The Talbot Manual

Technical Resource

Gearbox

Bill Barrott & Martin Bryant

8 Talbot Gearbox

The Talbot Pre selector Gearbox

Introduction

The pre selector gearbox was one of the great innovations in 1930s car design, aimed at making gear changing faster and foolproof. There were a number of different manufacturers, but all used the "Wilson Patents" as the basis of their design. Georges Roesch's variant was called the Talbot Self Accelerating Gearbox.

The repair of these complex pieces of machinery is well beyond the scope of this manual and best left to the experts. However this section does cover a general description of their working and helpful information on diagnosis and adjustment.

Diagnosis

The gearbox is accessed after removal of the front seats and floor boards. The lid is held on by many 6mm nuts. Take particular care to lift all washers before removing the lid. Prise the lid off using the screwdriver slot provided for the purpose.

The gearbox is located beneath the front floor boards

Carefully remove all washers using a magnetic pickup

Carefully prise off the gearbox lid using the screwdriver slot

A view inside the gearbox showing gear bands and the automatic adjustment mechanisms for all gears

Using a digital caliper and tape carefully measure the critical operating tolerances and record them on the gearbox setting record sheet. This contains useful datum measures that Cecil Schumacher has recorded from working on a great number of these devices. This exercise gives you a useful guide to the health of your gearbox.

Measure the depth of the pull rod inside the auto adjuster nuts

Record this measurement for each gear on the record sheet

Select each gear in turn and measure the distance between the case and the auto adjust nut

Measure the length of the thread from the head of the stop pin to the lock nut: see record sheet

Measure the pedal position at rest

Measure the movement to the first point of resistance. This should be less than 1 inch

The pedal adjusting screw. Measure the distance between the flange and the top of the thread. The nut is 8mm but with a special fine thread

Measure the thread showing above the tops of the main spring adjusting

The top gear clutch. Engage top gear and measure the length of the exposed cone

The gear engagement strut and spring. The spring can be replaced in situ. Carry a spare

The automatic adjustor spring. This must be removed if the adjusting ring requires manual setting. Easily replaced in situ. Carry a spare

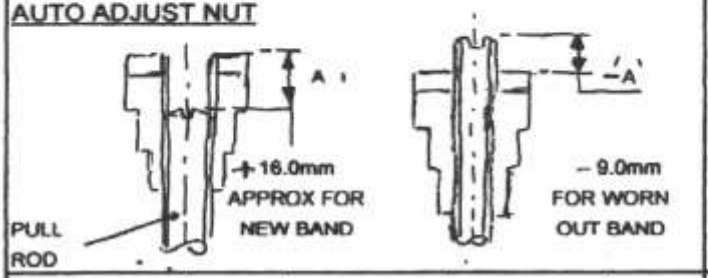
TALBOT PRE-SELECTOR GEAR BOX SETTING RECORD

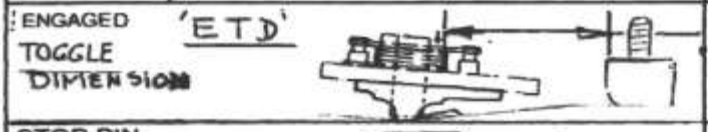
JOB No:

YEAR OF MANUFACTURE	MODEL LETTER NUMBER	SERIAL NUMBER	CAR DETAILS	OWNER :

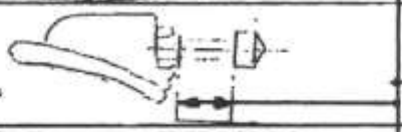
NOTE: BEFORE TAKING MEASUREMENTS MARK AUTO ADJUST NUTS AND 'PEDAL UP' TEN TIMES IN EACH GEAR UNTIL NO FURTHER ADJUSTMENT OCCURS

AUTO ADJUST NUT

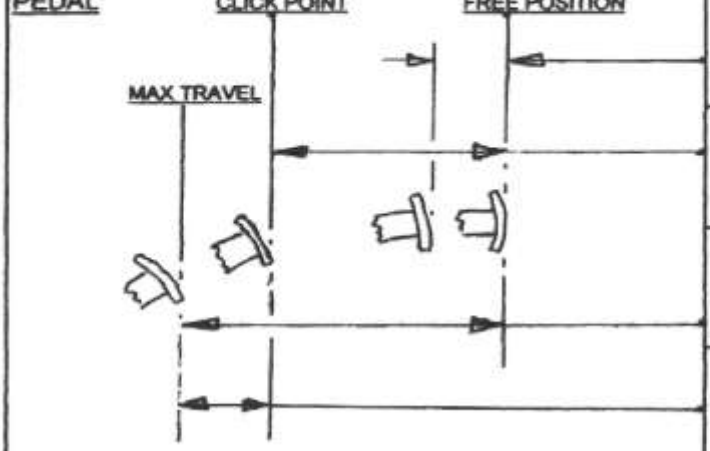




STOP PIN



Numbers in brackets are the average settings from many boxes



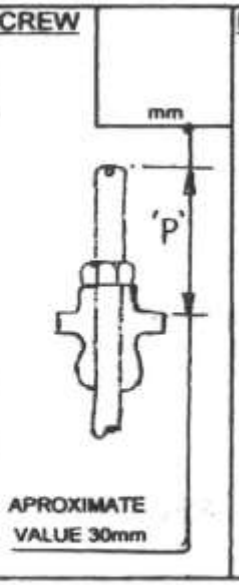
	TOP	3RD	2ND	1ST	N	REV
LENGTH A (mm)						
CASE TO AUTO ADJUST NUT (mm)						
HEAD TO LOCK NUT (mm)	(14mm)	(22 mm)	(20 mm)	(20 mm)		(12 mm)
FREE MOVE-MENT (mm)				(25 mm) (min)		
ENGAGE-MENT (mm)						
FULL TRAVEL (mm)						
OVER TRAVEL (mm)				(20 mm) (min)		

PEDAL ADJUSTING SCREW

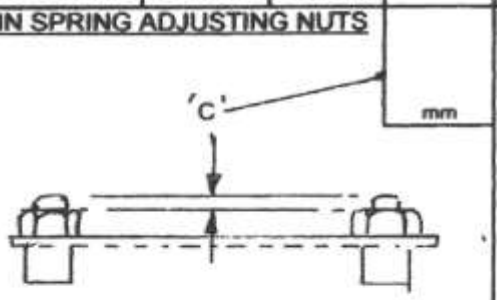
1) ENSURE 20mm MIN OVER TRAVEL WHEN ENGAGING 1ST GEAR

2) ENSURE 25mm MINIMUM FREE MOVEMENT IN 1ST GEAR

3) CHECK ALL OTHER GEAR ENGAGEMENTS FOR ADEQUATE OVER TRAVEL

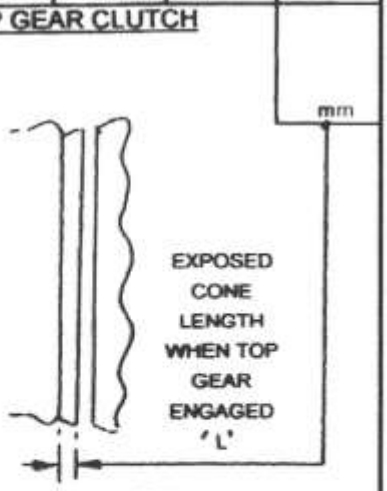


MAIN SPRING ADJUSTING NUTS



AVERAGE VALUE 2-3 mm

TOP GEAR CLUTCH



6.0mm NEW
0.0mm WORN OUT

DATE:

TALBOT MANUAL TRANSMISSIONS
SECTION B : GEARBOXES

By Michael Marshall

These notes relate to Roesch Talbots equipped with manual clutches and gearboxes. Periods of manufacture and numbers of cars produced are indicated below:

Models		1926	1927	1928	1929	1930	1931	1932
14/45 14HP	AD		2,000					
	AF			2,000				
	AG				3,000			
	AQ					1,000		
	AU						750	
18HP	AO					510		
	AM						930	
3 litre	AV						57	

The fifty eight ambulances AS70, and eighty AY75s, had the same arrangement of clutch and gearbox as AO70. Both had dropped rear axles.

B.1 –GENERAL DESCRIPTION

Fig.11 is a longitudinal cross section through a 14HP gearbox and Fig.12 provides a view inside with the cover removed and with all gears in neutral. The three parallel shafts seen in the upper part of Fig.12 lie on the offside of the centerline and carry the selector forks which engage grooves in the sliding gears. All the sliding gears are splined to the output shaft, which is carried at the front by a small roller bearing inside the input shaft and at the rear by a roller bearing set into the gearbox.

The middle selector shaft carries the fork which engages the two rearmost gears to engage 1st and 2nd gears; the one to the outside carries the fork which engages 3rd and top gears, and the one in the middle carries a fork (not visible in either illustration) which shifts a double gear in the bottom of the box to engage reverse.

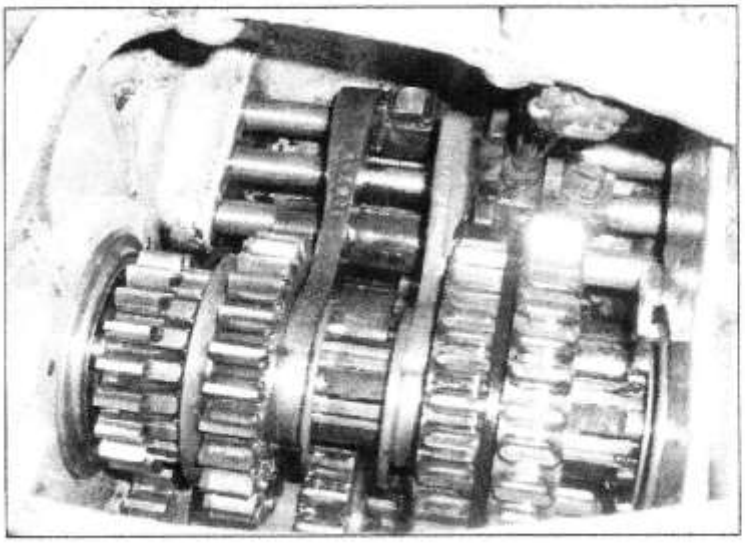


Fig.11

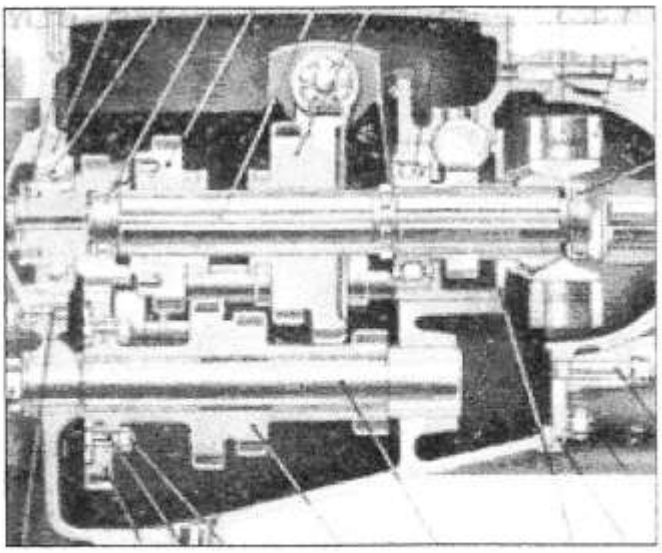


Fig.12

All gears are driven (when the clutch is engaged) by the gear to the left in both illustrations which is integral with the splined shaft on which the clutch plate is mounted. This constantly drives the four layshaft gears, all fixed together and carried on white metal bearings on a fixed arbor. The transverse shaft to which the gear lever is fixed has a small downwards pointing lever at its inner end inside the box, which selects the appropriate selector:

- Sliding the gear lever to the left causes the lever to engage the middle selector, then pushing it forward draws the two large gears to the rear so that the largest sliding is engaged by the smallest on the layshaft.
- Pulling the gear lever to the rear disengages 1st gear then, having passed through neutral, engages the next largest sliding gear with the corresponding layshaft gear to select 2nd.
- Moving the gear lever forwards to neutral disengages 2nd, then sliding it to the right engages the lever with the outermost selector, and pushing it forward causes the lever to draw the front sliding gear to the rear to engage the corresponding layshaft gear for 3rd.
- Pulling the gear lever backwards firstly disengages third gear then slides the front sliding gear forwards where its internal teeth engage external teeth at the rear of the input shaft gear, locking them and providing direct drive in top.

Fig.13 shows arrangement on the gearbox on 18HP and 105 models. This is very similar to that of the 14HP cars. However, there are two major differences: the gears driving down to and up from the layshaft are helical; and the engagement of third and top gears is by a sliding internal quill which locks the output shaft to third gear when moved to the rear, and the output shaft to the indrive pinion for top gear.

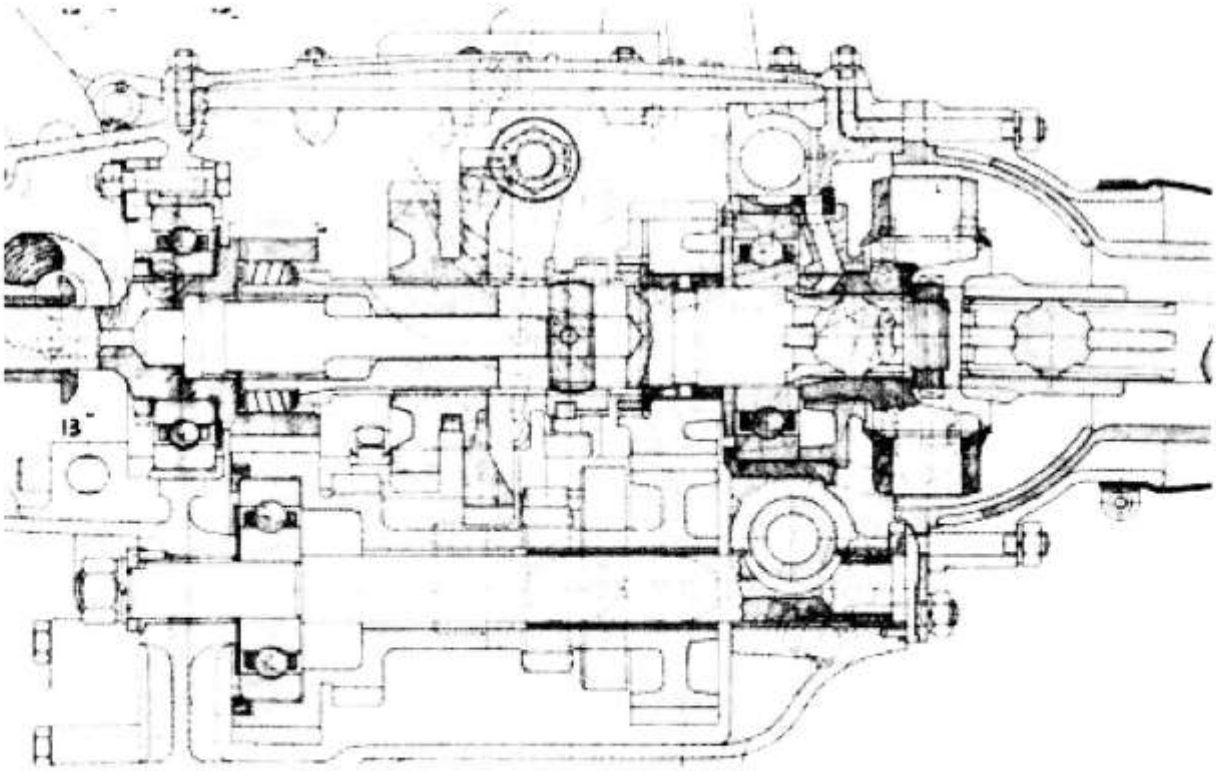


Fig.13

The 18HP gearbox is considerably bulkier and heavier than that of the 14HPs. When used on AV105s it employed different ratios.

