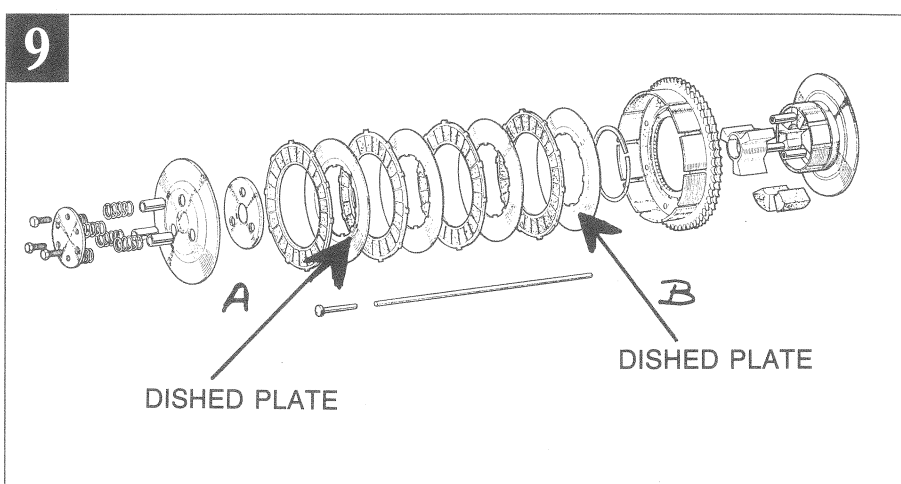
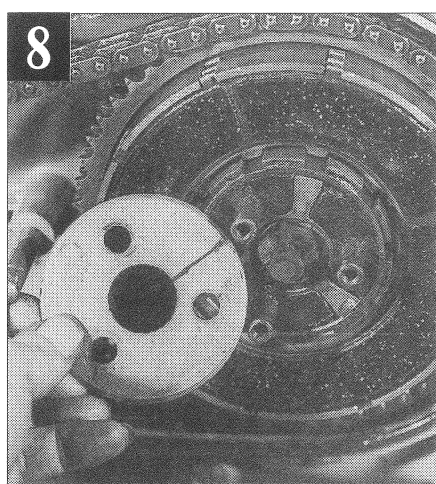
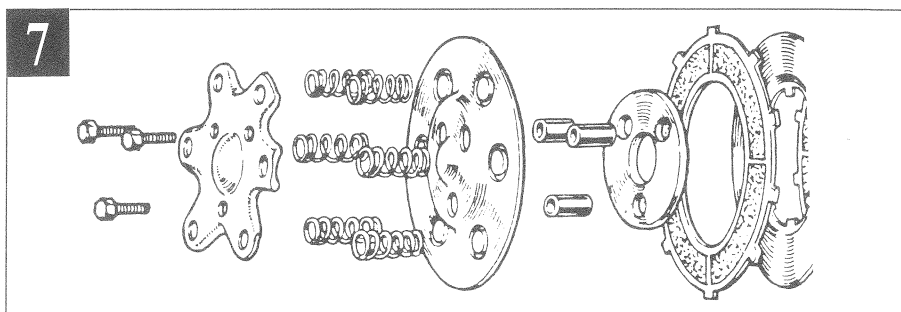
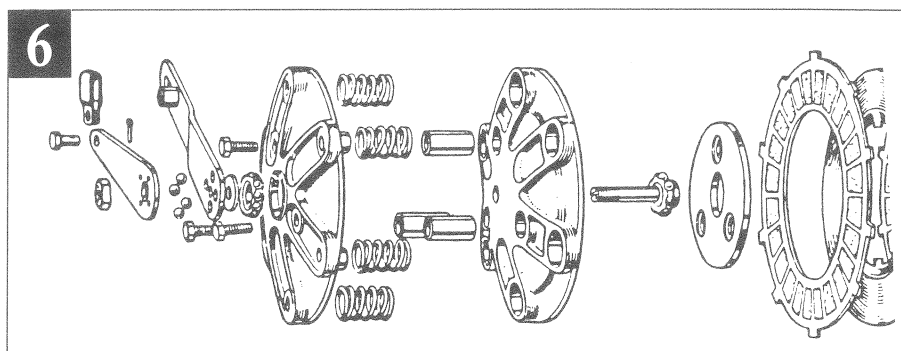
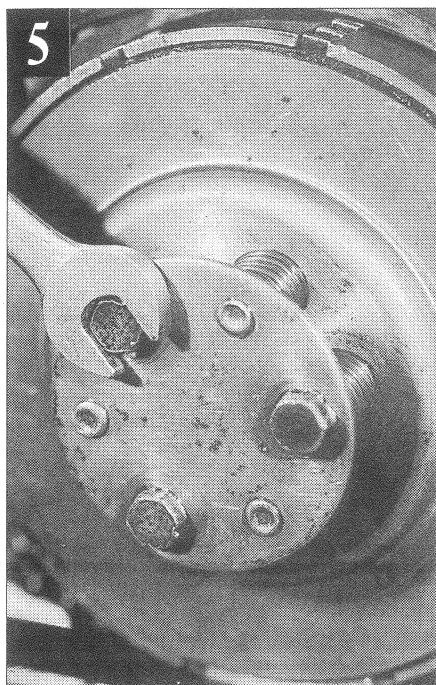
- Fit a socket spanner and tommy bar (not ratchet wrench) on to the engine mainshaft nut. Set the bike in bottom gear with spark plug(s) fitted and rotate the engine with the tommy bar until maximum piston compression is felt. All that should be necessary then to loosen the mainshaft nut is a few very sharp rotational taps on the bar end with a lead of copper headed mallet. Do hold the actual socket firmly to stop it slipping off the nut (**pic four**).



