

Fig. 1.12 Gearbox shafts - 250, 251 and 300 models

- | | | | |
|-------------------------|----------------------------------|---------------------------|-----------------------------|
| 1 Nut | 7 Output shaft 2nd gear | 12 Output shaft 4th gear | 18 Input shaft 5th gear |
| 2 Tab washer | 8 Spacer | 13 Thrust washer - 4 off | 19 Input shaft 2nd/3rd gear |
| 3 Drive sprocket | 9 Output shaft 3rd gear | 14 Needle roller - 48 off | 20 Input shaft 4th gear |
| 4 Bearing | 10 Splined thrust washer - 2 off | 15 Output shaft 1st gear | 21 Input shaft |
| 5 Output shaft 5th gear | 11 Circlip - 2 off | 16 Circlip - 2 off | 22 Bearing |
| 6 Output shaft | | 17 Bearing - 2 off | |

it is recommended that all circlips are renewed regardless of their apparent condition. Examine all thrust washers for any signs of wear or damage, renewing them if necessary.

3 Having examined the gearbox components as described in the previous Section, reassemble each shaft as described below, referring to the accompanying line drawings and photographs for guidance. Note that when fitting a circlip to a splined shaft, the ends of the clip must be positioned in the middle of one of the splines to ensure that the circlip is as secure as possible on its shaft. Ensure that the bearing surfaces of each component are liberally oiled before fitting.

4 If problems arise in identifying the various gear pinions, which cannot be resolved by reference to the accompanying photographs and illustrations, the number of teeth on each pinion can be used to identify them. Count the number of teeth on the pinion and compare this figure with that given in the Specifications, remembering that the output shaft or layshaft pinions (as applicable) are listed first, followed by those on the input shaft or mainshaft. The problem of identification should not arise, however, if the instructions given in paragraph 2 of this Section are followed carefully.

Mainshaft - 125 and 150 models

5 The mainshaft is easily identified by its integral 1st gear pinion. Hold the threaded end of the shaft (left-hand end) and slide the components on from the opposite end (right-hand end) as follows.

6 Slide the 4th gear pinion along the shaft, with its dogs facing the right-hand end of the shaft, and secure it with a circlip. Slide the 2nd/3rd gear pinion onto the shaft so that the slightly smaller of the two gears

faces the 4th gear, then refit the 5th gear pinion to the right-hand end of the shaft.

Layshaft - 125 and 150 models

7 Fit a circlip to the centre of the three grooves in the shaft then hold the end of the shaft with the shorter splines (right-hand end) and slide the following components on the opposite end (left-hand end).

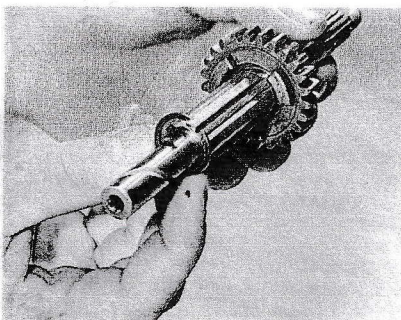
8 Slide the 2nd gear pinion onto the shaft, making sure its recessed face is on the left-hand side. Refit the splined thrust washer and secure the thrust washer and gear with a circlip. Slide on the 4th gear pinion, so that its selector fork groove faces the 2nd gear, then refit the 1st gear pinion ensuring that its recessed surface is on the right-hand side of the gear. Turn the shaft around and slide the following components on from the right-hand end of the shaft.

9 Fit the 3rd gear pinion, ensuring its selector fork groove faces the left-hand end of the shaft, and secure it with a circlip. Slide the output gear onto the shaft and refit the plain thrust washer. Liberally oil the needle roller bearing and fit it to the right-hand end of the shaft.

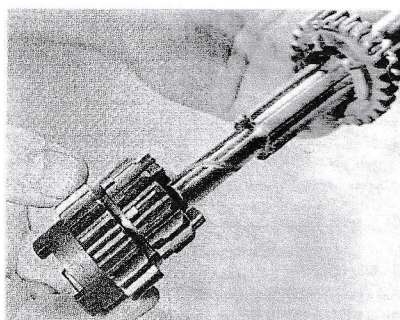
Input shaft - 250, 251 and 300 models

10 The input shaft is easily identified by its integral 1st gear pinion. Hold the threaded end of the shaft (left-hand end) and slide the components on from the opposite end (right-hand end) as follows.

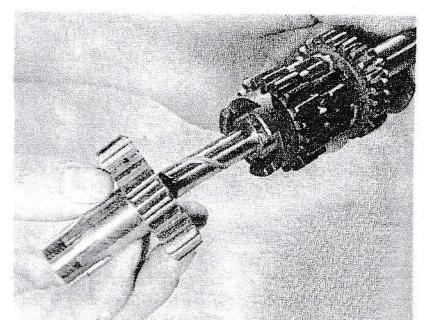
11 Slide the 4th gear pinion along the shaft, with its dogs on the right-hand side of the pinion, followed by a splined thrust washer. Secure the gear and thrust washer with a circlip. Slide the 2nd/3rd gear pinion onto the shaft so that the larger of the two gears faces the 4th



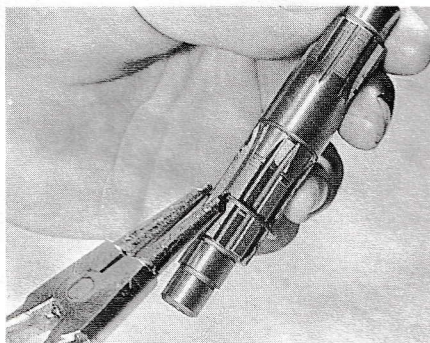
26.6a Take the bare mainshaft slide on the 4th gear pinion and secure it in position with a circlip



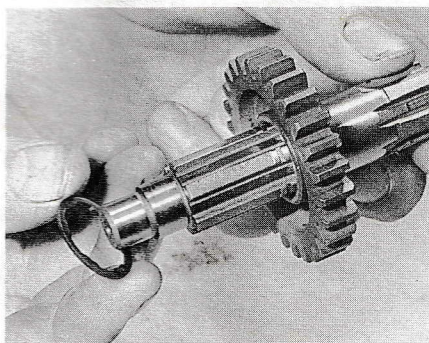
26.6b Refit 2nd/3rd gear pinion ...



