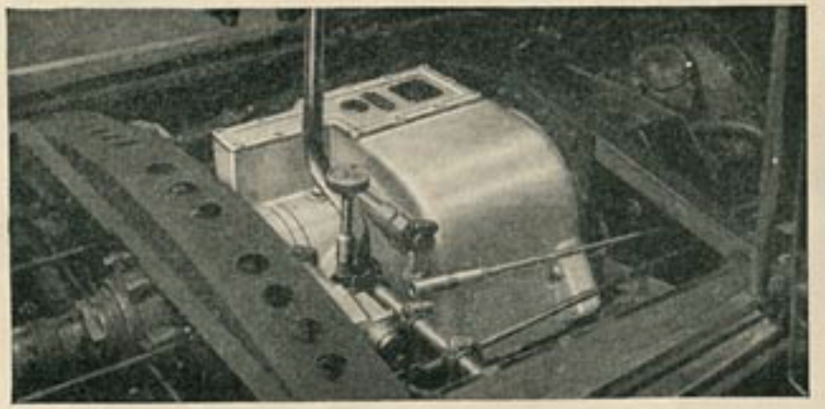
LUBRICATION *and* CARE *of the* WILSON PRE-SELECTIVE SELF-CHANGING GEARBOX

Care and Lubrication

Driving and Maintenance Hints

How the Wilson-type Gear Box Works



LUBRICATION of the WILSON GEAR BOX

If your car is fitted with a WILSON SELF-CHANGING GEAR BOX it has the most revolutionary device since the introduction of the Motor Car itself. This remarkable innovation enables the change of gear to be effected with the utmost speed and without the least possibility of miscalculation, damage or noise. It is proof against almost any form of abuse, is self-adjusting and will give long and trouble-free service under the most arduous conditions.

There is one form of abuse, however, which is detrimental to all forms of mechanism. This is insufficient or incorrect lubrication, and a Wilson Gear Box is no exception in its demand for fair treatment in this respect.

It is for this reason that the following notes and diagrams have been prepared, explaining how the lubrication system works and the simple attentions required to ensure that the correct grade of oil is always present in sufficient quantity.

THE CORRECT GRADE OF OIL

The first step to satisfactory lubrication is always to use the right grade of CASTROL as recommended by the manufacturers. The right grades for the Pre-selective Gear Box as fitted by the different motor manufacturers are listed for your guidance on page 20. Use the CASTROL grade recommended for your car and no trouble will be experienced from this source.

A glance at the accompanying diagrams will make clear the attention which has been given to the question of lubrication in the Wilson Gear Box. The system has been so designed that each vital part is fed with a direct stream of oil, which is delivered under pressure from the pumps, situated one at either end of the main shaft. (See Fig. 3.)† Small apertures in the shafts enable the circulation to be continuous and penetrate to every part.

It will be easy to understand therefore that only a lubricant of carefully defined consistency will give the desired results, and the importance of using only the oil recommended by the car manufacturers who fit this Gear Box will be apparent.

HOW MUCH OIL TO USE

When the Wilson Gear Box is filled to the correct level through the filler, it contains sufficient for adequate lubrication. This is the case when you first take over the car. The oil level is gauged by removing the level plug, or opening the tap, situated in the side of the Gear Box. Oil should just begin to flow from this aperture when the correct amount is present. To check the level in this manner, wait until the oil has had time to drain back from the mechanism into the well of the box at the conclusion of a run whilst the Gear Box is still warm, and the oil is consequently more fluid. In a similar manner draining should be carried out whilst the oil is warm.

† In some cases only one pump is fitted.

HOW OFTEN TO LUBRICATE

Oil in the Wilson Gear Box has an unusually long "life" of usefulness, because it is not subject to a continuous churning of the gear wheels. It is in fact directed by an ingenious pump and circulatory system to just those bearing surfaces which require it and then allowed to drain straight back into the well of the Gear Box, where it is able to settle before being drawn up again by the pumps to resume its ministrations to the gear mechanism above. **After the first 1,000 miles** of running it is recommended that the Gear Box be completely drained, and replenishment made with fresh CASTROL oil as recommended on page 20. The reason for this is that a slight residue of fabric from the brake bands may be present in the oil, a condition which will not recur when the newness has worn off and the bands bedded down to their respective brake drum surfaces.