The simultaneous selection of more than one gear is prevented by an interlock system which is, quite literally, all balls; in fact no less than five of them. Three are spring loaded into notches in the selector rods to act as detents to retain a gear in engagement once selected, and two which assure the interlocking lie in a horizontal cross drilling, one between the middle selector shaft (for 1st and 2nd), and the outer selector (for 3rd and 4th), the other between the middle selector and the innermost one (for reverse), see Fig.14.

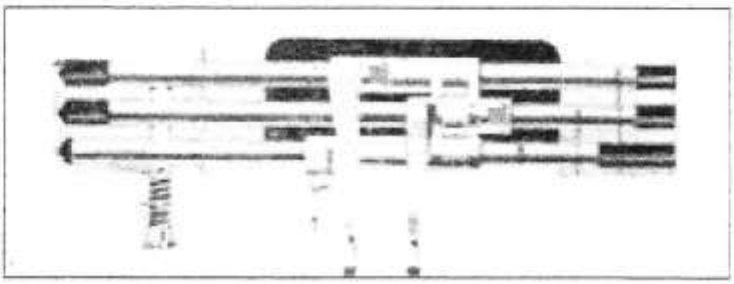


Fig.14

In neutral, each of these two balls is aligned with two interlock notches, one in each adjacent selector shaft. Selecting 1st or 2nd nudges both balls outward to engage and lock, the notches in the other two selectors, preventing the engagement of 3rd, 4th or reverse. Similarly, selecting 3rd or top will impede the selection of 1st or 2nd, and the selection of reverse will prevent the engagement of 1st or 2nd. **NB: This is all very simple and clever, but if the parts are horribly worn, the simultaneous selection of two gears *can* occur!**

To the rear of the rear bearing the output shaft carries a bronze spiral gear which engages a transverse drive to the speedometer. **NB: For this gear not to slip, the nut securing the front yoke of the universal joint must be done up hard.**

B.2 – LUBRICATION

B.2.1 - Grade of Oil

The grade of oil originally recommended, for both the engine and gearbox of 14HPs for temperate conditions was "Castrol XXL, Triple Shell, or Mobil BB". Modern oils are far superior from all points of view, but the choice of the most suitable equivalent must lie with the owner, after consulting the supplier of his choice.

On ADs and some AFs the gearbox had its own filling plug. Then on the AGs onwards (as part of the move to reduce the maintenance tasks of the 'owner driver' along with the adoption of Silentbloc spring bushes) the gearboxes were arranged to be supplied with engine oil, and the correct level maintained automatically, via a 'balance pipe' between engine and gearbox.

Where the lubrication of the gearbox is segregated from that of the engine the owner has the option of using a thicker oil for quieter operation and to allow faster upwards gear changes. However, it is not advisable to use a 140 gear oil such as many use on vintage gearboxes, because the white metal bearings of the layshaft were originally intended to run with a relatively thin engine oil. However, a 90 grade oil seems to provide some advantages with no snags.

B.2.2 – Oil Level

On cars converted back to independent lubrication by blanking off the balance pipe attachments by those who prefer their gears not to have to operate in dirty engine oil, the question can arise as to what is the correct oil level? This should be such as to just cover the floor of the antechamber on the left hand side. If this level is exceeded there is a risk, particularly where the gearbox input shaft is drilled in order to lubricate the clutch plate splines with oil from the gearbox, of the clutch linings becoming contaminated.

The speedometer drive gears are lubricated by gearbox oil. Some of this migrates somehow to the rear to lubricate adequately the universal joint, propeller shaft splines and the socket of the torque tube, so that no other lubrication is required than that in the gearbox itself - other than an occasional few drops of oil on the gear lever cross shaft and reverse interrupter mechanism.

B.3 - ADJUSTMENTS

None required.

B.4 – REPAIRS AND IMPROVEMENTS

B.4.1- Installing an independent oil filler and dipstick If gearbox lubrication has been segregated, the oil level may be checked and made-up as required simply by removing the gearbox cover plate. However, it's much more satisfactory to drill and tap the oil filler boss for a plug incorporating a dipstick reaching to the floor of the antechamber as this enables the oil level to be checked after removing only the left hand floorboard. Fig.14. The necessary drilling and tapping may be done with the gearbox in situ after the oil has been drained, the inside of the antechamber smeared with grease to catch the swarf, and a partition of plastic or thick paper stuck in place to stop any swarf getting into the box itself.

B.4.2- Reverse interrupter

It is as well to check from time to time that the rod down the gearlever is in sound condition, as these have been known to break just where they screw into the knob, leaving the knob in the driver's hand and the interrupter pin on the road. If in doubt, it is easy to make and install a new rod.

B.4.3 – Gear lever bushes.

Where these are badly worn, the bushes in the cross tube housing the cross shaft should be re-bushed.

This will make gear changing much more pleasant, and release of the reverse interrupter much easier. To remove this tube, the lever inside the box (where there is very little room to spare) must be drawn off using an extractor – see Fig.15. A hole may also be drilled in the top of the tube to allow a little oil to be squirted in from time to time.

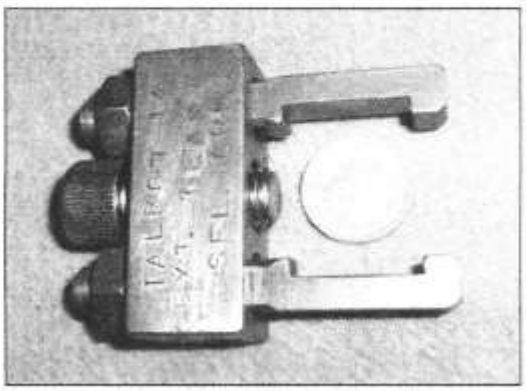


Fig.15

B.4.4 – Axial location of output shaft

A fault of early boxes is that is that the rear roller bearing is located only by its fit in the box. If the propeller shaft shifts forward in the torque tube (as it can - see Section C.4.1) its forward end can nudge the gearbox output shaft forward, unseating the rear roller bearing and damaging the front roller by applying axial loads which it was never intended to carry. This problem may be cured by fitting the two special M6 bolts shown in Fig.16 so that their heads provide positive location by holding the outer race of the rear bearing securely in its seating, see Fig.17. These were fitted as standard from the model AG onwards.

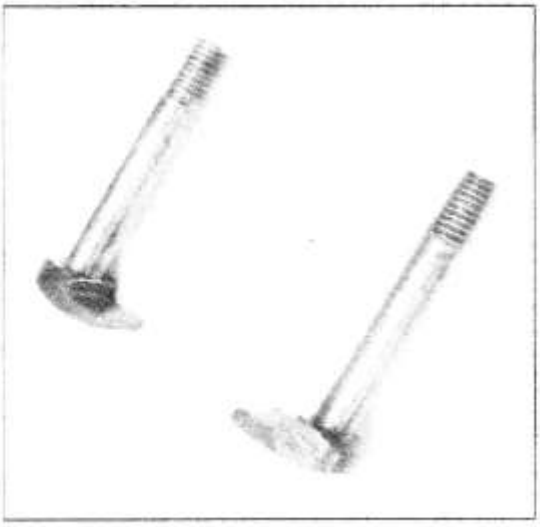


Fig.16

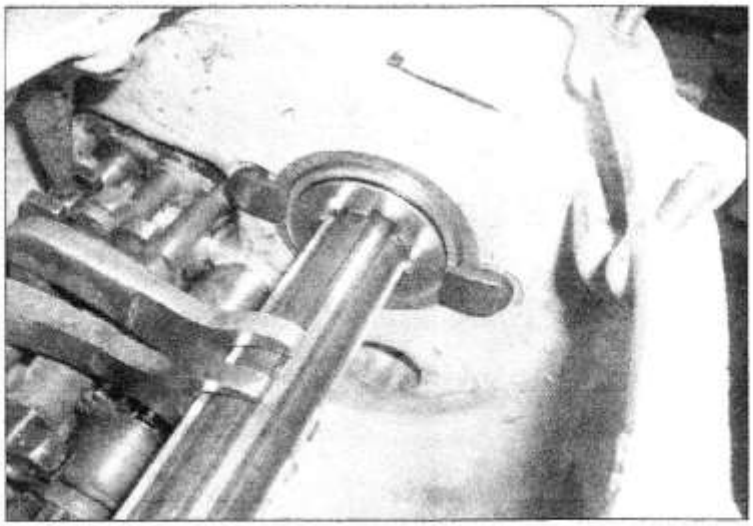


Fig.17

B.4.5 – Gearbox Alignment

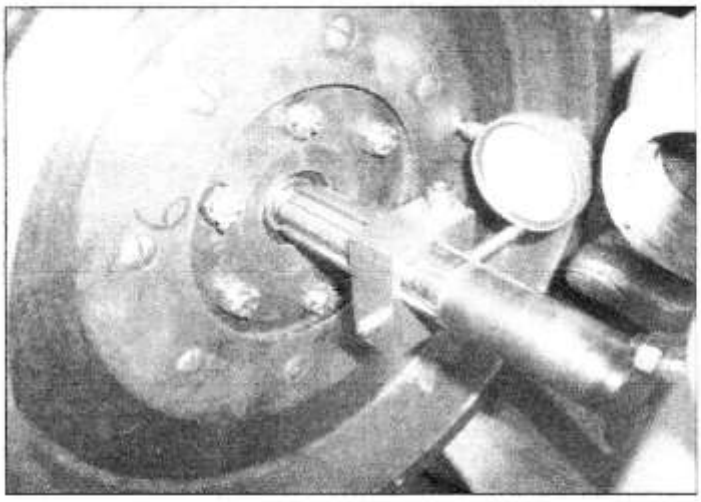


Fig.18

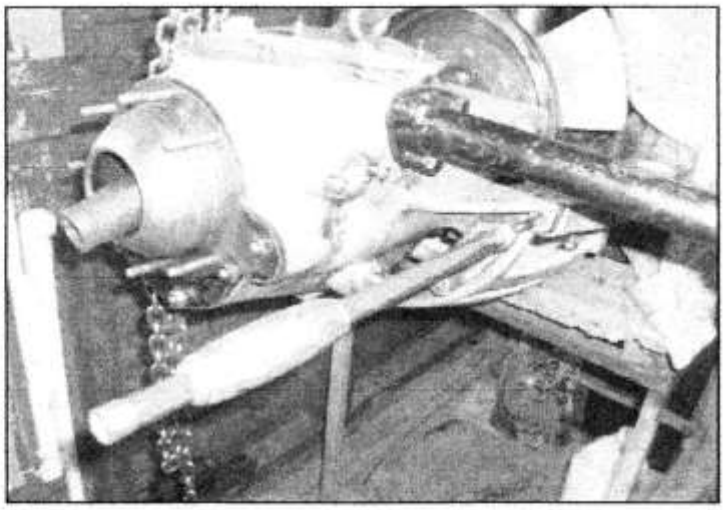


Fig.19

If it has been necessary, for any reason, to remove the gearbox and the fixing bolts are not a convincingly tight fit in their holes, then it is worthwhile to re-align the gearbox to the face of the flywheel with a DTI, using the attachment bolts to clamp the box lightly in position until good alignment has been achieved (Fig.18); then reaming out the two uppermost and fitting oversized bolts as dowels to ensure alignment in future.
(The wooden handled object in Fig.19 is an old garden spray adapted to hold a reamer for working in awkward places).

AA 10 – TALBOT PRE-SELECTOR GEAR BOXES

We find when reconditioning these gearboxes that each one has to be dealt with on an individual basis. There are at least four different gear trains in use, depending on the model and beyond that, they are all worn to different degrees.

The various bronze bushes and washers, if they are to be replaced, are best made to suit the particular gearbox. With the thrust washers we usually aim at the thickness which will give a .010" separation at the periphery of the drums. The journal fitted should be such that the bushes have about .001" - .002" clearance. It is a mistake to try and reduce the clearance to zero because the bronze will expand and then there is the risk of the whole thing seizing up.

If the steel surfaces are badly damaged, then it is best to re-machine them in the lathe to a smooth condition. The situation where most wear occurs is usually in the area of the 3rd gear drum. Depending on the model, this drum is rotating backwards about three times faster than the input shaft. Thus, in neutral, the engine is turning at, say, 1,000 r.p.m. The drum will be doing 3,000 r.p.m. but in the opposite direction, thus the journal speed will be equivalent to 4,000 r.p.m., hence the need for adequate clearance. You will usually find that the wear decreases towards the bottom and reverse gears where the rotational speeds are much lower.

You have to clean all the parts up, make sure that the planet wheel pins are firm in their housings. It is permissible to lightly re-rivet these if they are loose. You have to deal then with each set of parts, making new bushes, thrust washers, etc. as required. When you have done the whole set of drums, it is best to mount them back in the gearbox on the shafts, but without the top gear clutch and reset the end float. The end float is measured at the small steel thrust washer which fits on the front of the input shaft. (Make sure that the lugs engage with the splines).