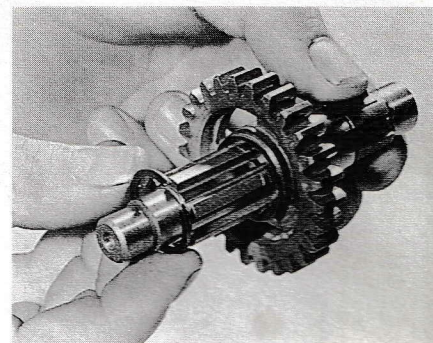
26.6c ... and fit 5th gear pinion to the end of the mainshaft



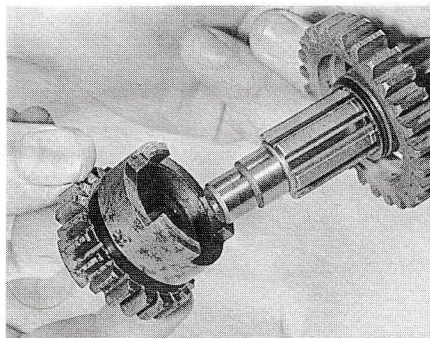
26.7 Fit a circlip to the central groove on the layshaft



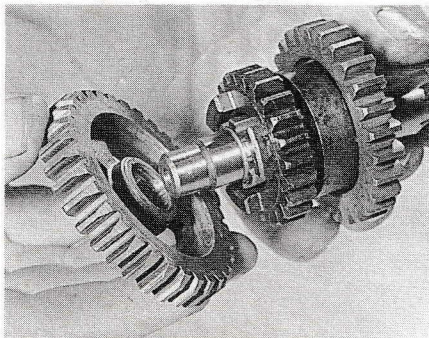
26.8a Slide 2nd gear pinion on left-hand end of the shaft followed by a splined thrust washer ...



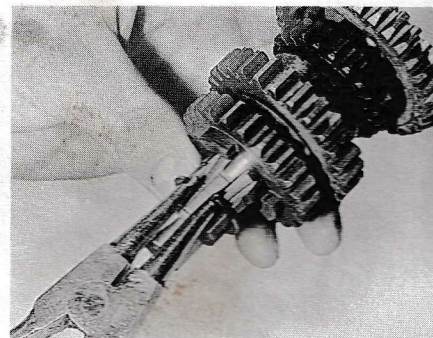
26.8b ... and secure them both in position with a circlip



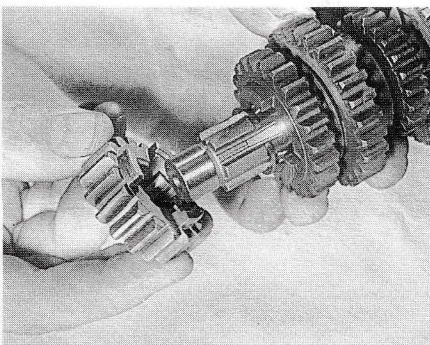
26.8c Slide on the 4th gear pinion ...



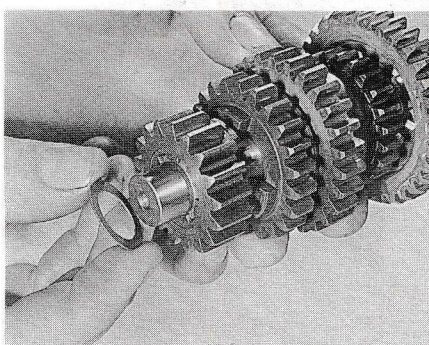
26.8d ... and the 1st gear pinion



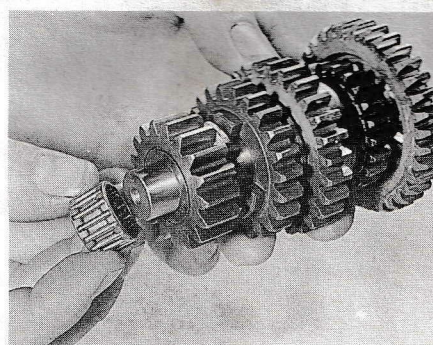
26.9a Fit the 3rd gear pinion and secure it in position with a circlip ...



26.9b Fit the output pinion to the shaft



26.9c Fit the plain thrust washer to the end of the shaft ...



26.9d ... followed by the needle roller bearing

gear pinion, followed by a plain thrust washer. Refit the 5th gear pinion so that its flat surface is on the right-hand side of the gear, then carefully insert all the needle rollers between the gear and the shaft. Slide on another plain thrust washer and secure the washer and gear in position with another circlip.

Output shaft - 250, 251 and 300 models

12 Hold the threaded end of the shaft (right-hand end) and slide the components on from the opposite end (left-hand end) as follows.

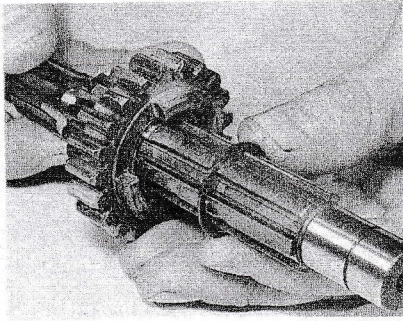
13 Slide the 2nd gear pinion onto the shaft, making sure that its recessed face is on the right-hand side. Refit the spacer and the 3rd gear pinion, ensuring that its flat surface is on the right-hand side of the gear, then slide on a splined thrust washer. Secure all the above components with a circlip. Slide the 4th gear pinion onto the shaft, so that the selector fork groove faces the 3rd gear pinion, followed by a plain thrust washer. Fit the 1st gear pinion onto the shaft, making sure that its recessed face is on the right-hand side, and carefully insert all the needle rollers into the centre of the gear. Slide on another plain thrust washer and secure

the gear and washer with a circlip. Turn the shaft around and slide the 5th gear pinion onto the right-hand end of the shaft making sure the selector fork groove is on the left-hand side of the gear.

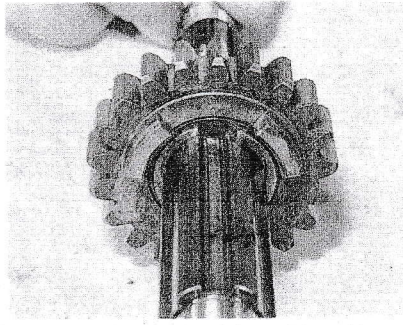
27 Engine reassembly: general

1 Before reassembly of the engine/gearbox unit is commenced, the various component parts should be cleaned thoroughly (see Section 15) and placed on a sheet of clean paper, close to the working area.