Fig. 1

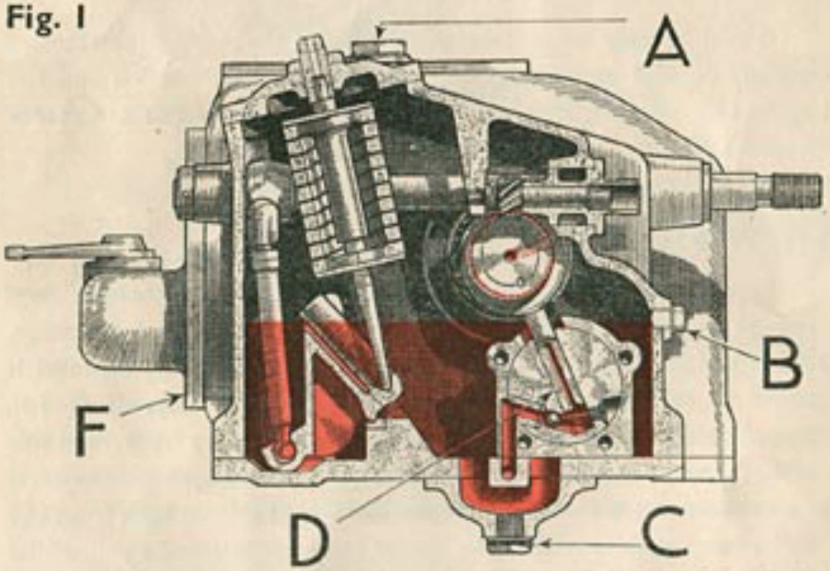


Fig. 1 is a cross section of a WILSON PRE-SELECTIVE GEAR BOX showing the oil level and oil pump. (A) is the filler cap through which filling is carried out. (B) is the oil level plug. In some cases a tap is fitted here. (C) is the drain plug and (D) the pump driven by an eccentric on the shaft above. (F) is the side plate which can be removed for dismantling the Gear Box.

Periodical replenishment

From time to time (every 1,000 miles is sufficient) the oil filler plug should be removed—whilst the oil is warm, as described previously. If it is found that the lubricant does not flow from the level plug or tap, replenishment should be made until this is the case.

Changing the oil

Every 3,000 miles after the first 1,000, we recommend that the gear box be completely drained and replenished with fresh oil. This is because even the best oil is subject to deterioration after a long period of use, and we believe that the extraordinary smoothness and effortless take-up of the Wilson Gear Box is a feature worth preserving at its maximum degree of efficiency.

To drain the Gear Box, remove the drain plug situated beneath the well of the box and allow the oil to drain off completely. May we remind you again here to carry out this operation whilst the oil is warm after a run ? When all oil has drained off, replace the plug and then refill to the correct level with fresh CASTROL of the correct grade (see page 20).

SUMMARY OF LUBRICATION INSTRUCTIONS

To summarise the foregoing instructions. In order to ensure the lasting good service for which the Wilson Gear Box is renowned—

—**Use only The CASTROL grade as recommended on page 20.**

—**Drain and refill after first 1,000 miles.**

—**Check oil level at regular intervals and replenish if necessary.**

—**Subsequently drain and refill every 3,000 miles.**

DRIVING AND MAINTENANCE HINTS FOR WILSON PRE-SELECTIVE SELF-CHANGING GEAR BOX

CONTROL

Before starting the engine it is advisable to pre-select neutral and to fully depress and release the pedal to ensure that no gear is engaged.

When about to start away with the engine running the pre-selector lever must be moved into the position for first gear (or reverse) and upon the pedal being **fully depressed** and released the car will glide away.