In the absence of the top gear clutch, you can measure the clearance with an ordinary feeler gauge. The clearance is controlled by shim washers on either side of the input shaft front bearing. If you want to move the shaft in to decrease the clearance, then you take a washer from behind the bearing and replace it on the other side. The total number of shims in the housing should be such that the bearing is just lightly trapped. Aim at about .006" clearance. Too much is better than too little. It is a mistake to assemble it without any clearance because this immediately places a heavy load on all the thrust washers in the pack.

Having got to this stage, you dismantle the end again and re-assemble the top gear clutch. Whilst it is dismantled, you should make sure that the left and right hand threaded bush in the back end of the gearbox is a close fit in the gearbox case. This bush is crucial to the well being of the gearbox in that it acts as an oil pump forcing oil into the center of the shaft; from thence it can find its way out through all the planetary trains lubricating as it goes. It is then thrown out into the gearbox, much of it going into a small trough or gutter which you will see on the top right side of the gearbox. From thence it finds its way back into the box which is located above the aforesaid screw pump. The feed in from the engine does not deliver oil in any great measure, it merely serves to keep the box topped up. Any surplus finds its way back to the engine sump via the big transfer pipes visible on

the outside. The main ball bearings in the box are standard engineering bearings, ball journals and you should be able to get them anywhere. (4 required – 2 of No. 6207 and 2 of No. 6211)

Because of the speed difference on the 3rd gear train, mentioned above, it is a mistake to rev the engine when the car is stationary any more than is absolutely necessary. Racing cars, which used to be fitted with pre-selector gearboxes, were always warmed up in the paddock with the back wheels jacked up so that in top gear the whole transmission rotated as one.

AA 11 – TALBOT PRESELECTOR GEARBOX OIL FEED NOTES
ORIGINAL LAYOUT : ALL MODELS EXCEPT THOSE WITH TRAFFIC CLUTCH
(To be read in conjunction with the diagram opposite)

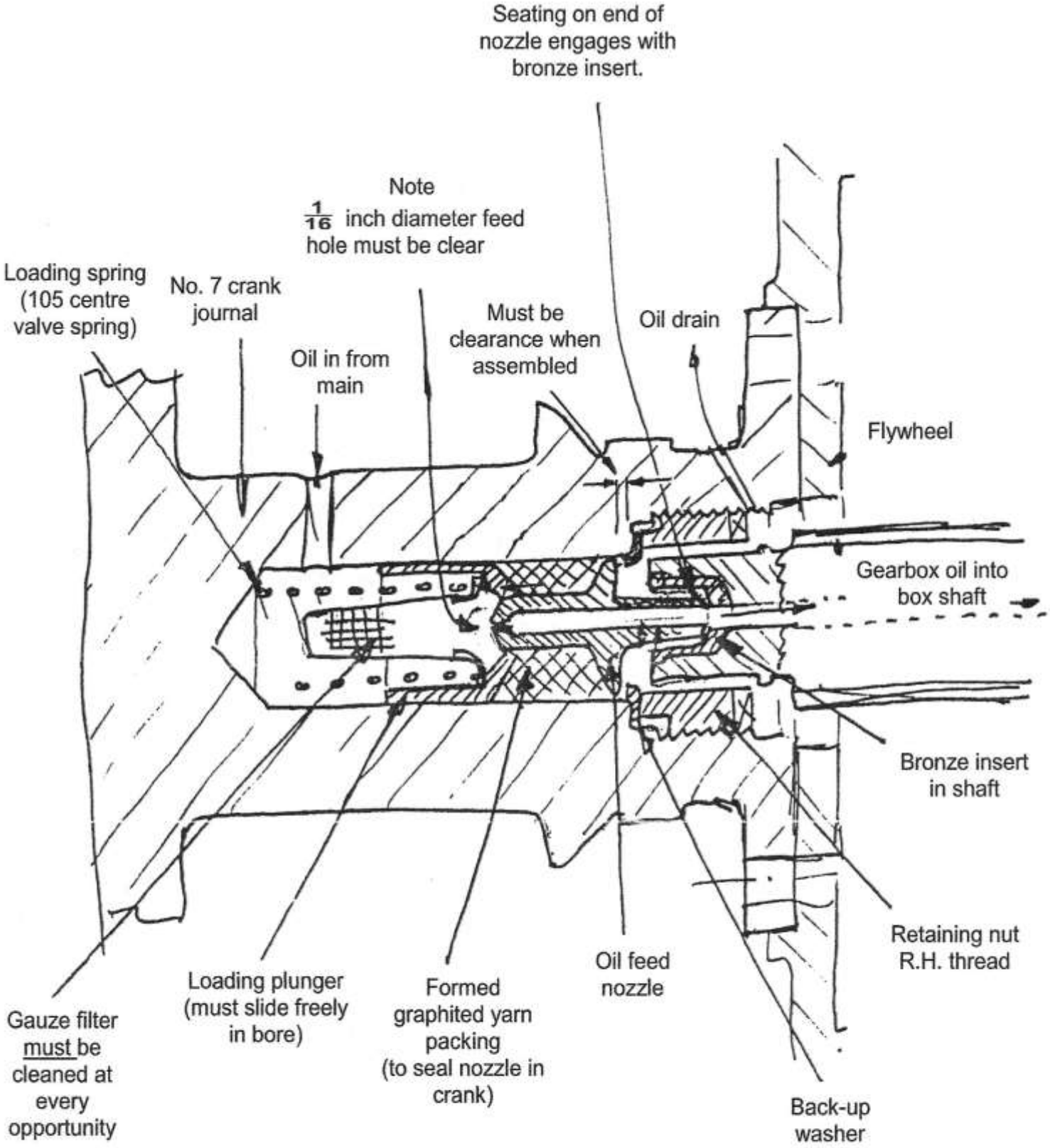
The kit of parts comprises:-

a) 1 bronze insert for gearbox shaft. (Tap a thread and screw a bolt into the old one to get it out. I hope this bronze nozzle is a good press fit in your shaft, but we have found differing sizes).
b) The oil feed nozzle.
c) Packing in assembly ring.
d) Loading plunger.

The packing is contained in what I call the assembly ring which should push up into the crankshaft and enable the packing to start dead square with the recess. You need an assistant and two substantial screwdrivers to assemble it because the spring at the back is quite powerful.

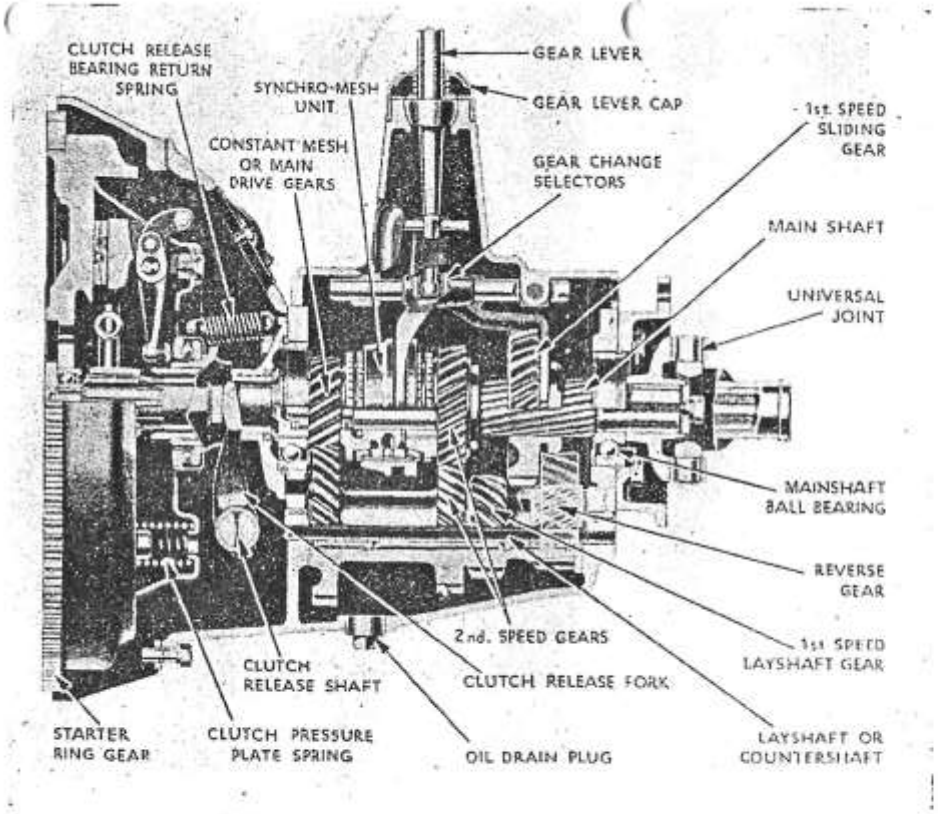
1. Clean out the shaft, clean filter etc. Make sure 1/16" hole in the nozzle is clear. Smear the inside of the shaft with oil. Make sure the retaining nut runs in freely.
2. Assemble onto the second screwdriver, the nut and the retaining washer and give this to the assistant.
3. Insert into the crankshaft, spring, filter, loading plunger, then offer in the new assembly of the nozzle and packing (still contained in the steel assembly ring) and push the whole assembly of nozzle, packing etc. firmly into the crankshaft. It should pass in through the assembly ring, leaving the latter trapped on your screwdriver.
4. Wake up your assistant and get him to push on the opposite side of the nozzle to yourself with his screwdriver containing the back up washer and nut. He has to hold his screwdriver onto the feed nozzle while you remove your screwdriver with the assembly ring which has now served its purpose.
5. You should then be able to bring the back up washer and nut along the assistant's screwdriver and screw them into the crank. The nut must be fully home before the assistant releases his screwdriver, whereupon the feed nozzle should snap back onto the back up washer. Finally tighten up the nut. It is not a bad idea to centre punch it in one place to prevent it undoing, although this should not be necessary.

NB: The packings are some which we press ourselves from water pump packing. They are perfectly satisfactory once installed but prone to unravel if carelessly handled. When it is all done up, the nozzle should push in and spring out. When you offer up the gearbox, ascertain either by measurement (tricky), or by feel (difficult), or by a small blob of paint on the steel nozzle in the crankshaft, which will by its displacement ensure that the nozzle has been making contact with the bronze seating in the gearbox shaft. If it all flies to pieces, refit the packing into the steel assembly ring before making another attempt.



Detail for the Talbot preselector gearbox oil feed

All models except those with traffic clutch



FORD THREE-SPEED SYNCHROMESH GEARBOX

Fig. 15c. The photograph shows the main constructional details of the Ford three-speed synchromesh gearbox in relation to the clutch assembly on the left.

members to be engaged before positive connection is made, but although they may vary in detail, the fundamental principle is the same in all circumstances.

FREE WHEEL

This device (Fig. 16) has been frequently fitted in the transmission line behind the gearbox, often as an integral part of the gearbox. It actually functions as a one way clutch transmitting the turning power or torque of the engine via the gearbox to the rear axle. It will not, however, transmit any turning effort from the rear axle to the gearbox, as would happen in the ordinary way when the vehicle was endeavouring to over-run the engine. The freewheel as fitted to the ordinary bicycle is an example familiar to everyone. When the cyclist turns the pedals he propels the machine, but if he ceases to pedal the machine runs on without the pedals being carried round. Similarly, when a free wheel is fitted to a motor vehicle coasting can be indulged in whenever road conditions are favourable, the engine being allowed to tick over and the gears remaining in engagement. Lower petrol consumption results from the use of such devices and another advantage is that when the accelerator is released the engine and gearbox shafts will slow down together. A change of gear can, therefore, be effected quite easily even with the sliding pinion type of gearbox. A control is usually provided whereby the driver can lock the device at will, and the transmission will then

function in the ordinary manner. Except when so locked the free-wheel prevents use of the engine for braking purposes.

EPICYCLIC GEARS AND PRE-SELECTIVE GEAR CHANGING

There is another method of changing gear ratios which, having been used on some of the very earliest successful motor-cars (e.g., the Lanchester), has been revived in recent years to give not only a change of gears, but a very easy change. This is the epicyclic gear system developed into the pre-selector gearbox. Cars so equipped have for their gear change only a short lever on the steering column just under the steering wheel (Fig. 17), and a pedal that takes the place of the ordinary clutch pedal. To engage or change the gear the lever is first put into the required position but no change occurs until the pedal is depressed and released. Only when this is done is the gear engaged, and if necessary a gear disengaged first. Thus, when the car is being moved from rest, the driver pre-selects the appropriate gear, but nothing happens until he operates what is still spoken of as the clutch pedal, by association with the pedal that previously occupied the same position but which now does not operate a conventional clutch. Generally, the pre-selector gearbox is used in conjunction with some form of automatic clutch such as the fluid flywheel and only when the engine is accelerated by depression of the accelerator pedal does the car move away from rest. Thus the driver may operate the gear lever and the clutch pedal without making any difference to the movement or lack of movement of the car, provided always that the engine speed is low.

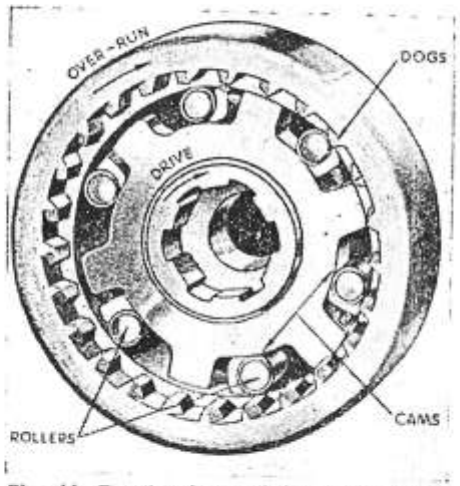


Fig. 16. Details of typical freewheel device. When the drive shaft is rotated under power from the engine the rollers are forced into the narrow sections of the cavities. On the over-run they roll freely in the wider section and the momentum of the car is not transmitted to the engine. Note that on the over-run the engine can not be used for auxiliary braking purposes.