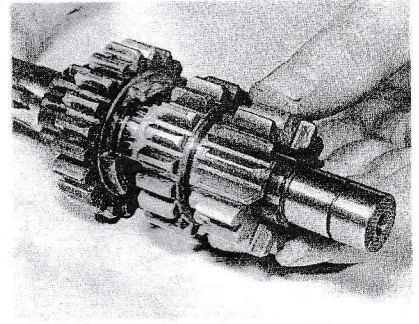
2 Gather together all the necessary tools and have available an oil can filled with clean engine oil. Make sure that all new gaskets and oil seals are to hand, also all replacement parts required. Nothing is more frustrating than having to stop in the middle of a reassembly sequence because a vital gasket or replacement has been overlooked. As a general



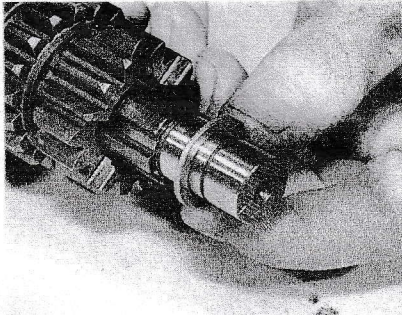
26.11a Take the bare input shaft and slide on the 4th gear pinion followed by a splined thrust washer ...



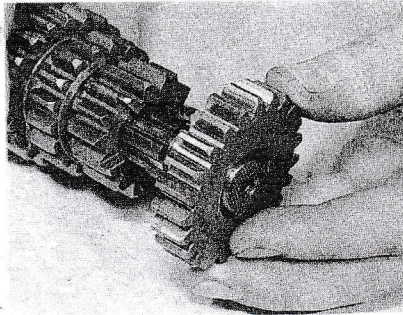
26.11b ... and secure both in position with a circlip



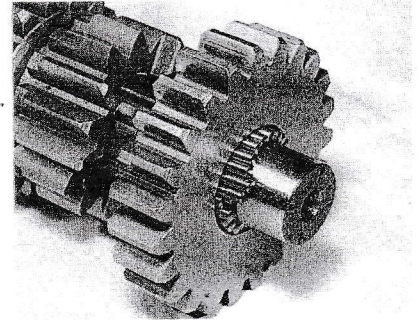
26.11c Slide on the 2nd/3rd gear pinion ...



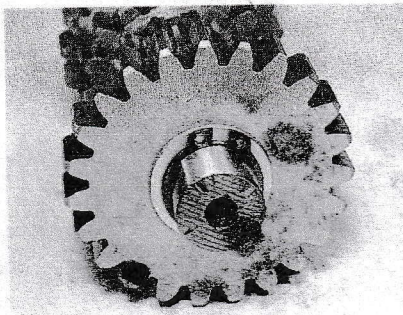
26.11d ... and fit a plain thrust washer ...



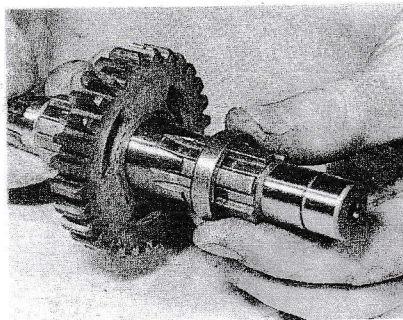
26.11e ... and the 5th gear pinion



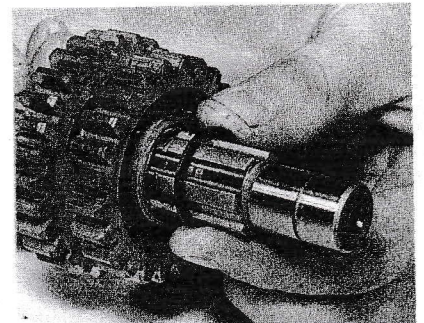
26.11f Refit all the needle rollers to the centre of the pinion ...



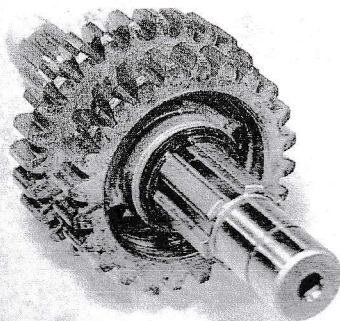
26.11g ... fit another plain thrust washer and circlip



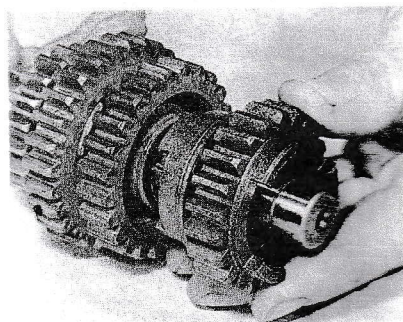
26.13a Slide the 2nd gear pinion on the left-hand end of the output shaft followed by the spacer ...



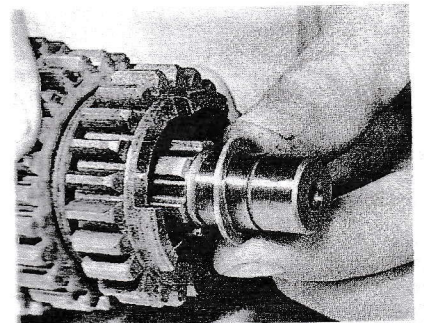
26.13b ... 3rd gear pinion and splined thrust washer ...



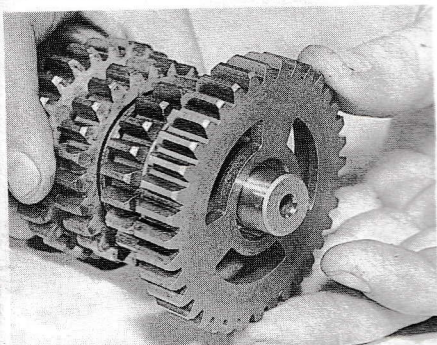
26.13c ... and secure all the above components in position with a circlip



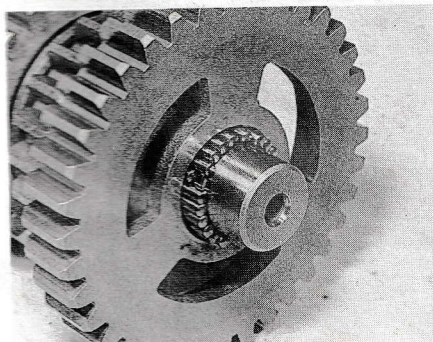
26.13d Slide on the 4th gear pinion ...



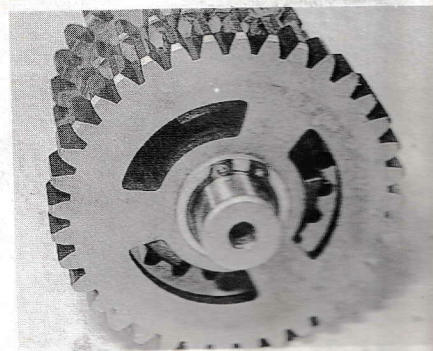
26.13e ... followed by a plain thrust washer ...



26.13f ... and the 1st gear pinion



26.13g Insert all the needle rollers into the centre of the pinion ...