All subsequent changes of gear are made by moving the pre-selector lever into the appropriate notch and **fully depressing** and releasing the pedal, but until the pedal has been operated no change of gear takes place.

The driver may change his mind at any time, even when the pedal is fully depressed, and move the lever to select any gear desired except when actually releasing the pedal. But whatever the driver does, it is impossible to engage two gears at once or to harm the Gear Box in any way. When the pedal is depressed the engine is free, and so the pedal is used exactly as an ordinary clutch pedal, but on releasing the pedal the gear indicated by the pre-selector lever will be engaged.

When stopping the car it is important always to remember to pre-select neutral and to **fully** depress and release the pedal.

IMPORTANT

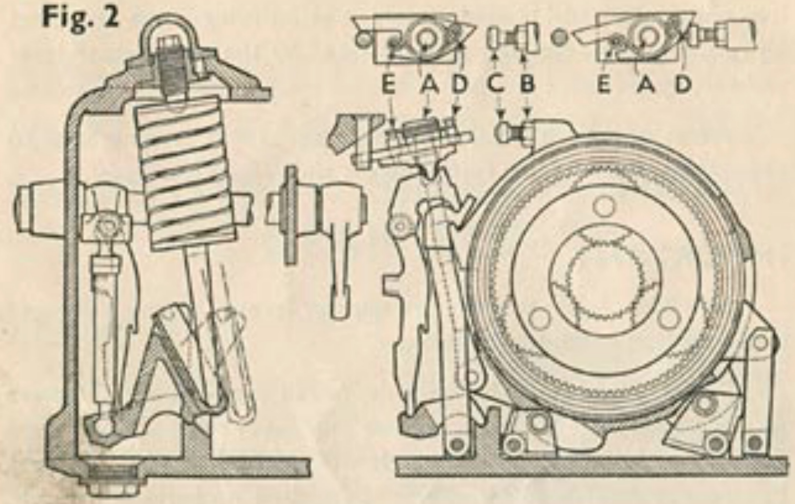
(1) Make certain that the pre-selector lever is properly engaged in the desired notch in its quadrant.

(2) The pedal must be **fully** depressed every time. Omission to pay attention to these two points may cause the pedal to return abruptly without changing gear. It will then be heavy to depress, but even if considerable pressure is required no harm will result, and the pre-selection of neutral and the full depression and release of the pedal will ensure correct control again.

RUNNING HINTS

It is necessary that the oil should be kept up to the correct level as shown by the spout, plug or tap on the side of the box. The special Wakefield CASTROL grade as described on page 20 should be used for this purpose. After the first 1,000 miles the oil should be changed and again after every 3,000 miles. The adjustment of the brake bands in the Gear Box is automatic, and this adjustment takes place, if necessary, every time the pedal is fully depressed ; it is, therefore, advisable occasionally to " pump " the pedal about ten or a dozen times with the engine stationary. This should be repeated with the pre-selector lever in each of the four forward and the reverse notches, thus keeping the adjustment of the bands at " concert pitch." The phrase " pumping the pedal " means fully depressing and releasing it.

Fig. 2



ADJUSTING THE TOGGLE ACTION

A Gear Box is adjusted by the manufacturers so that each of the bands grips with just the necessary force, so that it neither slips nor is too fierce, and by the automatic adjusters this force is always maintained unvaried. If, however, owing perhaps to some radical change in the power given by the engine or in the weight of body fitted to the car, any gears should have a tendency to slip and pumping the pedal does not cure it, more toggle action will be required, and the car should be taken to the service agent or garage. The method of carrying out this adjustment is as follows :—

Remove the inspection plate from the Gear Box, the top of the brake bands and the automatic adjusters will then be plainly visible. To increase the toggle action, proceed as follows (this applies to each gear requiring adjustment) :—

Slack back the lock nut B which secures the cone-shaped set screw C. Then screw the set screw C in, one quarter of a turn, and lock it with the nut B. Lift the top eye D of the automatic adjuster spring off the pillar, and then lift the loop E off the other pillar.