- To ensure the nut turning rather than the engine, temporarily refit the rear brake linkage, and then hold the brake hard on (with two hands and a knee!) as an additional aid. This is a better method than using a separate tool to grip the engine sprocket, or even worse by holding or clamping the even more delicate alternator rotor.

- Shaking this nut loose can, admittedly, take five hands and some considerable practice, and more than a few sharp and potentially knuckle ripping taps against the tommy bar's end, but it will do the trick sooner or later without any unnecessary damage. It works even if a fixing agent such as Loctite has been used.

- With the engine shaft nut off, slide the alternator rotor off its key way. This should be merely a matter of wobbling it about by hand until it is ready

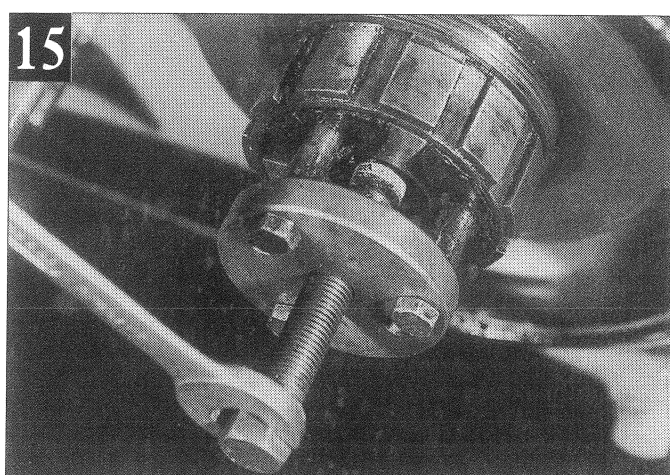
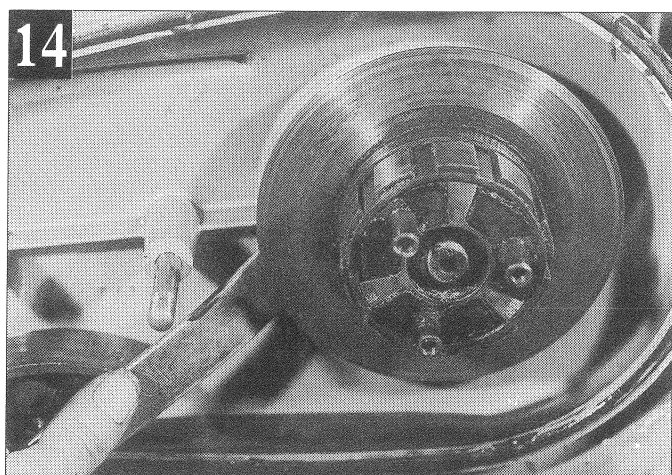
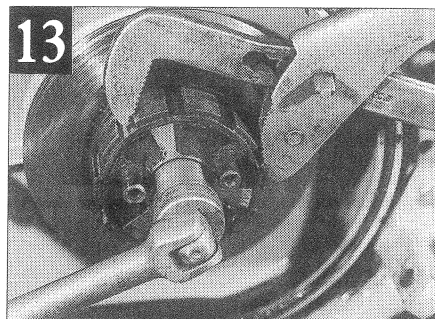
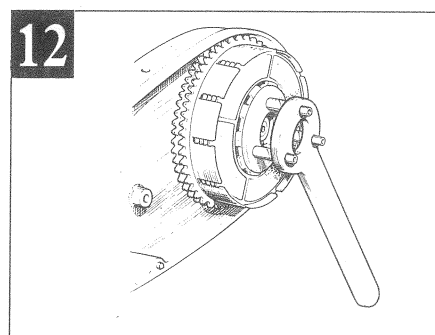
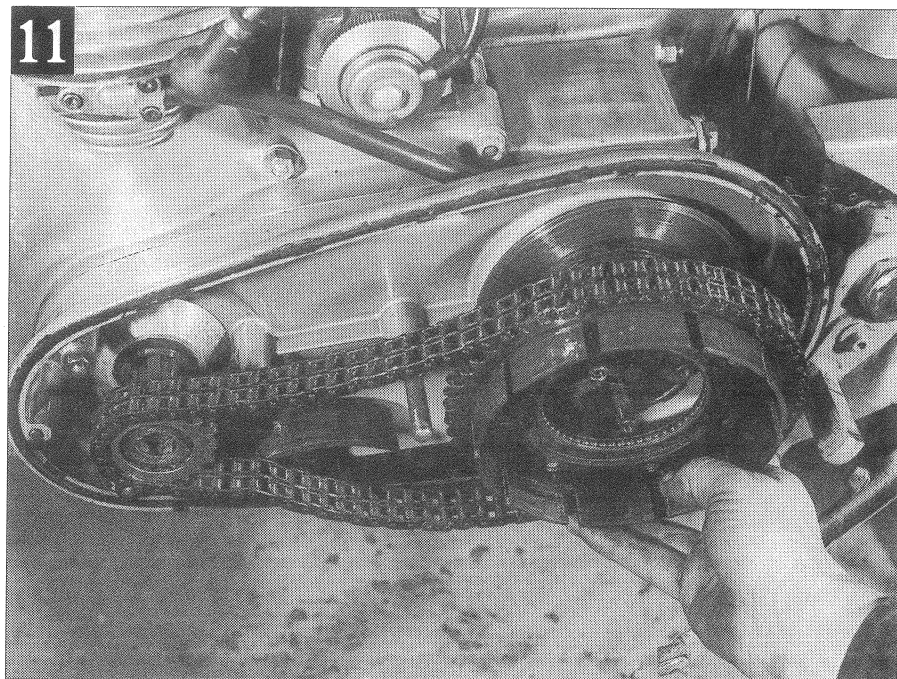


to go rather than needing a separate puller. Now undo the outer spring plate (**pic five**).