26.13h ... fit another plain thrust washer and circlip

rule each moving engine component should be lubricated thoroughly as it is fitted into position.

3 Make sure that the reassembly area is clean and that there is adequate working space. Refer to the torque and clearance settings wherever they are given. Many of the smaller bolts are easily sheared if overtightened. If the existing screws show evidence of maltreatment in the past, it is advisable to renew them as a complete set.

28 Reassembling the engine/gearbox unit: preparing the crankcases

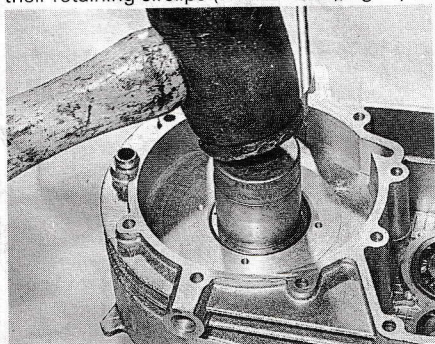
1 At this stage the crankcase castings should be clean and dry with any damage, such as worn threads, repaired. If any bearings are to be refitted, the crankcase casting must be heated first as described in Section 14.

2 Place the heated casting on a wooden surface, fully supported around the bearing housing. Position the bearing on the casting, ensuring that it is absolutely square to its housing then tap it fully into place using a hammer and tubular drift such as a socket which bears only on the outer race of the bearing. Be careful to ensure that the bearing is kept absolutely square to its housing at all times.

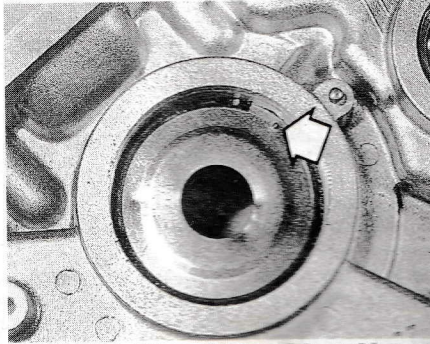
3 On 250, 251 and 300 models when refitting the main bearing oil guide plates ensure that the raised dot on the plate is positioned next to the oilway in the casting. Secure the plate with its circlip ensuring that the ends of the circlip are positioned on each side of the oilway. (See accompanying photo).

4 Oil seals are fitted into a cold casting in a similar manner. Apply a thin smear of grease to the seal circumference to aid the task, then tap the seal into its housing using a hammer and tubular drift which bears only on the hard outer edge of the seal, thus avoiding any risk of the seal being distorted. Tap each seal into place until its flat outer surface is just flush with the surrounding crankcase, or against its locating shoulder, as appropriate. Ensure all oil seals are fitted the same way round as those which were removed.

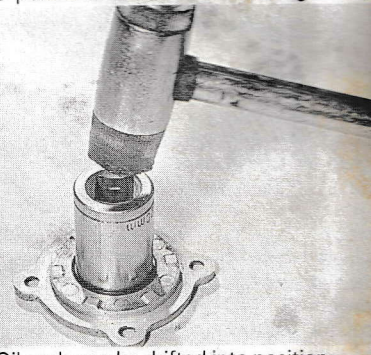
5 When all the bearings and seals have been fitted and secured with their retaining circlips (where fitted), lightly lubricate the bearings with



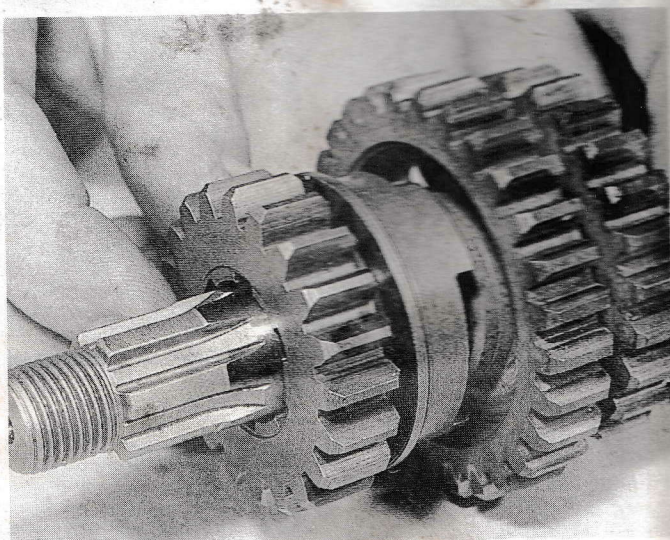
28.2 Tap bearings into place using a suitable tubular drift



28.3 On 250, 251 and 300 models position raised dot next to crankcase oilway



28.4 Oil seals can be drifted into position using a tubular drift



26.13i Slide the 5th gear pinion onto the right-hand end of the shaft

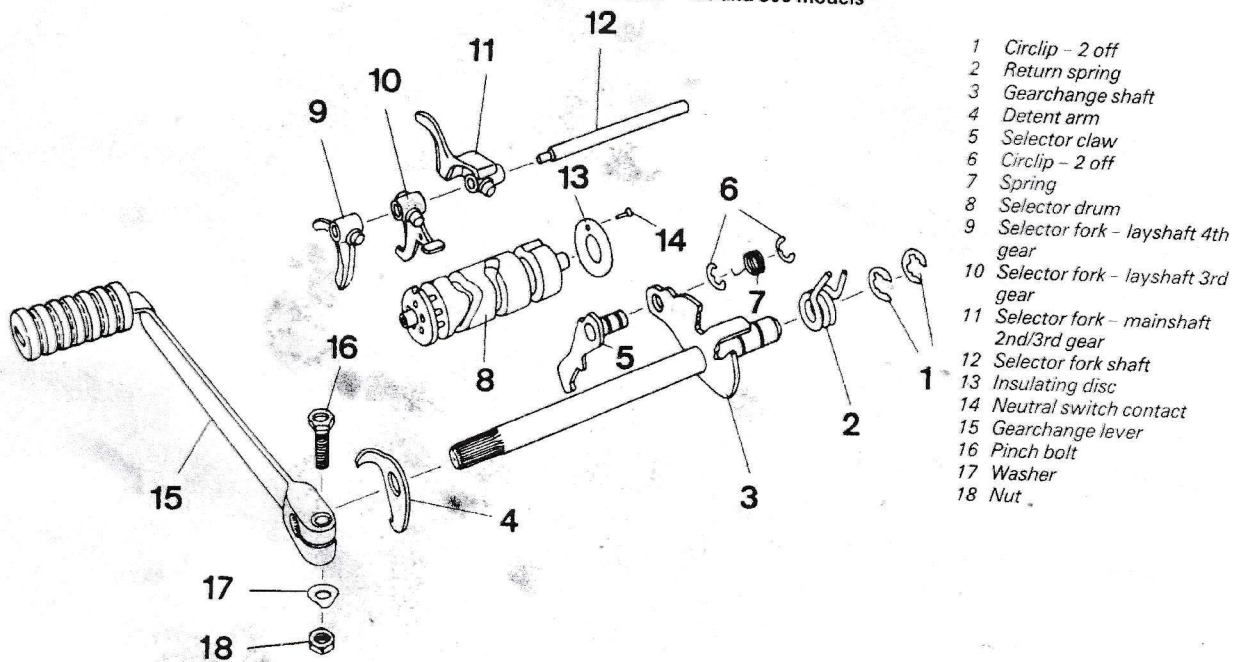
clean engine oil and apply a thin smear of grease to the sealing lips of each seal.