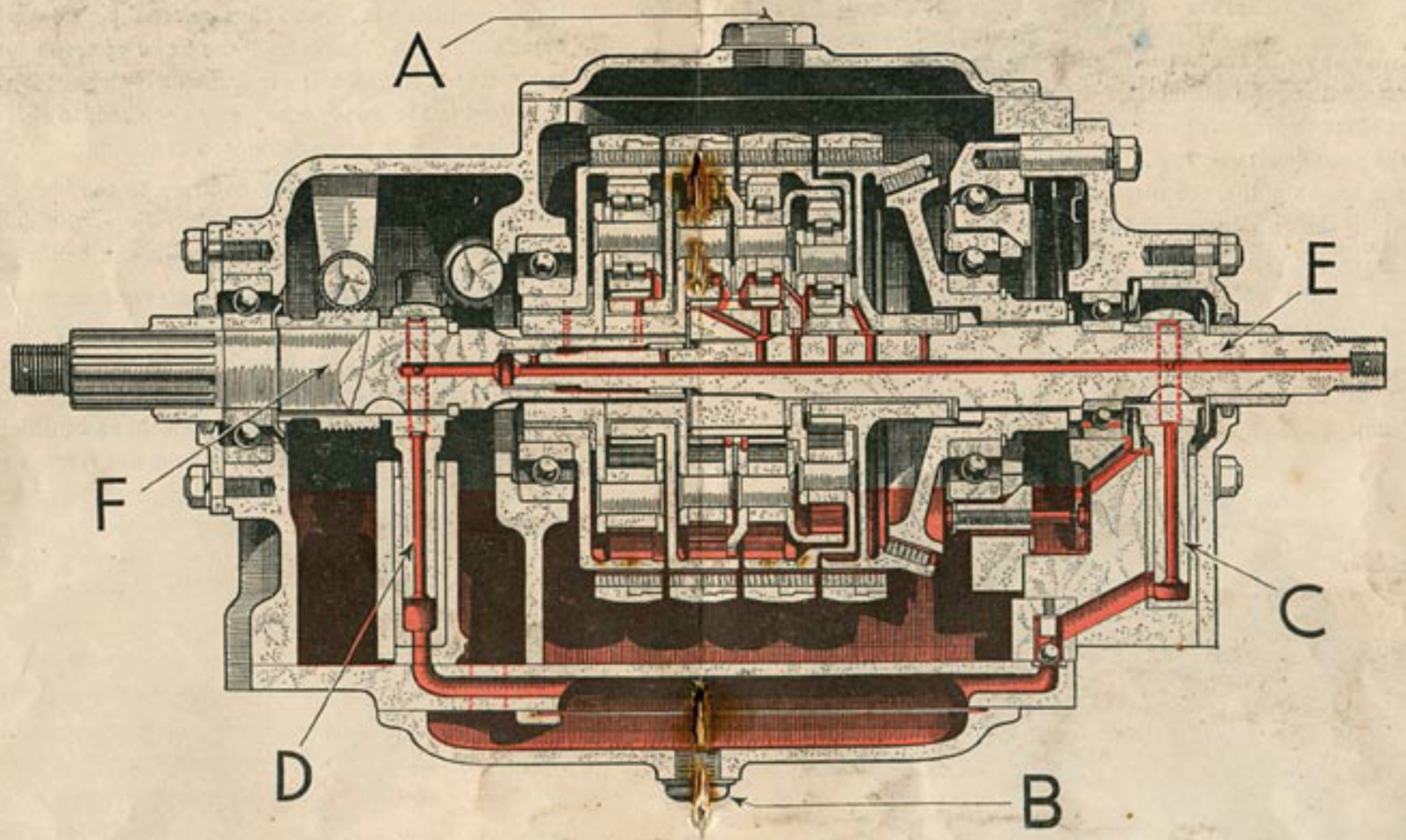
The spring need not be removed from the nut A. Unscrew half a turn the round automatic adjuster nut A which is inside the spring. An easy way to grip the nut A to unscrew it is to screw into it a short distance a suitable bolt with a nut on it to lock it. Replace the loop E and the eye D, and then select the gear which has just been adjusted. Then " pump up " the pedal until the automatic adjuster nut A stops turning. The movement of the nut with each stroke of the pedal is too small to be easily detected, so that before pumping up it is advisable to mark the top of the nut.