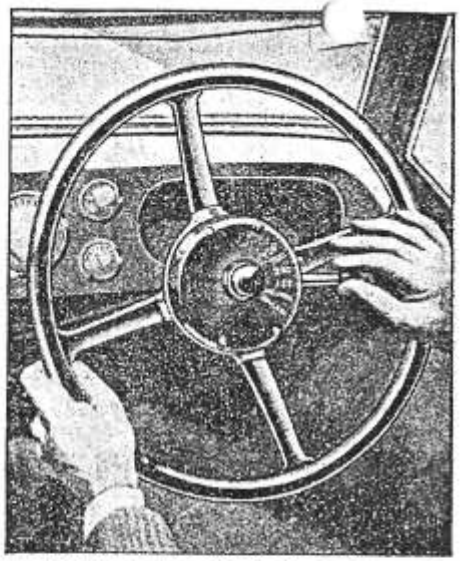
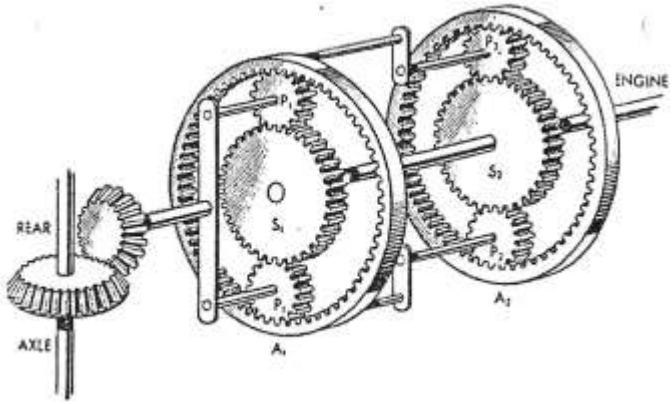


Fig. 17. Finger tip control of gear change for pre-selector geartox. Note.—When the car is in motion, the action of the pedal changes the gear after another gear has been selected.

In changing gear, once the car has moved away from rest, the driver puts the lever into the position of the gear required next but no change occurs until the left pedal is operated. When this pedal is depressed and released, the gear changes immediately and automatically, and so on throughout the whole range of the gearbox. Depressing the pedal gives a disconnecting effect between engine and rear wheels as does depressing an ordinary clutch pedal, although the mechanism involved is fundamentally different. When a car fitted with a pre-selector gear-



COMPOUNDING TWO SIMPLE EPICYCLIC GEAR TRAINS

Fig. 18. Diagram showing the three essential components to each set of gear trains, viz. : in A_1, the gears are P_1, S_1 and P_1, respectively.

box is about to be stopped the lever should be put in the neutral position and the clutch fully depressed and then released, which will bring the gears into neutral.

Principles of Epicyclic Gearing. Gear changing does not involve any change in the meshing of gears or pinions, all gears and pinions engaged in an epicyclic gearbox being in constant mesh, nor is there any equivalent of locking or unlocking pinions, constantly meshed, to or from their shafts as in the conventional gearbox, where sliding pinions are replaced by sliding dog clutches. The principles of the epicyclic gear is illustrated in Fig. 18; this shows that there are three essential components to each set or train of gears. Of these components the first, an external member, is a disc with a flange; on the inner face of this flange gear teeth are cut, and this member is known, technically, as the annulus. It is hollow and mounted on the engine driven shaft, round which it is free to rotate. Fixed to the engine shaft, concentrically with but independently of the annulus, is a pinion called a sun gear; this is incorporated so that the two may rotate independently of each other, i.e. the sun gear can be stationary with the annulus rotating, or vice versa. Between the sun gear and the teeth of the annulus is interposed a pinion, or series of pinions (generally three) which are not fixed to the disc, but are fixed or connected to each other by a cage or carrier. These pinions are known as the planet wheels, and they may rotate independently on their axes by which they are attached to their carrier, or the carrier may revolve bodily taking the pinions with it around the sun gear and inside the annulus. The sun and planet pinions are the internal members of the gear.

If the sun gear is turned while the annulus is held stationary, then the planet pinions will roll round the sun gear (between this gear and the annulus) at a speed dependent on the speed of rotation of the sun gear and the relative sizes. If the annulus be rotated in the same direction as the sun gear the planet pinions will roll round more quickly than before, at the same time rotating on their own axes unless and until the sun gear is rotating at the same speed, when the planet pinions will be carried round still faster, but will cease to rotate on their own axes. Thus, by varying the relative speeds between the sun gear and the annulus, it is possible to vary the speed of revolution of the planet pinions in their cage, from a minimum when the annulus is stationary.

So long as there is any discrepancy between the speeds of rotation of sun gear and annulus, the planet pinions will rotate on their own axes in addition to revolving bodily with their cage round the sun gear. When the speed of the sun gear and annulus are equal, the planetary cage will revolve without any rotation of the pinions.

So far, control of the sun gear and annulus to control movement of the planet pinions have been considered.

Now suppose the planetary cage be held stationary while the sun gear is rotating, the planet wheels will rotate on their axes in their cage to drive the annulus in the opposite direction to the sun gear, an effect that may be utilised to give reverse gear for the vehicle.

The sun gear is connected directly to the engine driven shaft of the gearbox, thus corresponding to the constant mesh driving pinion on the mainshaft of an ordinary gearbox, and the planet wheel cage is connected through the output shaft of the gearbox to the propeller shaft of the transmission to the rear axle. Means are incorporated in an epicyclic gearbox for holding the annulus stationary by an external contracting band brake which, when applied, grips the annulus firmly, but allows the other components to move.

The epicyclic gearbox as applied to a motorcar consists of a number of sets of trains of gears as already outlined; these are connected by the engine through the clutch, if provided, and the planetary cage of the rearmost train is connected to the output shaft of the gearbox. Reverting to Fig. 18, the engine when running with the clutch engaged is always driving both sun gears, but for the moment the gear train A_2 may be ignored. Now if annulus A_1 is held stationary, its planetary pinions P_1 will roll between it and the sun gear S_1, and turn the shaft to the rear axle. As the annulus is stationary the planetary cage will travel at its minimum speed for a given engine speed and this will give the lowest available ratio between engine and rear axle, in other words bottom gear.

If the annulus A_1 is released and the annulus A_2 is held stationary the planetary pinions P_2 will roll between their sun gear S_2 and the fixed annulus A_2. As the cage of these planetary pinions is connected to annulus A_1 this also will rotate, but both sun gears are rotating at the same speed at the time, and in the first train of gears we now have the annulus A_1 also rotating so that the planetary cage P_1 will be rolling round the sun gear faster than before, and this will give a higher gear.

If the first annulus A_1 is held stationary, the planetary cage P_2 connected to it must also be stationary and so the pinions cannot roll round their sun gear S_2 although the pinions are free to rotate on their own axes. Therefore, if the sun gear S_2 rotates the planetary pinions P_2 on their axes, the annulus A_2 engages with these pinions P_2 and being free to rotate will turn in the opposite direction to the sun gear. If this reversal of direction be conveyed to the rear axle, reverse gear is obtained and this is achieved in the Wilson gearbox, one of the most popular of pre-selector gearboxes.

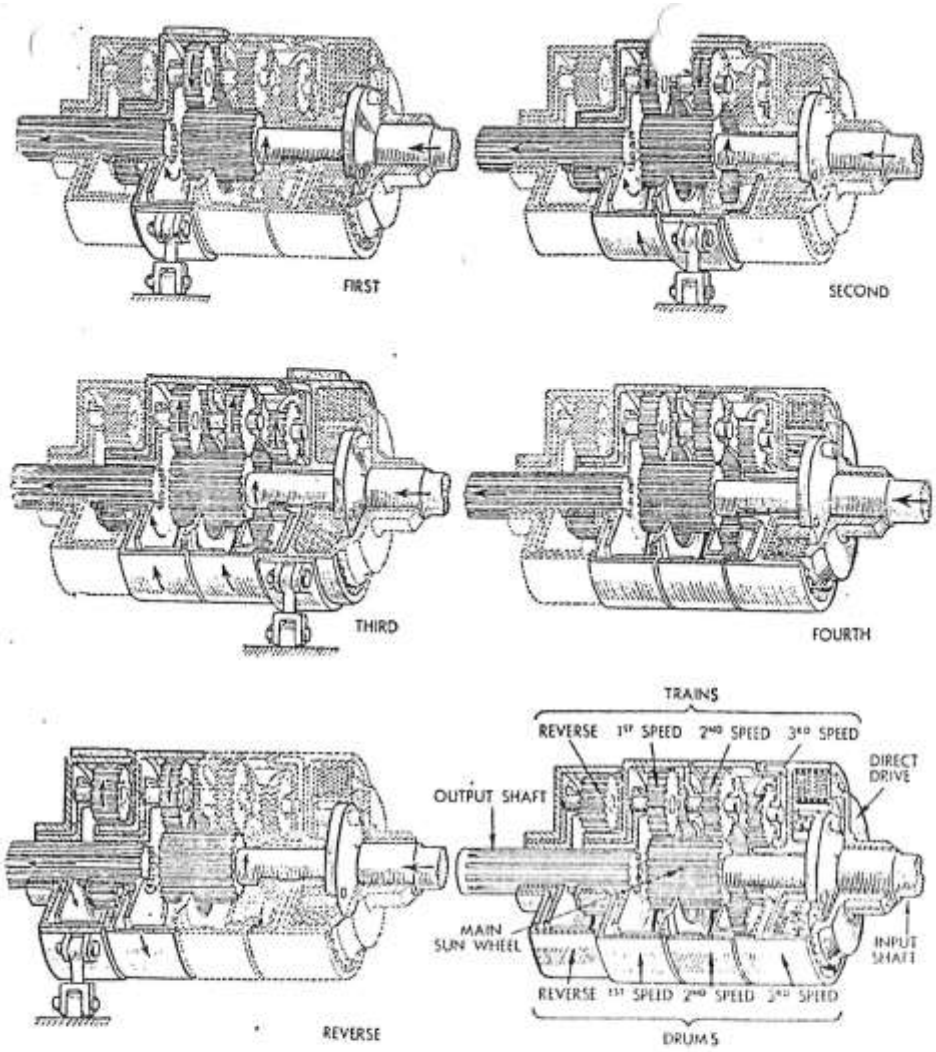
A full description of the Wilson gearbox follows, but it may perhaps first be emphasised that pre-selection and the use of epicyclic gearing are not necessarily bound together. In some early cars (e.g.) the Lanchester and the model T Ford, epicyclic gearing was used without any pre-selection mechanism, and it is possible that the near future will see the coming of pre-selection gearboxes that do not employ epicyclic gearing. The Wilson gearbox is a very successful union of pre-selective and epicyclic principles.

WILSON GEARBOX

The gearbox comprises three sub-assemblies; the *running gear*, the *brake harness*, and the *control mechanism*, housed in an oil-tight casing.

Running Gear. This consists of four epicyclic trains of gears interconnected so that different ratios and a reverse can be obtained by compounding the various trains. The various gear trains can be clearly distinguished in Fig. 19 and it will been seen that top gear or direct-drive is provided by a plate clutch. Oil pumps are also provided to ensure that lubricant is delivered to all parts of the somewhat intricate mechanism involved. To enable the reader to follow the action of the various speeds, they are diagrammatically shown in Fig. 19. It will be noticed that the first speed planet gear carrier acts as the driving member to the output shaft for all the forward gears. Let us follow how each gear train functions.

First Gear is obtained by applying a brake to the first gear annulus so that it is held stationary. The engine will then be



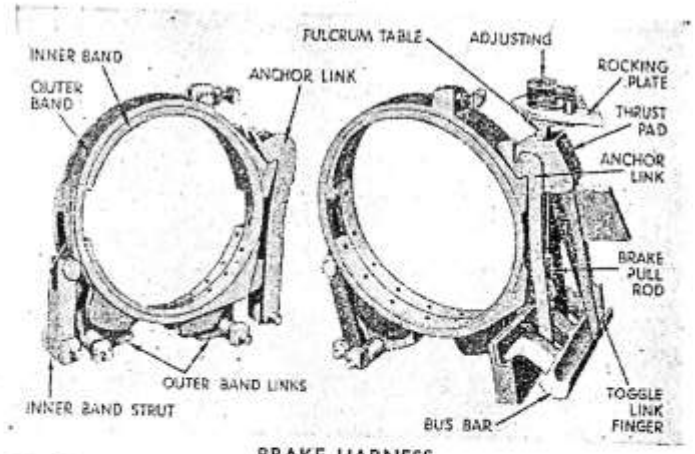
WILSON GEARBOX

Fig. 19. The six diagrams show the various gear positions and should be studied in conjunction with the text which describes the method of operation.

turning the main sun gear so that the planet gears will be rolling round inside the annulus, carrying their carrier round with them. As this carrier is fixed to the output shaft its motion is imparted to it and so to the rear axle.

Second Gear is obtained by holding the second gear annulus stationary by its brake. The main sun gear, still turned by the engine, causes the planet gears to revolve and turn their carrier. But this carrier is connected to the first gear annulus which therefore turns, speeding up the rotation of its planet gears and carrier, and is turning the output shaft faster than was the case in first gear, i.e. less reduction.

Third Gear is obtained by holding the third gear brake drum *and* sun gear stationary, for the sun gear of this train is integral with the brake drum. Further the annulus is an integral part of the second gear planet carrier which is in turn connected to the first gear annulus. The third gear planet carrier is connected to the second gear annulus so driving it in the same direction as the engine, i.e. increasing its speed. So the drive is taken back through the second gear planets and carrier and the first gear annulus both of which are speeded up. The result is to speed up the first gear planets and carrier, which are connected to the propeller shaft. In other words by interconnecting the second and third planetary gear trains, an increase of speed is obtained at the first gear annulus, which increases the speed of the planets and carrier.



BRAKE HARNESS

Fig. 20. Diagram showing one unit of the brake harness on the Wilson gearbox. The toggle linkage is shown more clearly in Fig. 21.

Top Gear. In top gear all the trains are locked together and revolve as one solid block, driving the output shaft at engine speed. This is brought about by the engagement of the driving member of the clutch (plate clutch on later designs) with the driven member, which is the drum and sun gear of the third gear train, so locking the third gear sun to the driving shaft. Thus all the sun gears will be revolving at the same speed since the first and second gear suns are fixed to the shaft and there cannot be any individual action of the various gear trains; all the brake bands being loose round their annuli.

Reverse. The first gear annulus is connected to the sun gear for the reverse gear train and hence drives it opposite to engine rotation. When the brake is applied to the reverse gear annulus, the reverse gear planet wheels, turned by the reverse sun gear connected to the first gear annulus (and therefore turning opposite to the engine), carry with them the planet carrier in the opposite direction to the engine shaft. As the planet gear carrier is directly connected to the output shaft, the direction of rotation of the propeller shaft is reversed. The action of the reverse gear train is also shown in Fig. 19 and the gear positions should be carefully noted.