6 Support the crankcase left-hand half on two wooden blocks placed on the work surface; there must be sufficient clearance to permit the crankshaft and gearbox components to be fitted.

29 Reassembling the engine/gearbox unit: refitting the crankshaft and gearbox components

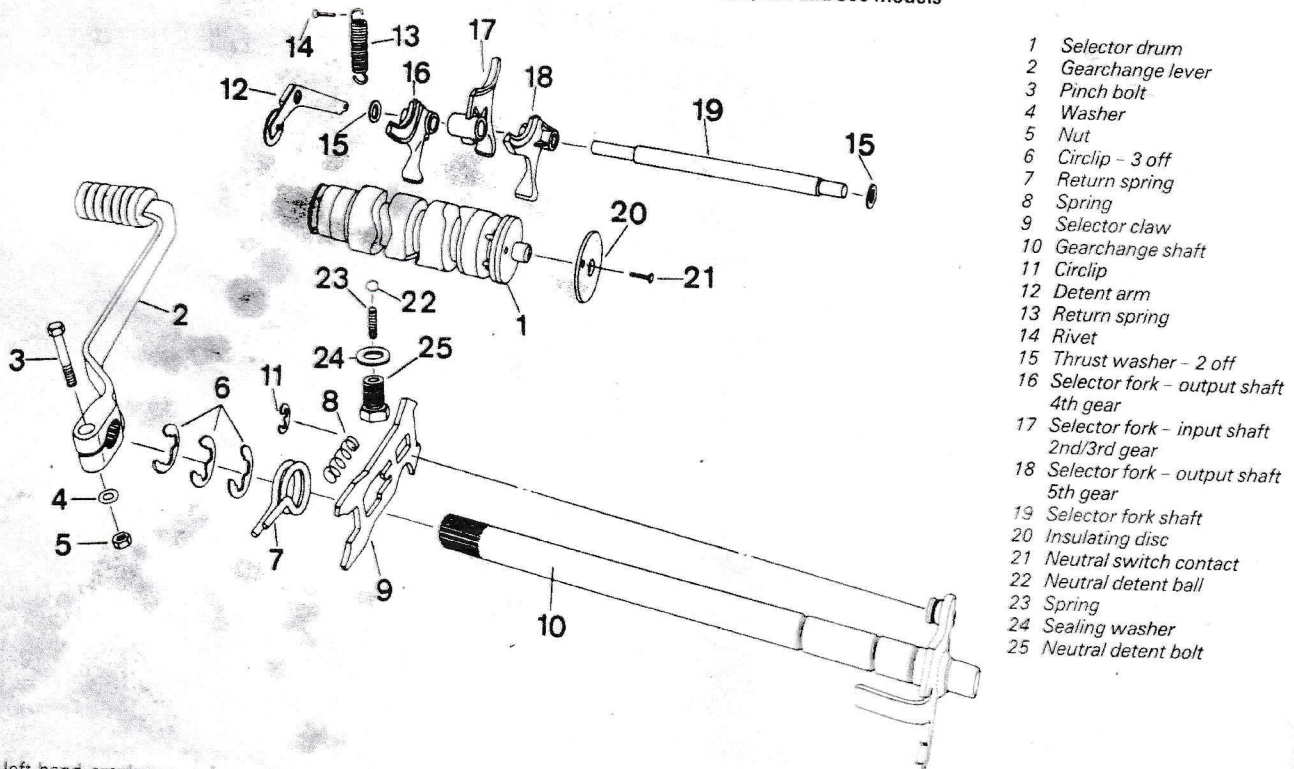
1 Refit the rotor retaining bolt to protect the end of the crankshaft and insert the crankshaft as far as possible into its main bearing in the

Fig. 1.13 Gear selector mechanism – 125 and 300 models



- 1 Circlip – 2 off
- 2 Return spring
- 3 Gearchange shaft
- 4 Detent arm
- 5 Selector claw
- 6 Circlip – 2 off
- 7 Spring
- 8 Selector drum
- 9 Selector fork – layshaft 4th gear
- 10 Selector fork – layshaft 3rd gear
- 11 Selector fork – mainshaft 2nd/3rd gear
- 12 Selector fork shaft
- 13 Insulating disc
- 14 Neutral switch contact
- 15 Gearchange lever
- 16 Pinch bolt
- 17 Washer
- 18 Nut

Fig. 1.14 Gear selector mechanism – 250, 251 and 300 models



- 1 Selector drum
- 2 Gearchange lever
- 3 Pinch bolt
- 4 Washer
- 5 Nut
- 6 Circlip – 3 off
- 7 Return spring
- 8 Spring
- 9 Selector claw
- 10 Gearchange shaft
- 11 Circlip
- 12 Detent arm
- 13 Return spring
- 14 Rivet
- 15 Thrust washer – 2 off
- 16 Selector fork – output shaft 4th gear
- 17 Selector fork – input shaft 2nd/3rd gear
- 18 Selector fork – output shaft 5th gear
- 19 Selector fork shaft
- 20 Insulating disc
- 21 Neutral switch contact
- 22 Neutral detent ball
- 23 Spring
- 24 Sealing washer
- 25 Neutral detent bolt

left-hand crankcase, using a smear of oil to ease the task. Align the connecting rod with the crankcase mouth and check that the crankshaft is square to the crankcase. Support the crank webs at a point opposite the crankpin to prevent distortion while the crankshaft is driven home with a few firm blows from a soft-faced mallet. Do not risk damaging the crankshaft by using excessive force. If undue difficulty is encountered

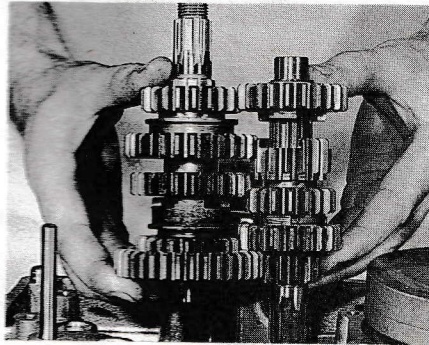
take the assembly to an authorized MZ dealer for the crankshaft to be pressed into place using the correct service tool.