It should be noted that, contrary to the idea that one unaccustomed to the box would probably have, the automatic adjuster nut A must be slackened **off** to make the bands grip **tighter.**

Conversely, this nut must be screwed **down** to make the grip **less** fierce. And to do this it is not necessary to touch the spring on the nut A but only to unlock the nut B and unscrew the set screw C one-quarter turn, afterwards locking it again with the nut B (it will be found that one-quarter turn makes a considerable difference). Then pump up with the pedal until the nut A stops turning.

THE WILSON GEAR BOX IN SECTION

Fig. 3



This is a full-length section of a **WILSON GEAR BOX** showing the oil level and the circulatory system which reaches to all moving parts, (A) is the oil filler cap, (B) the drain plug, (C) the forward oil pump, (D) the rear oil pump, (E) the input shaft, and (F) the output shaft, which transmits the drive to the back axle.

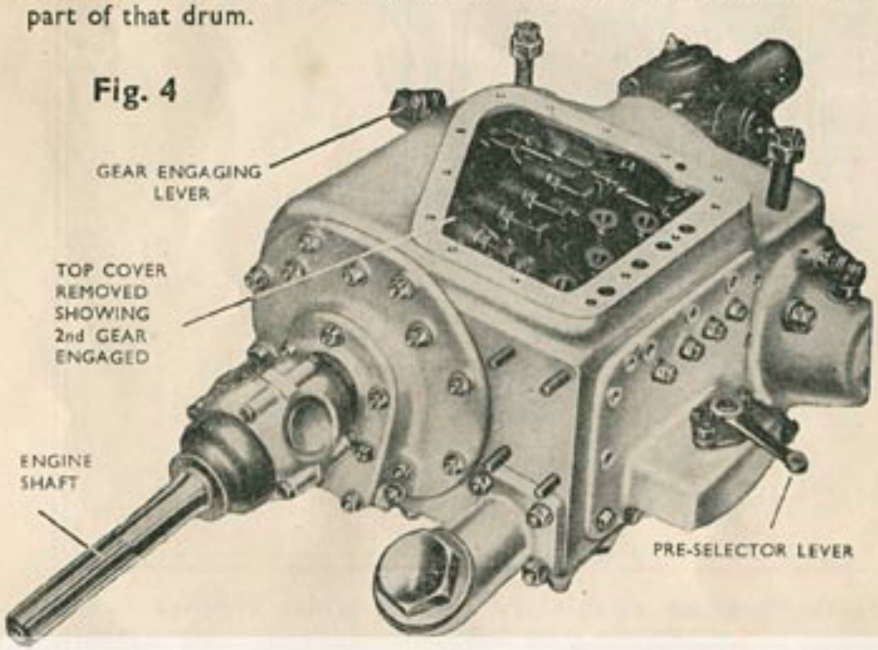
THE WILSON SELF-CHANGING GEAR

What it is and how it works

To those who know it, the Wilson Self-Changing Gear is really very simple ; it consists of a planetary system of an entirely novel form, in which the tooth pressures are extremely light and the speeds of rotation of the gearwheels very low. These are two of the features which ensure the length of life, the silence at all speeds and the high efficiency on which the gear has earned its reputation.

The illustration Fig. 5 shows the gear battery assembled complete. This part consists of four internally-geared epicyclic trains enclosed in four drums or annuli, any one of which can be held fast by an individual brake. The application of any one brake locks the corresponding drum and brings into operation the gear train forming part of that drum.