Note:- The 700cc Constellation used a different spring retainer for 1959 which incorporated a scissor action clutch release mechanism (**pic six**). This arrangement proved unsuccessful and Enfields reverted to the original three stud six spring arrangement for all following models except their 1965 onwards 736cc Interceptors. These came with a new design end cover which allowed some degree of tension adjustment for the individual clutch springs (**pic seven**).

These items are very hard to come by, not the least because in the UK the Interceptor was, and still is, an extremely rare bike. If you can find the parts they can be retro-fitted in a matter of minutes to any 350cc plus Enfield (including those from Madras), and do offer a vast improvement.

● Returning to the stripdown of the most common type of clutch end cover, undo the three $\frac{1}{4}$ " (26tpi) cycle threads set screws on the clutch outer plate. This will allow it and the springs to literally fall off revealing the small round inner plate behind (**pic eight**). On 350cc



Works Replicas, 500cc Bullets and Enfield's Twins this plate holds the internal clutch cush drive rubbers in their place, though the latter is a luxury not afforded to Roadster 350cc Bullets, or the even more basic 350 Clipper.

- Slide out the drive and driven plates, noting how many there are and their order. Most important being the first and last driven plates (ie. plain steel without any ferro-type inserts). They should be deeply stepped (**pic nine**). Also check that the first (or furthest) plate away from the bike's centre line has this step fitted running away (or inwards), whereas the reverse is true of the last plate, which must have the step facing out to clear the clutch chainwheel retaining ring.

- A small screwdriver is the ideal tool for gently prizing this latter spring steel out of its slot and away (**pic 10**). This allows the clutch drum, duplex primary chain and engine sprocket assembly to be slid off as one. This leaves the clutch centre (**pic 11**), and inner primary chaincase to remove to complete this stage of the stripdown.

- Perfection now would be to have Enfield's original holding tool handy (pic

12). This allows the clutch centre to be firmly held as a box or socket spanner is passed through its central eye to undo the gearbox mainshaft nut. However, as the centre's splines don't burr or mark easily, a perfectly acceptable alternative is to carefully use a mole wrench (**pic 13**), but to avoid any unnecessary damage do not let it slip.

- All that remains once the mainshaft nut is undone is to pull off the clutch centre carrying backplate. This is sometimes a simple matter of wriggling it off by hand, though given the much more likely scenario of it being jammed firmly in place, do not attempt to prise the centre and plate off with screwdrivers or tyre levers (**pic 14**). Such action is guaranteed to cause permanent back plate distortion.

- The only answer is to beg, borrow or buy a genuine clutch puller before starting the job (**pic 15**). Failing that make one. All it requires is a piece of $\frac{1}{4}$ " plate (or thereabouts) drilled with four holes, three of $\frac{1}{4}$ " clearance in a triangular pattern ready to line up with the clutch spring carrying posts, and one central hole of $\frac{5}{16}$ " or larger diameter (or its metric equivalent).

- This withdrawal plate is bolted on to the spring carrying posts via the latter's own $1\frac{1}{4}$ " (26tpi) set screws as removed a little earlier in the stripdown. All that is required then is one other surplus (and ideally fully threaded) bolt measuring approximately $\frac{5}{16}$ " diameter by 2" long, and a matching nut which is to be trapped or held with a separate spanner between our plate and the gearbox mainshaft.

- With this device fitted tighten the centre bolt through the nut. This will easily push our recalcitrant clutch off its splines, and what's more vital, does so without any possibility of damage or distortion to the back plate.

- Finally undo the chain tensioner slipper pads (cheese headed) central set screw, (through bolt), which is all that is left still holding the inner primary chaincase casting in position. Once done the latter can be removed by guiding it over and gently away from the gearbox mainshaft splines, again gently so as to avoid an unnecessary damage to the chaincase.

Next month: the gearbox strip and preparation for the rebuild.