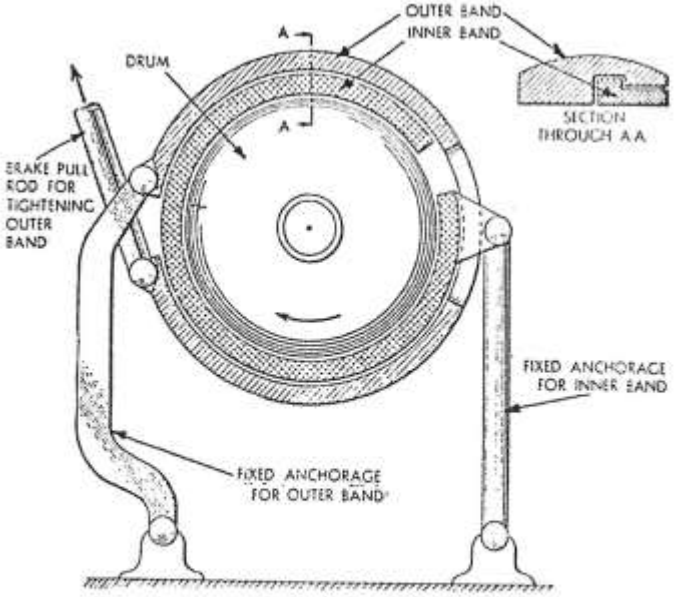
Brake Harness. One unit of the brake band assembly is shown in Fig. 20. To put any required gear train into action the respective brake is applied to grip the annulus or drum. It will be appreciated that, in the course of time, wear will take place on the linings of the bands in a similar manner to that experienced with the road wheel brakes. Therefore, some means of adjustment must be provided to eliminate the possibility of slipping. This is done automatically without any attention from the driver and ensures correct adjustment over long periods of service. The bands are also designed on the same principle as servo brakes (see Chapter 3) so that, as they are applied, the tendency is to self-wrap, and to unwrap on the over-run. The patentee has also cleverly utilised a double band (see Fig. 21) in such a way that the braking forces on the drums are fully balanced and impart no strain upon the running gear bearings. Full details of these refinements will hardly interest the driver, operator or repair man, but a knowledge of the self-adjusting mechanism is advisable.

Brake Band Operation and Adjustment. Fig. 20 also shows the toggle linkage used

for tightening the brake bands to put a gear into operation. Each gear train has a similar toggle linkage, put into or out of operation by the selector mechanism which will be dealt with later. First, it is necessary to understand how any one of the toggle linkages work; by referring to Fig. 21, it will be seen that a pull on the brake pull rod in the direction of the arrow will tighten up the outer band, and incidentally the inner band as well. The rotation of the drum will also assist the application, for the bands tend to "self-wrap" *ON*. The necessary pull on the brake pull rod is brought about as follows: The main spring forces the bus bar upwards whenever the clutch pedal is released. The bus bar in turn forces the selected toggle brake finger upwards (see Fig. 20), the hinged top piece or thrust pad acting as a lever. The fulcrum of this lever is the anchor link and, as the finger forces its outer end upwards, the brake pull rod is lifted upwards also.

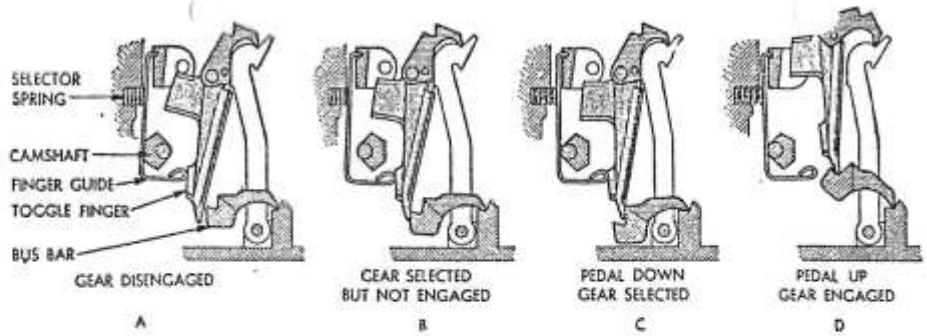
Automatic Adjustment. To maintain the correct loading on the brake bands it is necessary that they are kept correctly compensated for wear of the linings. This is accomplished by an automatic adjusting device which operates immediately wear takes place.

As the brake band linings wear, the movement of the toggle linkage will increase. The automatic adjustment provides that, when this movement exceeds a predetermined amount, the brake pull rod is shortened by means of the automatic adjuster which consists of the nut that screws on the brake pull rod. This nut fits down into a cone-shaped recess in the fulcrum table, through a hole in the rocking plate which is carried on the fulcrum table. A shoulder on the nut keeps the rocking plate down on the fulcrum table. Coiled round the nut is the automatic adjuster spring, one end of which is attached to a pin fixed to the fulcrum table, the other end being attached to a pin fixed to the rocking plate. When the brake is *OFF* the rocking plate contacts a stop fixed to the gearbox casing. When the brake is *ON* the toggle linkage pivots about its pin; the fulcrum table, etc., actuated by the upward movement of the finger, swing over until the brake band is applied. In this position the rocking plate contacts a set screw screwed into a boss on the brake band. Consequently, every time the brake is applied and released, a rocking or oscillating motion is imparted to the rocking plate. It is so arranged that the movement given to the rocking plate, when it contacts the set screw on the brake band, close coils the spring round the adjuster nut turning it on the



TOGGLE LINKAGE

Fig. 21. Diagrammatic illustration of the toggle linkage for tightening the brake bands when putting a gear into operation on the Wilson box.



GEAR SELECTION

Fig. 22. Four phases of gear selection illustrated diagrammatically to show the principle of the toggle action of the brake band assembly on the Wilson pre-selector gearbox.

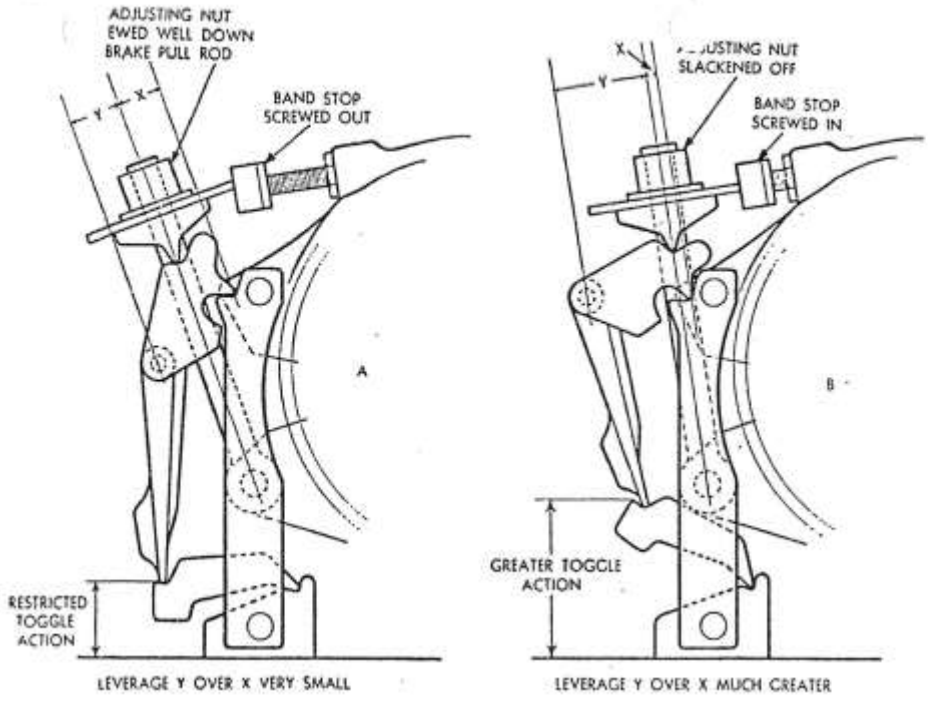
brake pull rod and tightening the band. If no adjustment is required, the loading on the nut is such that no movement takes place.

On the other hand, opposite movement of the rocking plate when it contacts the stop on the casing simply uncoils the spring and no movement of the nut can take place. This, summarised, means that every time the brake is applied and released any wear of the linings is automatically taken up and a predetermined loading of the bands maintained.

Control Mechanism. We have seen how the bus bar actuates the toggle linkage when a finger is engaged. Only one finger at a time, however, can be brought into engagement, each being pre-selected by the control lever on the steering column. This lever is connected, through suitable linkage, to the pre-selector mechanism mounted on a side plate of the gearbox. Thus, a camshaft (as shown in Fig. 22) is rotated according to the position of the control lever so the corresponding gear finger is pre-selected for engagement. This position is shown at B, but until the bus bar is lowered by depression of the "clutch" pedal no engagement actually takes place. When, however, this pedal is depressed the finger selected drops into the slot in the lowered bus bar as shown at C. When the pedal is released the rising bus bar forces the engaged finger upwards and this tightens up the brake of the selected gear through the pull exerted on the brake pull rod (Fig. 22).

Toggle Leverage. Apart from this automatic adjustment which compensates for wear on the bands, it is possible to alter the leverage on the brake pull rod. This is done by suitable adjustment of the adjusting nut in conjunction with the adjustable stop on the brake band. Reference to Fig. 23 will make this apparent, for if the adjusting nut is screwed down (as in A), the movement of the toggle linkage is restricted, and the leverage is low. If the adjusting nut is slackened *OFF* (as in B), there will be a greater movement of the toggle linkage and greater leverage on the brake pull rod.

Adjustment of Toggle Action. Should there be any tendency for the gears to slip, increased toggle leverage is required. Fierceness is counteracted by reducing toggle leverage. When either of these faults is experienced the rectification should be carried out as follows: First remove the inspection cover of the box; set the control lever in the position for selection of the faulty gear; make a pencil mark on the adjusting nut and depress and release the operating pedal until the adjusting nut ceases to revolve. Should the nut remain stationary from the start of operations, make quite sure that the operating pedal is not fouling the floorboards and so restricting full movement of the bus bar. This would also reduce the spring pressure of the mainspring and



TOGGLE ACTION IN RELATION TO LEVERAGE

Fig. 23. Diagram showing toggle action on the Wilson brake harness in relation to the leverage.

must be remedied by adjustment of the pedal before any internal adjustments are attempted. Such internal adjustments may indeed then become unnecessary.

To Increase Toggle Action. If the gear still slips after the above attention, adjustment to increase the toggle action is indicated.

First, ensure that the gear in question is not engaged, but the lever should not be put into neutral as two gears are partly engaged in this position.

Next screw in the adjustable stop on the brake band, one-half turn and lock up. Unhook one end of the adjuster spring, slacken off the adjuster nut half a turn, and re-attach spring eye. Select the faulty gear and pump the operating pedal until the adjuster nut stops turning.

To Reduce Toggle Action. To reduce the toggle action, first slacken the lock nut of the adjustable stop in the brake band, screw out the stop half a turn and lock it. Pump up operating pedal until adjuster nut stops turning.

Caution. When reverse gear is fitted with the horizontal type of adjuster mechanism, the adjustable stop should be unscrewed to increase toggle action instead of screwing in, as in the case of the other gears.

It will be noticed that the adjusting nut is *slackened off* to rectify slipping. But it must be borne in mind that this adjustment is to *increase toggle action*, or leverage.

Care and Maintenance. The driver should make a point of regularly "pumping up" on all gears to assist the automatic adjustment of the bands; he should, also, be particularly careful not to use the gear operating pedal as though it were an orthodox clutch pedal. Such use causes excessive and unnecessary wear on the brake band linings.

Check the level of oil in the gearbox,

drain and refill wi orrect lubricant as recommended by the makers. The gearbox will normally need attention on similar lines to that required by the engine. All the connections of the selector and operating mechanism need lubrication with the oil can. The gear box should be emptied of oil, while warm, and filled up again within about 750 miles after any of the brake bands have been re-lined.

CAUTION. On some boxes the drain plug acts as a stop for the bus bar; therefore, make sure that it is replaced with its correct washer, otherwise the movement of the bus bar may be restricted just sufficiently to stop the toggle fingers from dropping into or out of engagement.

Servicing the Wilson Gearbox. This should be undertaken only by a person well qualified or acquainted with the working of the box. Nor should the previous adjustments be undertaken by the amateur but should be submitted to the service station for attention.

When dismantling, the box will, first, have to be removed as a unit from the vehicle. Similar operations, as already outlined for the removal of orthodox gearboxes, hold good and should be followed. It is best to drain off all lubricant while the box is warm.

As it is only possible to generalise between the different manufacturers (Daimler, Armstrong, E.N.V. and various other manufacturers) of these gearboxes, the point to aim at is that dismantling consists of two major operations, namely, the removal of the running gear, as a separate operation to be completed first; and then removal of the brake harness.

With this in mind, the first operation is to let off the tension of the mainspring. Next, remove the side plate carrying the selector mechanism; also the mainspring, guides, buckets, etc. Nuts or set screws securing front and rear end plates will have to be unscrewed and driving flanges, speedometer drives, etc. also removed before the running gear can be withdrawn. Top gear toggle mechanism must also be operated on as this is usually attached to the casing of the box. When free of these various components the running gear can be drawn th gh the brake harness. Invert the assembly on its front end and proceed to lift off the various epicyclic gear trains, laying them in sequence as removed on a clean bench, taking particular care and note of all spacing washes, and operating balls, etc.

Before proceeding to commence work on the brake harness, it will be necessary to lift it out of the casing. Turn the box on its side and remove set screws or nuts securing bottom cover. When free, the gear casing can be lifted off the brake harness.

Automatic adjuster springs, nuts, rocking plates, fulcrum tables and toggle linkage can then be dismantled. The brake bands themselves can finally be removed by drawing the anchor pins, taking care not to lose the centraliser spring.

Renewal of Parts. These boxes are capable of completing thousands of miles of service before needing reconditioning. Even then, relining of the brake bands is the most that is required as a rule. As special equipment is necessary to carry this out correctly, re-conditioned bands should be obtained from the makers. While dismantled however, all ball races spacing washers between the drums, gear teeth and planet wheel races should be examined for wear. Also, make sure that the rivets in the planet carriers are tight. Should any of the planet assemblies need attention these also should be returned to the makers for rectification.