2 Once the crankshaft is fitted, remove the protecting bolt and check that the crankshaft revolves easily with no trace of distortion.

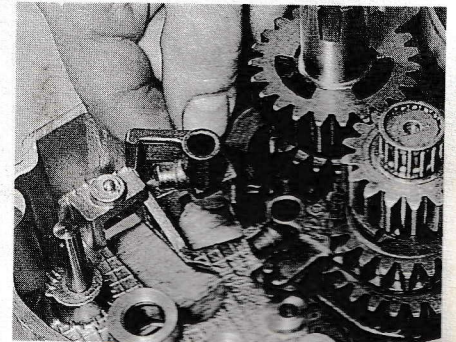
3 Mesh both the gearbox shafts together, ensuring that all matching pinions are correctly mated, and insert the shafts into their bearings



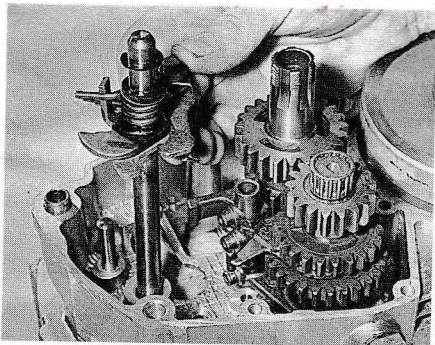
29.1 Do not use excessive force when fitting crankshaft



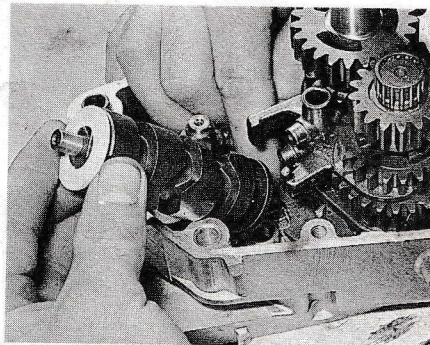
29.3 Fit gearbox shaft assemblies as a single unit



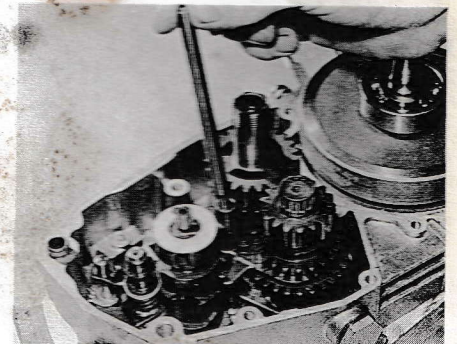
29.4 On 125 and 150 models refit all selector forks using notes made on dismantling



29.5a Refit the gearchange shaft ...



29.5b ... and install the selector drum whilst holding the gearchange selector claw



29.5c Fit selector fork pins to their respective grooves in the drum and fit the selector fork shaft

treating the two as a single assembly. If necessary, tap gently on the right-hand ends of the shafts to seat them in the casing.

125 and 150 models

4 Refit the selector forks to the grooves in their respective pinions, using the notes made on dismantling for guidance. If none were made note that on the machine shown in the photographs marks were provided in the form of a number cast on one surface of each fork. The fork marked 011 is fitted to the layshaft 3rd gear pinion (top fork) and the fork marked 013 is fitted to the layshaft 4th gear pinion (bottom fork), that marked 013 is fitted to the layshaft 3rd gear pinion (top fork) and the fork marked 015 is fitted to the layshaft 2nd/3rd gear pinion (centre fork).

5 Once all the selector forks are correctly fitted insert the gearchange shaft into the casing ensuring that its return spring locates correctly with the peg in the casting. Pivot the selector forks around their respective pinions, to gain the necessary clearance to fit the selector drum, and install the selector drum whilst holding the gearchange shaft claw out of the way. Once the drum is fully in position release the claw, checking that it locates correctly with the drum, and fit the selector fork guide pins to their respective grooves in the drum. Refit the selector fork shaft.

250, 251 and 300 models

6 First position the selector fork shaft thrust washer in the casing. If necessary, the washer can be stuck to the casing with a smear of grease. Using the notes made on dismantling, refit the bottom selector fork to the output shaft 4th gear pinion and position it so that the selector drum can be installed. Once the selector drum is fully into position refit the bottom selector fork to its respective grooves in both the pinion and drum then repeat the process for both the centre and top selector forks. Once all the selector forks are in position refit the selector fork shaft, ensuring the thrust washer is still in position in the casing, and fit the second thrust washer over the end of the shaft. Refit the gearchange shaft ensuring that its return spring locates correctly with the peg in the casing and that the selector claw engages correctly with the drum.

7 On the machine featured in the photographs, the selector forks were marked with a number, cast into one surface of each fork. If no notes were taken on dismantling, or there is any confusion as to the correct position of a selector fork, these marks can be used to identify each fork. The fork marked 010 is fitted to the output shaft 4th gear

pinion (bottom fork), that marked 012 is fitted to the output shaft 5th gear (top fork) and the fork marked 011 is fitted to the input shaft 2nd/3rd gear pinion (centre fork).

All models

8 When all components are fitted, check that the selector drum is in the neutral position and that both shafts are free to rotate, then rotate the drum to check that all five gears can be selected with relative ease. Return to the neutral position and lubricate all bearings and bearing surfaces thoroughly.

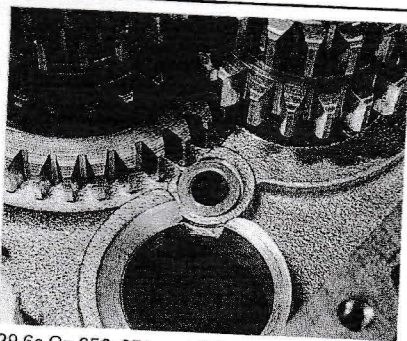
30 Reassembling the engine/gearbox unit: joining the crankcase halves

1 Apply a thin film of sealing compound to the gasket surface of the left-hand crankcase half, then press the two locating dowels, if removed, firmly into their recesses in the crankcase mating surface. Apply a thin smear of sealing compound to the edge of the rubber separating disc and press it firmly into position in the left-hand crankcase half. Make a final check that all components are in position and that all bearings and bearing surfaces are lubricated.