Fig. 4



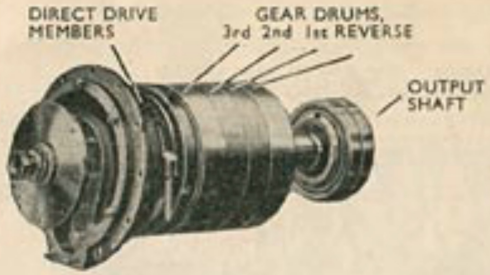


Fig. 5

The complete Gear Battery assembled, showing the compactness of this unit, which includes all the rotating parts.

THE GEARS

Fig. 7 shows a sectional view of a change-speed gear with four forward speeds and reverse. But, for the purposes of explanation, the mechanism is represented diagrammatically by Fig. 8 in a spread-out form showing, for the sake of clearness, only two planet wheels in each train instead of the three that are to be found in the actual gears.

First Speed.—The driven member for the forward speeds is the planet cage or carrier of the first-speed train, which is rigidly connected to the output shaft, while the sun wheel of this train is integral

Fig. 6

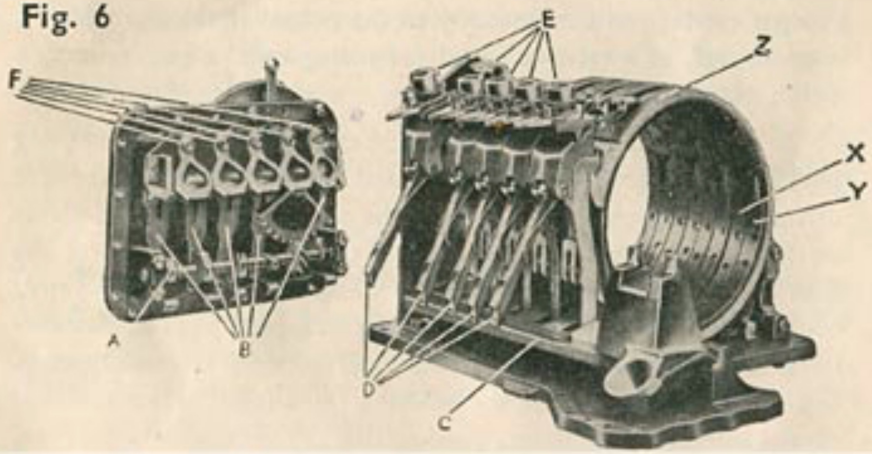
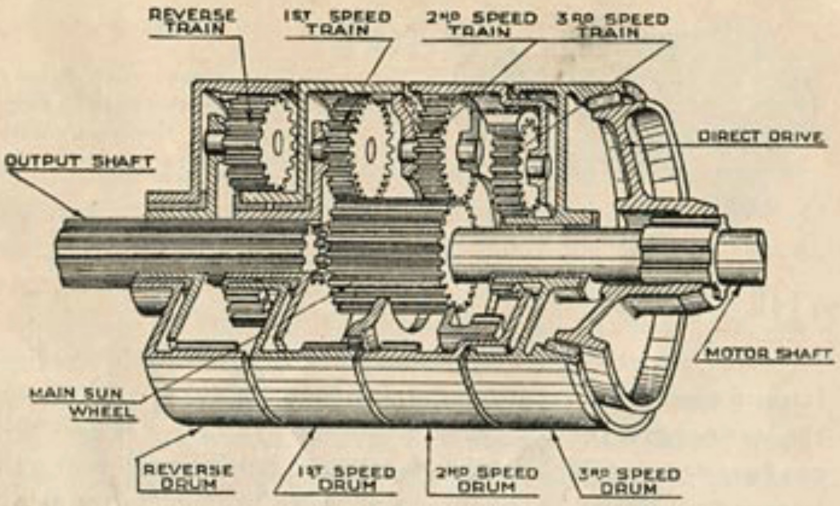


Fig. 7



This diagram gives a cut-away view of the Gear Battery illustrated in Fig. 5 on the previous page. Here may be seen the mechanism responsible for the variations of speed between the motor shaft and the output shaft.

with the engine shaft. If the internal-toothed annulus or drum is held stationary by its brake, the planet wheels, being driven by the sun wheel, will roll inside this annulus, communicating their motion to their carrier and consequently to the propeller shaft to which it is connected, at a relative speed depending on the gear reduction ratio ; this is the first speed.