Assembly. If the parts have been laid out in the order of their removal, it will definitely facilitate reassembly, which should simply be a reversal of the sequence followed for dismantling. It is advisable to use jointing on all the face jointings to eliminate any possible leakage of lubricant. Also, make sure that the brake bands of the brake harness are lined up before inserting the running gear from the *front* of the box. Adjustments to the toggle linkage should be carried out as already outlined in an earlier paragraph. If any of the brake bands have been relined, the gearbox should be drained after completion of the first 750 miles, washed out, and refilled with lubricant.

Keeping the TALBOT Gearbox in Good Order

THE [illegible] gearbox fitted to [illegible] closely follows the [illegible] which was described fully in the June issue of MOTOR SERVICE AND REPAIRS. In this case the engine is connected to the gearbox for lubrication, therefore the height of oil is governed by the crankcase. Another departure from practice with other gearboxes made under the Wilson patents is the automatic pre-selection of gears. Here, then, are the main adjustments for service attendance.

1. Slipping Gears

No free movement on clutch and change speed pedal.

(1) This will mean that the toggle action has gone over centre and in this case the pushing out and release of the pedal, called "pumping up" should set the automatic adjustment (Fig. 1) in operation, thereby restoring the free movement to the pedal. If this result is not obtained, the fault lies in the automatic adjusting gear.

(2) The stop bolt may not be near enough to the adjusting ring, in which case a half turn or so out will set the adjusting ring working again.

(3) The automatic adjusting nut may be at the end of the thread on the pull rod, if this is found to be the case, counterbore the adjusting nut.

(4) The automatic adjusting nut may not be operating due to the adjusting spring being weak, this may be overcome by tensioning up this spring.

Too much free movement on the clutch and change speed pedal.—This may be adjusted by releasing the automatic spring and turning the automatic adjusting nut in an anti-clockwise direction until the normal free movement is obtained, the stop bolt, of course, being adjusted accordingly, so that the adjustment finishes when the free movement is correct.

Weak main clutch spring.—If it is not possible to obtain a heavier poundage spring, it is permissible to screw down the nuts C and C1 (Fig. 2) about two threads below the head. If screwed down more than this the box may be stopped from working.

Early type housings.—The male and female housing which comprises the ball run of the top speed gear was found in the earlier boxes to wear considerably, allowing the balls to "pit in," thereby causing top speed slip and breakaway. In such cases the cure is to fit a modified male and female housing.

Originally the housing consisted of five slots and balls, and this was increased to six, whilst the angle of the top gear cones was altered from 17° to 15°. The new parts required for bringing the early type up to the later standard can be obtained from Clement Talbot, Ltd.

The male and female cones can be despatched to the works for grinding and relining (from 17° to 15°) and in most cases are returned the same day.

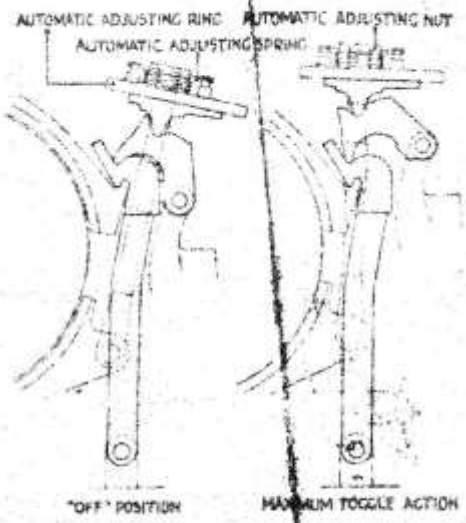


Fig. 1.

Top gear sticking.—Should the top gear cone splines become sticky on the shaft, this might cause slipping, and if serious will necessitate the removal of the box and the easing of the cone on the shaft. The cone might stick when fully engaged, and this could cause the stalling of the engine when brought to rest, or missing gears when changing down.

A slight "sticking in" of top gear may be due to the biting of the male cone into the lined female cone, and in such cases it is suggested that a small amount of graphite and oil is applied to the lining, being well worked in by means of engaging top gear and slipping it under load.

Adjusting piece fouling lid of box.—On the earlier models which have been in use some time it may be found that the toggle adjusting piece is fouling the lining of the lid of the box, if this is the case, a small strip of the lining should be removed. On the later boxes, however, more clearance has been allowed.

2. Gearbox Adjustment

Turn the automatic adjusting nuts anti-clockwise until the toggle movement goes over centre, then adjust the stop bolt, so that by pushing the clutch and change speed pedal, the automatic adjustment adjusts it to the pressure side of the top centre. Then adjust pedal adjusting bolt "B" (Fig. 2) until there is 1 in. free movement at the pad end of the pedal.

If by continual "pumping up" after being adjusted, such as when in use on the road, the above clearance increases, the stop bolt should be screwed in and the box readjusted as before.

3. Missing Gears

A correct diagnosis of this trouble saves a lot of work in the wrong direction. If when missing a gear the result is a neutral position on the clutch and change speed pedal, it means that the previously selected gear strut [illegible] is sticking in the busbar, or that the spring has lost tension.

(a) Strengthen spring on the side of the strut by setting with the fingers. In cases other than the first (or last) setting the spring should be sufficient.

(b) When the pedal comes back solid the trouble is more serious, and if this cannot be cured by taking a little off the bottom of the strut, it means that the following plate is bent and not pushing the strut into the busbar when selected. Then, after draining the box, remove camshaft frame. Remove all struts, withdraw the two studs from the bottom of the frame, sliding the frame backwards and up, thereby missing the quadrant. It is then easy to straighten up the following plate. It is possible for the strut to miss altogether through the centralising piece on the strut jamming in the camshaft frame, this, however, can be cured by setting or grinding, as long as it travels freely through the frame.

(c) There have been cases where a small stone has been thrown up from the road and has been found jammed under the stop of the clutch and change speed pedal, and this has not allowed the pedal to go right out, and consequently the box stays in one gear the whole time.

(d) On cars fitted with reversing lights the reverse can be missed by the switch becoming too stiff for the control lever to work it. This switch will be found [illegible] be cured by means of penetrating oil.

(e) Gears can also be missed through the pedal hitting the floor board before the action takes place. This is caused by the pedal adjusting nut "B" (Fig. 2) being loose and having gradually worked up.

(f) The selector rod from the steering to the box can be adjusted to cure missing gears, but only when the result is a neutral position on the pedal.

(g) Care must be taken in the removal of the top gear strut, for if the adjusting nut is unscrewed right off without holding up the pull rod, the latter might drop, allowing the short strut to swing away from the bottom connection. Should this be allowed to take place it is difficult to guide it back again, this may be done with a stout bent piece of wire, whilst the blade of a penknife is used between the strut and the pull rod. When removing the automatic ring, sprin[illegible] nut will hold up the pull rod, also wiring it up to the stop bolt with [illegible]. If the pedal is then held right out, [illegible] can be removed from the box [illegible] without trouble.

In the removal of struts, and to save trouble with the camshaft following plates, it is advisable to select on the quadrant any other gear than the one which is about to be removed.

4. Changing a Main Spring

This is a simple operation if the correct method is adopted. Firstly, select reverse gear, hold out the clutch pedal, then with a

screwdriver kick ... from the busbar, ... come back at the ... carried out correctly ... came back solid, having ... and taken the ... from ... position, as ... in the busbar fork ... falling over, a ... out and replaced with-

5. ... Noises

... noise developing in a gearbox, one of the few following suggestions may be followed :—

(a) Noisy in neutral and noisy ... gear, due to worn ball bearings.

(b) A constant scraping noise may be caused by the front oil trough or the oil deflector ... oil well ... the drum, and may be caused by slight end float, which if not ex... may be recti-fied by clearing away the edge of the sheet metal.

(c) Bushes should be examined for any seizure. Should this have occurred and the seizure is only slight, the bushes may be ... or if necessary ...

(d) If a "rattle" has developed, the first and second ... wheels should be examined, and if too slack in mesh, replaced with new gears. The driving ... should also be examined for slackness ... splines.

6. ... Automatic ... Changes

... the action of the automatic upsweep or gear selector fitted to some cars is of a ... simple nature working on a pawl principle, ... is fitted between the ... third gear struts, however, in the case of failure the following remarks may be of assistance.

... whole assembly loose, which only ... the tightening up of the 6 mm. ... down ...

... assembly correctly in position, but ... of adjustment. The adjusting nut should be unscrewed in order to lower the assembly and bring the pawl further into mesh.

... Stiff controls. The tightening up of the ... speed ... controls may, owing to ... power required, prevent the pawl from operating.

If for any reason it becomes necessary to put the automatic upsweep out of action, it may be easily effected by means of tightening up the adjusting nut to its fullest extent. The gearbox may then be manually operated.

7. Noise From Rear Axle

On the earliest type boxes which did not incorporate the "traffic clutch," a certain amount of drag was present in the box, and if the slow running of the engine was in any way erratic this was transmitted through to the differential, where a loud knocking developed even if the back lash in the gears was in no way excessive. This knocking could be plainly felt on the rear road wheels and in some instances if the hand brake was "off" the wheels would be seen to shudder, and attempt to drive the car.

In order to overcome these difficulties, it is only necessary to check over the slow running of the engine and ascertain that an even speed is being obtained and the noise will be entirely overcome.

8. Maintaining Oil Level

The oil is in constant circulation between engine and gearbox. On no account must thick oil or other substances be added to the gearbox, nor must the oil pipes connecting the gearbox and engine be interfered with.

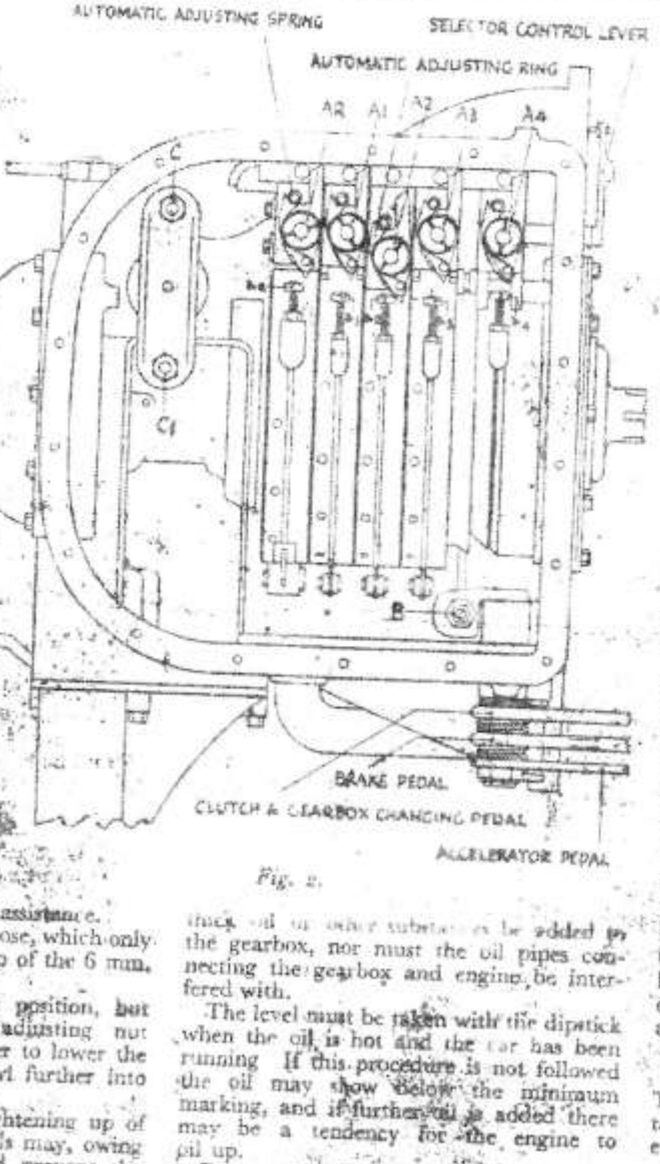


Fig. 2.

The level must be taken with the dipstick when the oil is hot and the car has been running. If this procedure is not followed the oil may show below the minimum marking, and if further oil is added there may be a tendency for the engine to oil up.

Removing the gearbox.—When draining engine oil it is also preferable to drain gearbox at the same time by removing bronze plug underneath. When refilling the engine it should be kept running slowly for some time so as to refill the gearbox to its usual level automatically, and until the engine level remains constant.

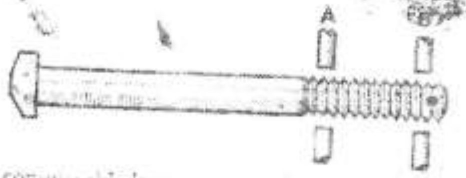
To remove the gearbox from the chassis, disconnect the torque tube at the rear of the gearbox and take out the rear shackles.

(Continued at foot of next column.)

Failure of Big End Bolts

In this connection a correspondent writes :—

The terms elongation, elastic limit, and reduction of area may be of only academic interest to the mechanic, but they are of



considerable importance to those engaged in big end work.

A representative big end bolt is shown in sketch. Failure generally occurs at A, and it is essential that the bolt be micrometered at A and B before assembly. Any difference shows that the bolt has been stressed beyond its elastic limit, and has suffered reduction in area, and it should be scrapped without hesitation.

A bolt in this condition may fail suddenly when the engine is "revved" in a low gear climbing a hill, and if the driver does not immediately "tumble" to it the other one will go with disastrous results. The Crossley Gas Engine Co. draw a line along their big end bolts with two centre pops exactly 6 in. apart. If the distance between pops exceeds ... in., or the line shows more than ... in. of twist, the bolt must be scrapped.

This method cannot be applied to automobile bolts owing to their smallness, but the writer has found the micrometer method to be very satisfactory.

Girling Brake Note

There are two varieties of steel Girling brake shoes fitted to the 15 h.p. Daimler, ... h.p., 19 h.p. and E. 18 h.p. Lanchester and 12 h.p. ... 1937 cars. The difference is in the length of the nose of the shoe. The latest pattern are the short shoes which are fitted to brake back plates which have the brake adjuster plungers inclined at an angle to each other. Care should be taken when fitting relined shoes to the earlier pattern back plates which have the brake adjuster plungers in line with each other, to see that the short pattern shoes are not fitted in error.

On these and E. 20 h.p. Daimler cars the brake shoes should be assembled with the buttons to which the brake pull-off springs are attached facing towards the ... back plate. Cases of incorrect assembly have been found which have resulted in tilting of the brake shoe, thus causing rubbing and uneven wear.

(Continued from previous column.)

This will allow the propeller shaft and torque tube to be ... end of the box.

Remove battery, brake rod ... take out the bolts holding the box to the bottom half crankcase round the circular flange. Then, after removing the steady pin in the cross ... the box can be withdrawn.