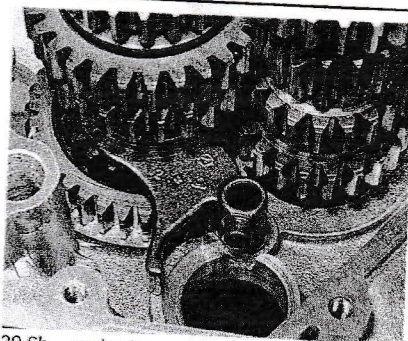
2 Lower the upper crankcase half into position, using firm hand pressure to push it home. It may be necessary to give a few gentle taps with a soft-faced mallet to drive the casing fully into place. Do not use excessive force; instead check that all shafts and dowels are correctly fitted and accurately aligned, and that the crankcase halves are exactly square to each other. If necessary, pull away the upper crankcase half to rectify the problem before starting again.

3 When the two have joined correctly and without strain, refit the crankcase retaining screws, using the cardboard template to position each screw correctly. Working in a diagonal sequence from the centre outwards, progressively tighten the screws to the specified torque setting.

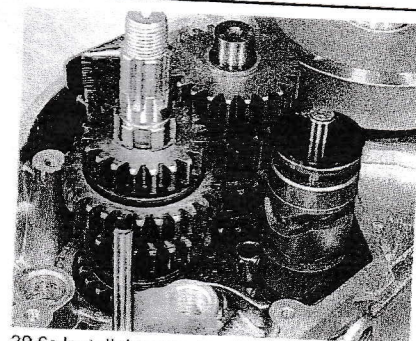
4 Wipe away any excess sealing compound from around the joint area, check the free running and operation of the crankshaft and gearbox components. If a particular shaft is stiff to rotate, a smart tap on



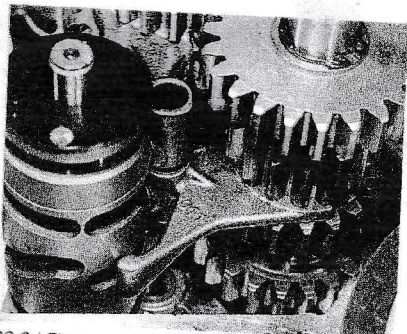
29.6a On 250, 251 and 300 models, position selector fork shaft thrust washer in the crankcase ...



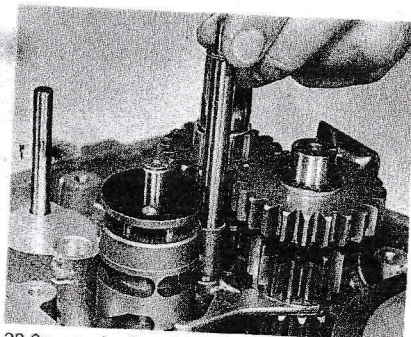
29.6b ... and using notes made on dismantling fit bottom selector fork to the output shaft 4th gear pinion



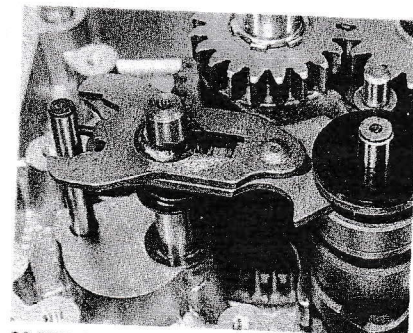
29.6c Install the selector drum and fit selector fork guide pin to its respective groove



29.6d Fit the centre and top selector forks ...



29.6e ... and refit the selector fork shaft



29.6f Refit the gearchange shaft ensuring its return spring and claw are correctly engaged

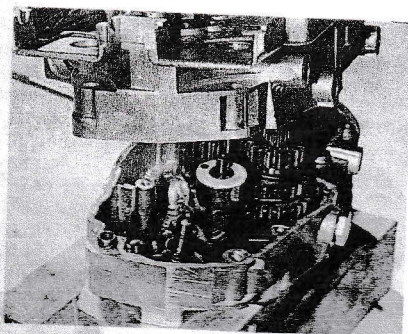
each end using a soft-faced mallet will centralise the shaft in its bearing. If this does not work, or if any other problem is encountered, the crankcase must be separated to find and rectify the fault. If all is well, pack a clean rag into the crankcase mouth to prevent the entry of dirt, then refit the neutral detent ball bearing and spring in the bottom of the crankcase followed by the retaining bolt and washer; tighten the bolt securely.

5 On 250, 251 and 300 models refit the three rubber plugs to the right-hand side of the crankcase and refit the 8 mm bolt to the front of the crankcase, tightening it securely. On the left-hand side of the crankcase, refit the output shaft oil guide plate and cap and secure them in position with the circlip. Install the detent arm and spring, ensuring that the arm locates correctly with the selector drum, and hook the spring over its retaining pin. On 125 and 150 models refit the gearchange mechanism detent spring to the detent arm on the left-hand side of the crankcase and hook it over its retaining pin.

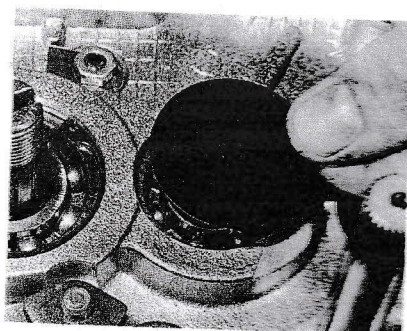
6 On all models, before refitting the oil seal cap(s) it is necessary to check the clearance between the outer race of the relevant bearing and

inner face of the sealing cap. This can be done, using a vernier caliper, by measuring the distance from the edge of the bearing to the sealing face of the crankcase and subtracting the height of the sealing cap ridge less the thickness of the gasket which is 0.5 mm (0.02 in). This will then give the clearance between the bearing race and sealing cap which should be 0.2 - 0.3 mm (0.008 - 0.012 in). If this is not the case the clearance can be adjusted using shims of various thicknesses which are available from any MZ dealer. Once the clearance is known to be correct, fit the required shim(s), followed by a new gasket. Apply a smear of grease to the lips of the oil seal then carefully fit the oil seal cap. Apply a sealing compound to the threads of the oil seal cap retaining screws and tighten them to their specified torque setting.

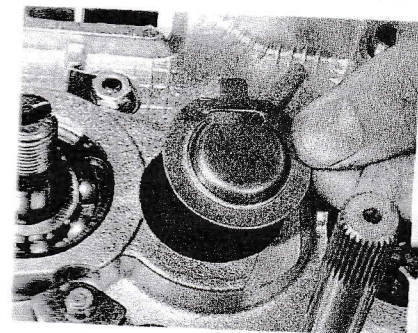
7 Once all oil seal caps have been fitted, check again that both the crankshaft and gearbox shafts are free to rotate easily. If a particular shaft is stiff to rotate, tap on smartly each end of the shaft with a soft-faced mallet to centralise the shaft on its bearings. If this does not free the shaft, remove the relevant sealing cap and recheck the clearance.



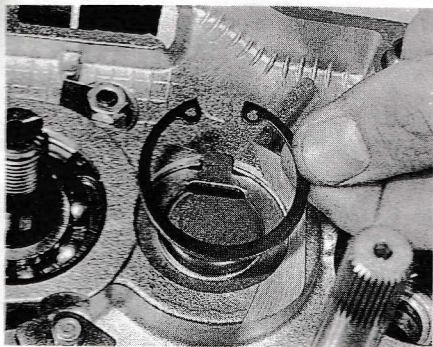
30.2 Ensure crankcase locating dowels are in position and refit right-hand crankcase half



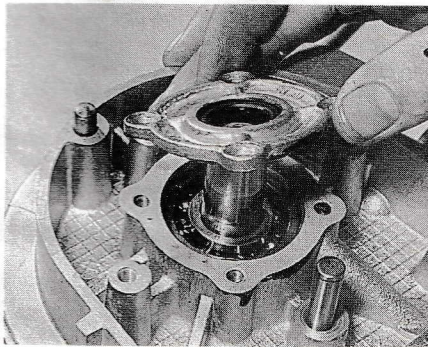
30.5a On 250, 251 and 300 models refit output shaft oil guide plate ...



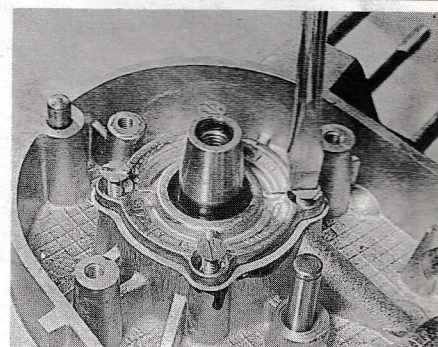
30.5b ... and cap ...



30.5c ... and secure them in position with the circlip



30.6a Refit the oil seal cap(s) using a new gasket ...



30.6b ... and tighten their retaining screws to the specified torque setting

31 Reassembling the engine/gearbox unit: refitting the tachometer drive - 125 and 150 models

1 Ensure that the circlips are correctly fitted on each end of the driven gear and refit the thrust washers to each end of the shaft. Insert the driven gear down through the casing and into position ensuring that both thrust washers remain in position on the gear.

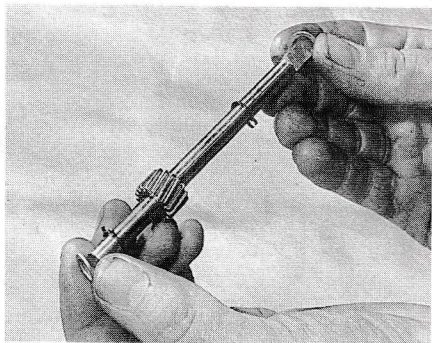
2 Examine the O-ring which is fitted to the driven gear bush and renew it if necessary. Apply a thin smear of grease to the inside of the bush and smear the O-ring with engine oil to aid refitting. Fit the bush to the crankcase with a twisting motion as if screwing it in. When the housing is fully in place rotate it until the hole in the bush is aligned with the bolt hole in the casing. Refit the bush retaining bolt and locking tab then tighten the bolt and secure it by bending up the locking tab.

3 Slide the drive gear onto its shaft, followed by the thrust washer and secure them in position with the circlip.

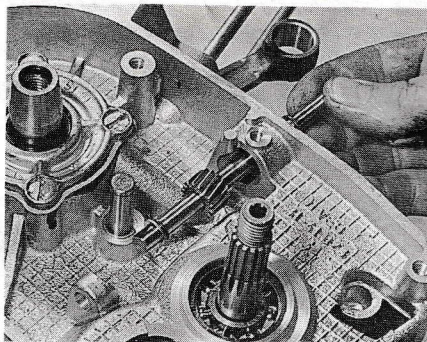
32 Reassembling the engine/gearbox unit: refitting the kickstart mechanism

125 and 150 models

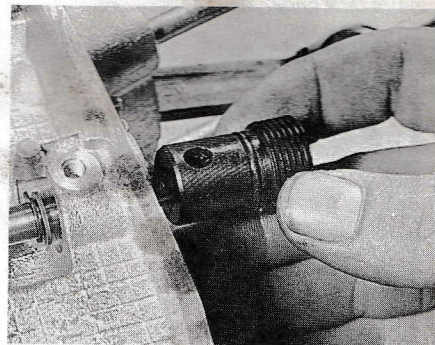
1 Ensure the return spring internal tang is correctly fitted in the slot on the kickstart shaft and fit the thrust washer over the gearchange shaft. Refit the kickstart shaft over the gearchange shaft and insert the external tang of the return spring into its recess in the crankcase. Temporarily fit the kickstart lever to the shaft and tension the return



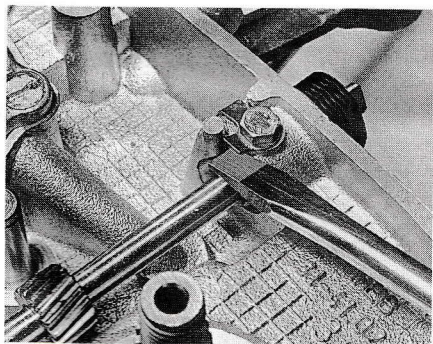
31.1a On 125 and 150 models, fit the circlips and thrust washers to each end of the tachometer driven gear ...



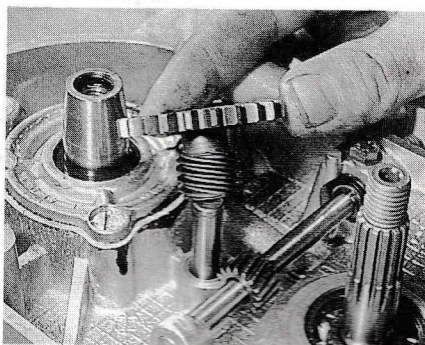
31.1b ... and insert gear into crankcase



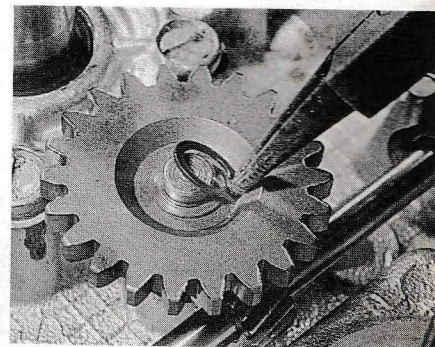
31.2a Refit bush ensuring hole in the bush aligns with bolt hole in the crankcase



31.2b Refit the bolt and secure it with the tab washer



31.3a Refit the tachometer drive gear ...



31.3b ... and secure in place with the circlip