The box must be held firmly and pulled straight back until the driving shaft is clear of the spline in the coupling or the traffic clutch as the case may be. If a traffic clutch is fitted great care must be taken not to damage the oil retaining seal in the ... thereof.

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8 Talbot Gearbox

SUNBEAM TALBOT LIMITED,
North Kensington, W.10.

General Adjustments to Preselector Gear Boxes of Talbot Cars.

C O N T E N T S

Section

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Years 1933/7.

ALL MODELS FITTED WITH PRE-SELECTOR GEAR BOXES.

GENERAL ADJUSTMENTS TO GEAR BOXES.

1. SLIPPING GEARS.

Gear slip will generally be found to be due to one of the following causes:-

a. NO FREE MOVEMENT ON CLUTCH AND CHANGE SPEED PEDAL.

(1) This will mean that the toggle action has gone over centre and in this case the pushing out and release of the pedal, called "pumping up" should set the automatic adjustment (Fig. 1) in operation, thereby restoring the free movement to the pedal. If this result is not obtained, the fault lies in the automatic adjusting gear.

(2) The stop bolt may not be near enough to the adjusting ring, in which case a half turn or so out will set the adjusting ring working again.

(3) The automatic adjusting nut may be at the end of the thread on the pull rod, if this is found to be the case, counterbore the adjusting nut.

(4) The automatic adjusting nut may not be operating due to the adjusting spring being weak, this may be overcome by tensioning up this spring.

b. TOO MUCH FREE MOVEMENT ON THE CLUTCH AND CHANGE SPEED PEDAL.

This may be adjusted by releasing the automatic spring and turning the automatic

adjusting nut in an anti-clockwise direction until the normal free movement is obtained. The stop bolt, of course, being adjusted accordingly so that the adjustment finishes when the free movement is correct.

c. WEAK MAIN CLUTCH SPRING.

If it is not possible to obtain a heavier poundage spring, it is permissible to screw down the nuts C and C1 (Fig.3) about two threads below the head. If screwed down more than this the box may be stopped from working.

d. EARLY TYPE HOUSINGS.

(1) The male and female housing which comprises the ball run of the top speed gear was found in the earlier boxes to wear badly, allowing the balls to "pit in," thereby causing top speed slip and break-away and in such cases, the only cure is to fit a modified male and female housing.

(2) The original type of housing consisted of five slots and balls and this was increased to six whilst the angle of the top gear cones was altered from 17° to 15°. The new parts required for bringing the early type up to the later standard are as follows:-

Part No.	Name	Price
202097	Female Housing	£1. 1. 0. ea.
202099	Male member	- 15. 0. "
312057	Steel ball (six reqd)	- 1. "
312578	Retaining ring	- 3. "
312577	Return spring	3. 6. "
312576	Rear plate	-. 9. "
312035	Front plate	- 10. "
312575	2 B.A. Bolts (shorter than earlier type	- 2. "
312034	Top gear operating street	- 8. "

The male and female cones may be despatched to the works for grinding and relining (from 17° to 15°) and in most cases can be returned the same day. The labour and material charge being £1. 0. 0.

e. TOP GEAR-STICKING.

Should the top gear cone spines become sticky on the shaft, this might cause slipping, and if serious will necessitate the removal of the box and the easing of the cone on the shaft. The cone might stick when fully engaged and this would cause the stalling of the engine when brought to rest, or missing gears when changing down.

A slight "sticking in" of top gear may be due to the biting of the male cone into the lined female cone, and in such cases it is suggested that a small amount of graphite and oil is applied to the lining, being well worked in by means of engaging top gear and slipping it under load.

f. ADJUSTING PIECE FOULING LID OF BOX.

On the earlier models which have been in use some time, it may be found that the toggle adjusting piece is fouling the lining of the lid of the box, if this is the case, a small strip of the lining should be removed. On the later boxes, however, more clearance has been allowed.

2. GEAR BOX ADJUSTMENT.

Our latest method of adjusting the box for all gears is as follows:-

Turn the automatic adjusting nuts anti-clockwise until the toggle movement goes over centre, then adjust the stop bolt, so that by pushing the clutch and change speed pedal, the automatic adjustment adjusts it to the pressure side of the top centre. Then adjust pedal adjusting bolt "B" (Fig. 3) until there is 1" free

movement at the pad end of the pedal.

If by continual "pumping up" after being adjusted, such as when in use on the road, the above clearance increases, the stop bolt should be screwed in and the box re-adjusted as before. The various positions shown in Fig. 2 need not be strictly adhered to.

3. MISSING GEARS.

A correct diagnosis of this trouble saves a lot of work in the wrong direction. If when missing a gear, the result is a neutral position on the clutch and change speed pedal it means that the previously selected gear strut (Fig.1) is sticking in the bus bar, or that the spring has lost tension.

a. Strengthen spring on the side of the strut by setting with the fingers. In cases other than the first few boxes, setting the spring should be sufficient.

b. When the pedal comes back solid, the trouble is more serious, and if this cannot be cured by taking a little off the bottom of the strut, it means that the following plate is bent and not pushing the strut into the bus bar when selected. Then, after draining the box, remove camshaft frame. Remove all struts, withdraw the two studs from the bottom of the frame, sliding the frame backwards and up, thereby missing the quadrant. It is then easy to straighten up the following plate. It is possible for the strut to miss altogether through the centralising piece on the strut jamming in the camshaft frame, this, however, can be cured by setting or grinding, as long as it travels freely through the frame.

c. There have been cases where a small stone has been thrown up from the road and has been found jammed under the stop of the clutch and change speed pedal and this has not allowed the pedal to go right out and consequently the box stays in one gear the whole time.

d. On cars fitted with reversing lights, the reverse can be missed by the switch becoming too stiff for the control lever to work it. This switch will be found situated close to the flywheel, and the plunger may be eased by means of penetrating oil.

e. Gears can also be missed through the pedal hitting the floor board before the action takes place. This is caused by the pedal adjusting nut "B" (Fig. III) being loose and having gradually worked up.

f. The selector rod from the steering to the box can be adjusted to cure missing gears, but only when the result is a neutral position on the pedal. Details of adjusting this "timing" will be found in the instruction books.

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"	47	"	3	1934	"
"	48	"	3	1933	"

g. It was found in the earlier boxes that trouble confined itself mostly to top gear. Care must be taken in the removal of the top gear strut, for if the adjusting nut is unscrewed right off without holding up the pull rod, the latter might drop, allowing the short strut to swing away from the bottom connection. Should this be allowed to take place it is difficult to guide it back again, this may be done with a stout bent piece of wire, whilst the blade of a pen knife inserted between

the strut and the pull rod when removing the automatic ring, spring and nut will hold up the pull rod, also when wiring it up to the stop bolt with thin wire. If the pedal is then held right out, the strut can be removed from the box easily and without trouble.

In the removal of struts, and to save trouble with the camshaft following plates, it is advisable to select on the quadrant any other gear than the one which is about to be removed.

4. CHANGING A MAIN SPRING.

This is a simple operation if the correct method is adopted. Firstly select reverse gear, hold out the clutch pedal, then with a screw driver kick out the reverse strut from the bus bar, allowing the pedal to come back at the same time. If this is carried out correctly, the pedal should come back solid, having missed gear and taken the load from off spring. In this position, as long as a slight pressure is put on the bus bar fork, in order to keep it from falling over, a spring can be taken out and replaced without trouble.

5. GEAR BOX NOISES.

In the event of a noise developing in a gear box, one of the few following suggestions may be followed:-

a. Noisy in neutral and noisy in top gear, due to worn ball bearings.

b. A constant scraping noise may be caused by the front oil trough or the oil deflector to rear oil well fouling the drums, and may be caused by slight end float, which if not excessive may be rectified by clearing away the edge of the sheet metal.

c. Bushes should be examined for any seizure. Should this have occurred and the seizure is only slight, the bushes may be eased, or if necessary replaced.

d. If a "rattle" has developed, the first and second sun wheels should be examined, and if too slack in mesh replaced with new gears. The driving member should also be examined for slackness on the splines.

6. AUTOMATIC UPSWEEP.

The action of the automatic upsweep fitted to some cars is of a very simple nature working on a pawl principle, and is fitted between the top and third gear strut, however, in the case of failure the following remarks may be of assistance.

a. The whole assembly loose, which only necessitates the tightening up of the 6mm. holding down nut.

b. Assembly correctly in position, but out of adjustment. The adjusting nut should be unscrewed in order to lower the assembly and bring the pawl further into mesh.

c. Stiff controls. The tightening up of the change speed lever controls, may, owing to the extra power required prevent the pawl from operating.

If for any reason it becomes necessary to put the automatic upsweep out of action, this may be easily effected by means of tightening up the adjusting nut to its fullest extent. The gear box can then be manually operated.

7. NOISE IN NEUTRAL AND FROM REAR AXLE.

On the earliest type boxes which did not incorporate the "traffic clutch," a certain amount of drag was present in the box and if the slow running of the engine was in any way erratic this was transmitted through to the differential, where a loud knocking developed even if the back lash in the gears was in no way excessive. This knocking could be plainly felt on the rear road wheels and in some instances if the hand brake was "off" the wheels would be seen to shudder, and attempt to drive the car.

Having overcome these difficulties, it is only necessary to check over the slow running of the engine and ascertain that an even speed is being obtained and the noise will be entirely overcome.

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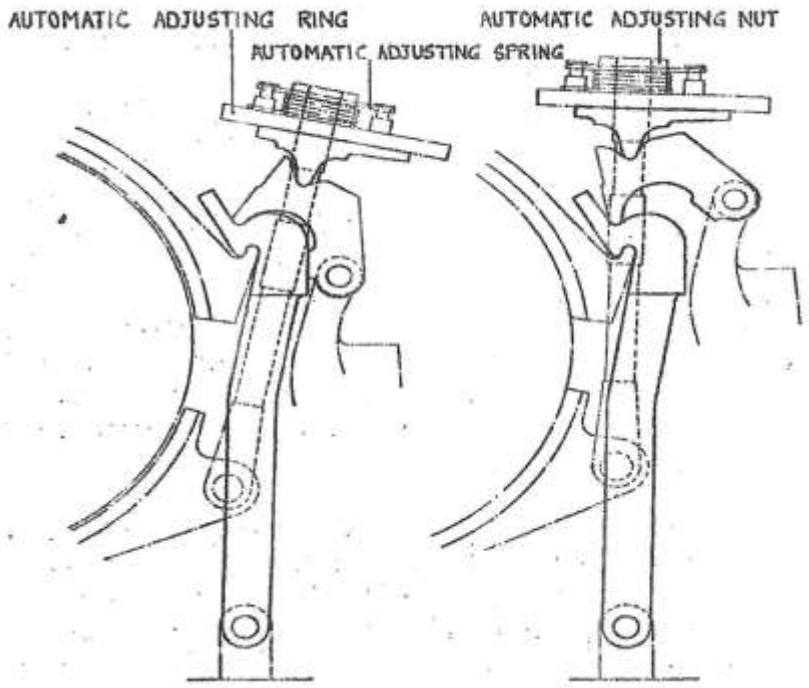


Fig. 1

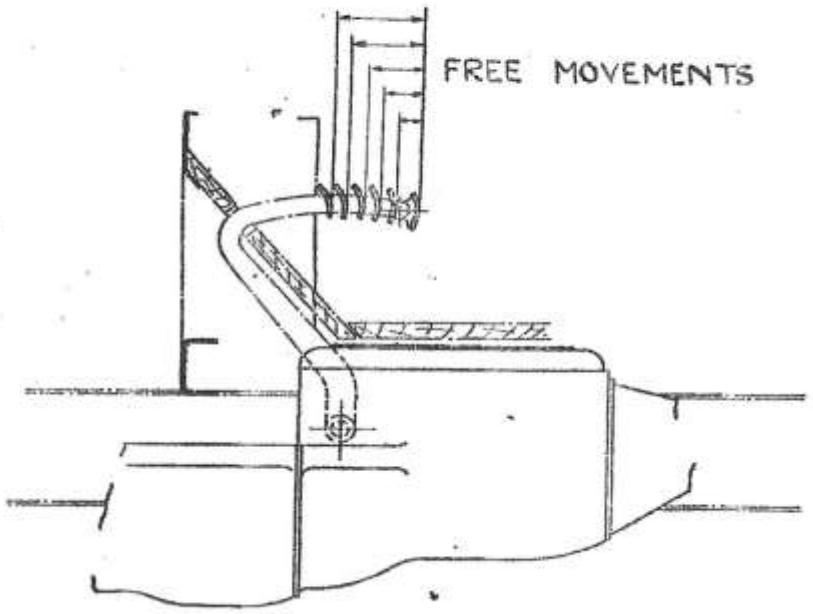


Fig. 2

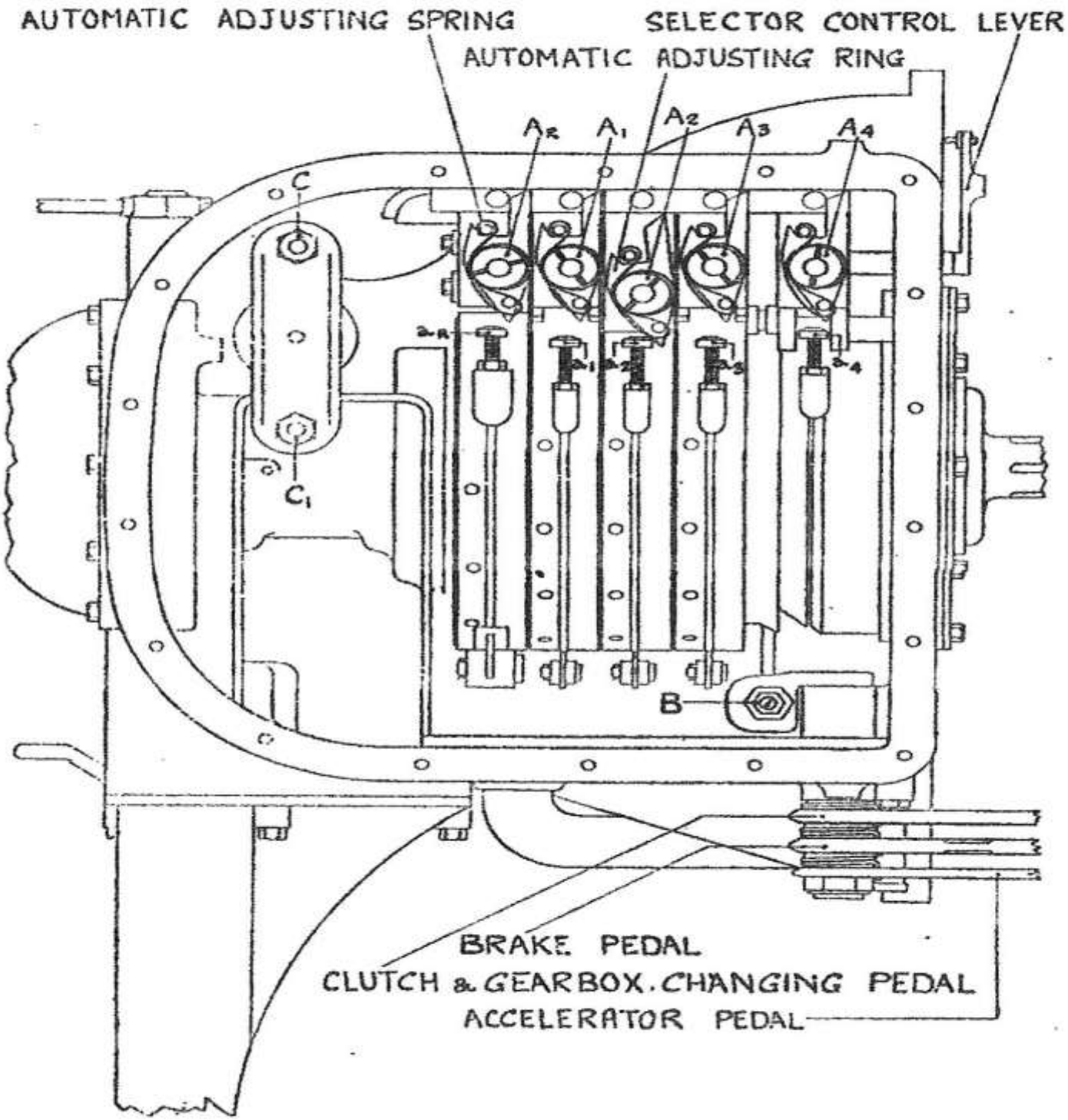

AUTOMATIC ADJUSTING SPRING
SELECTOR CONTROL LEVER
AUTOMATIC ADJUSTING RING
A R
A 1
A 2
A 3
A 4
C
C 1
B
BRAKE PEDAL
CLUTCH & GEARBOX. CHANGING PEDAL
ACCELERATOR PEDAL

Fig 3

(1)

SELF-CHANGING GEARBOX

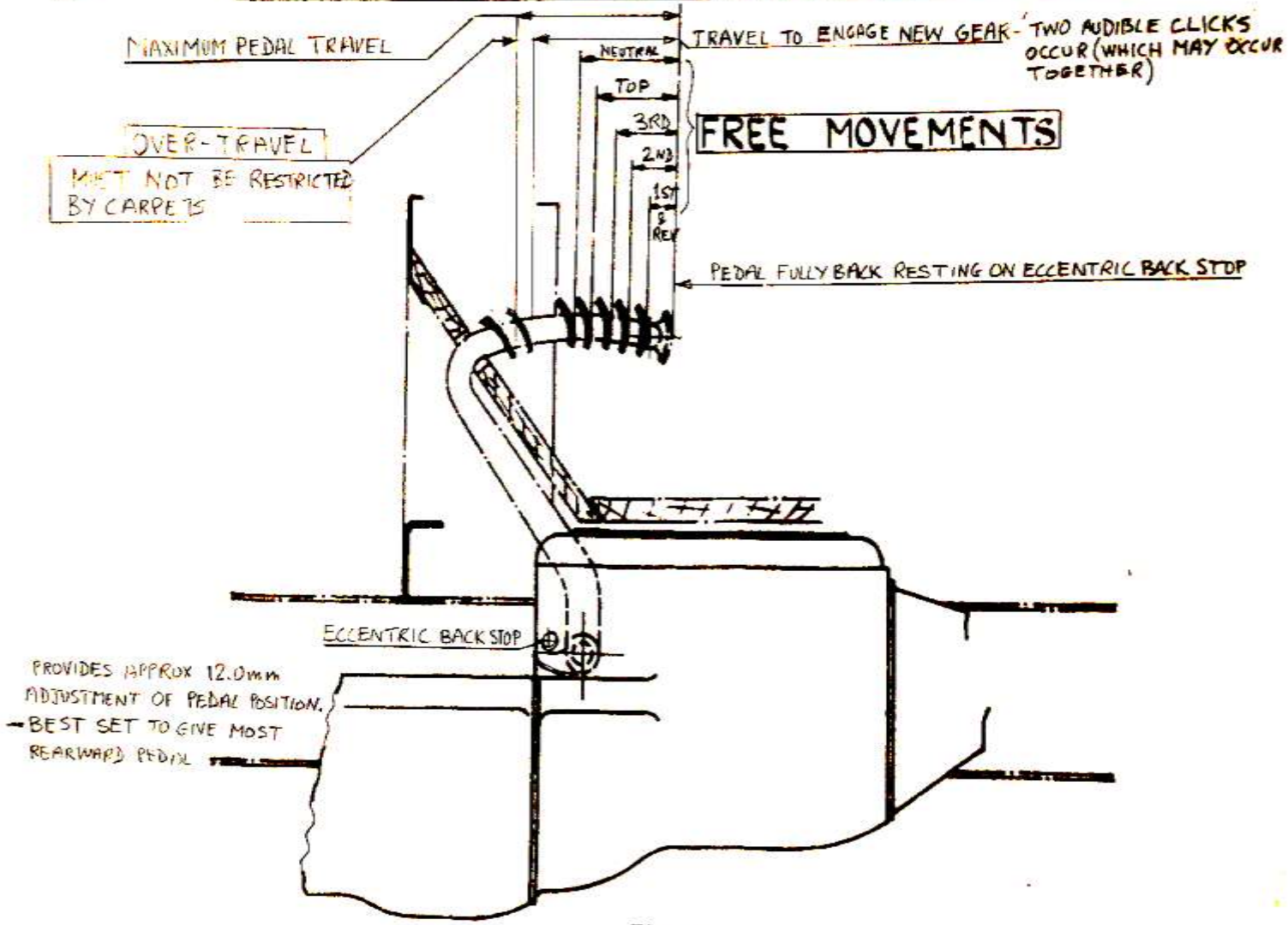
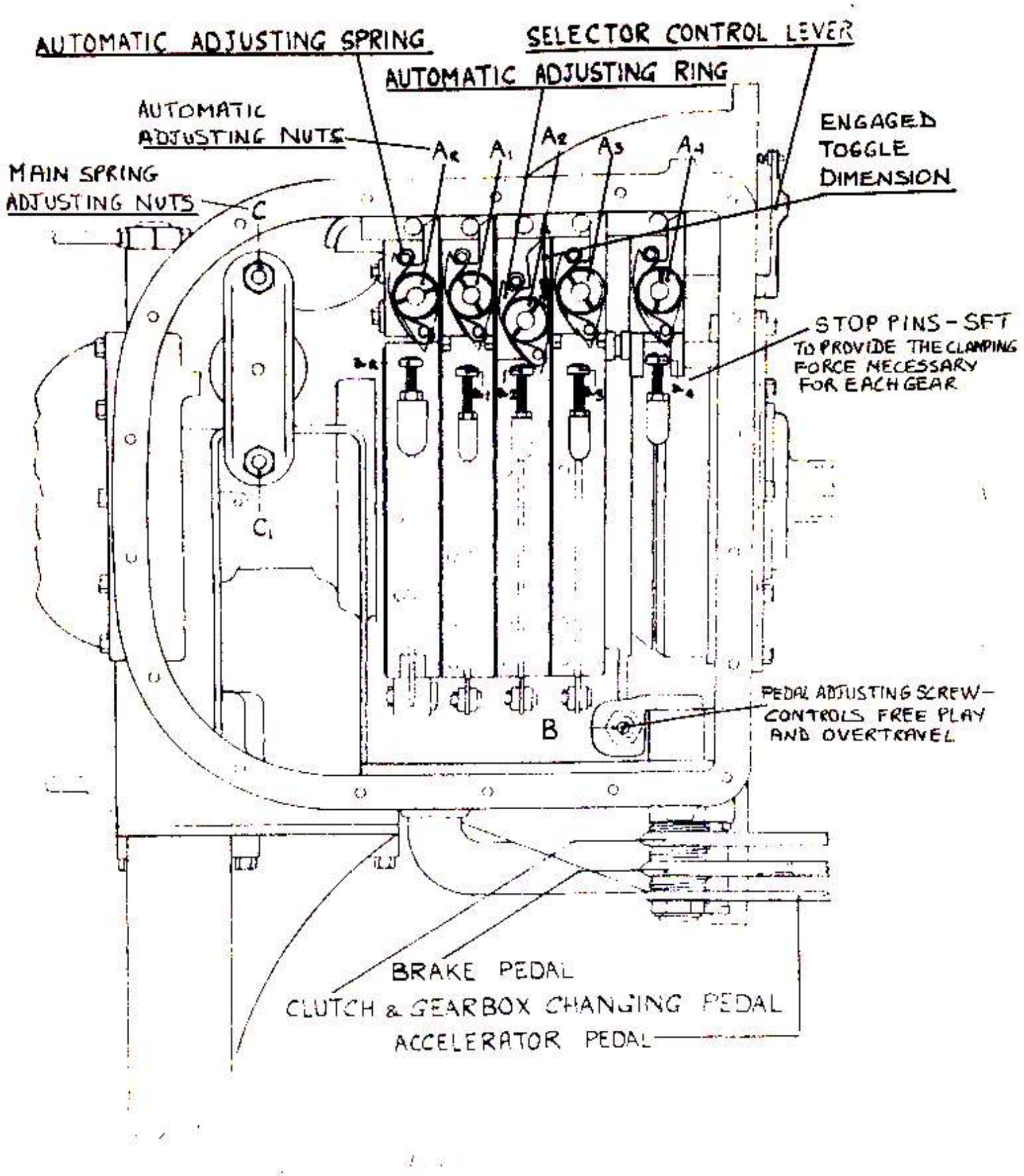


Fig. 29.

SELF-CHANGING GEARBOX



if any adjustment is required the following instructions must be carefully carried out :—

(1) It is advisable that from time to time **while the engine is stationary** to push the clutch and gear changing pedal fully out and release it about a dozen times with the selector control lever in each forward and reverse gear. This will allow the automatic adjustment to correctly adjust the brake bands.

(2) **No adjustments should be attempted while the engine is running.**

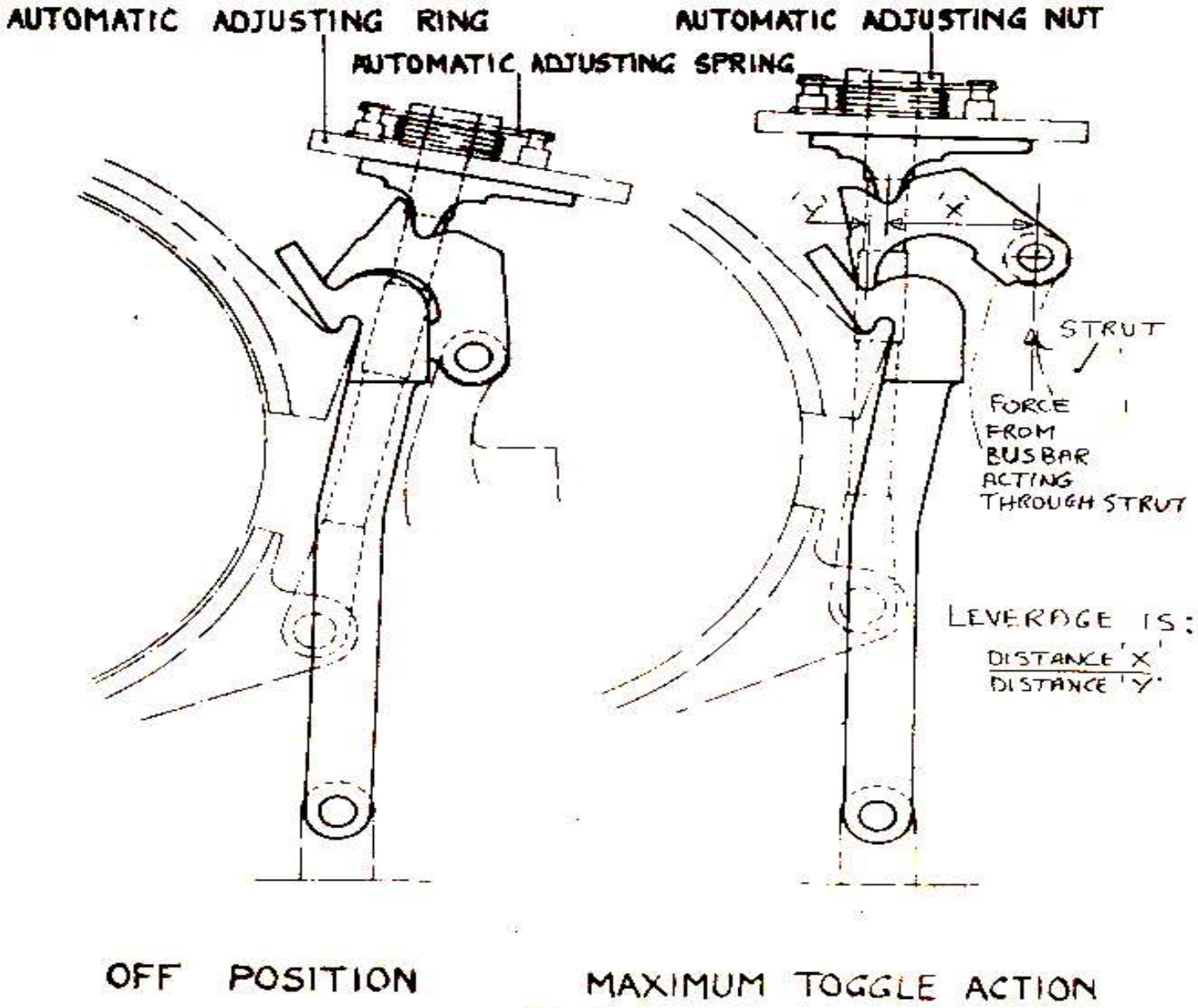


Fig. 28.