It will be readily understood that if this annulus, instead of being held fast by its brake, could be rotated in the direction of forward drive, this rotational motion would be added to that of the planet carrier or cage and, in consequence, the rotational speed of the shaft would be increased. Now, the whole secret of the apparently complex action of the Wilson Gear Box is wrapped up in this matter of imparting to this No. 1 annulus a rotational motion at increased speeds, and the functions of the second- and third-speed trains precisely consist in imparting such increased motion to the annulus in question.

Second Speed.—For the second speed, for instance, the corresponding annulus is held stationary by its brake ; the sun wheel, also integral with the motor shaft, causes the planet wheels to rotate, and these in their turn drive their carrier as in the previous case ; but this carrier is connected with the first-speed annulus, and thus imparts to it the required rotational motion.

Third Speed.—In a like manner the third speed is obtained by the braking of a drum which, otherwise, revolves solid with the sun wheel of the third-speed train. A glance at the illustration will, better than any explanation, make the mechanism quite clear. Here three trains of epicyclic gears contribute to impart the required final speed, the second and third trains serving to give the desired acceleration to the annulus of the first train.

It is seen, therefore, that in first gear the drive is transmitted by train No. 1 only, in second gear by trains Nos. 1 and 2, and in third gear by trains Nos. 1, 2 and 3. This fact, together with the use of three planet pinions in each train, results in the loads transmitted by the teeth being extremely low.

On the other hand, a very important point to note is that, owing to this division of the final acceleration over several trains of gears, each increase in the rotational speed of annulus No. 1, while increasing the speed of the planet carrier and consequently of the propeller shaft, is accompanied by a reduction of the rotational speed of the planet wheels themselves. This feature, coupled with the light loads on the teeth, ensures the high efficiency of the system and its silent running.

Direct Drive.—For the direct drive on top speed all the brakes are free and the cone shown at the right-hand end of Figs. 7 and 8 is engaged by means of the selector lever as for the other speeds. Then all the trains revolve together as a solid block driving the propeller shaft at engine speed.

Note that in this case both sun wheels, of the first and second trains, which are integral with the input shaft (see Fig. 8), contribute to transmit the torque, so that the cone only transmits about one-third of the power, which enables its dimensions to be reduced, and almost eliminates wear of its lining.

Reverse.—Reverse running is given by a fourth planetary train, which also works in conjunction with the first-speed train, and is operated, like the others, by means of a drum and brake controlled by the selector lever on the steering wheel.

THE BRAKES

The brakes are illustrated in Fig. 6 as a complete assembly. In order to engage any required speed, the corresponding brake is brought into operation.

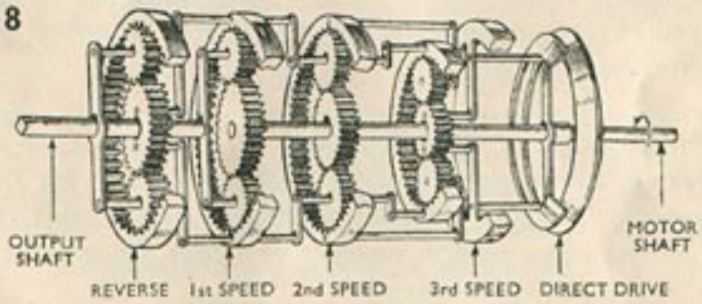
This braking system, which is patented, being one of the special features to which the Wilson Self-Changing Gear owes much of its success, will now be briefly described.

The brakes present three essential characteristics :—

(1) They are self-adjusting—which ensures that there is never any slipping, even after a long period of service.

(2) They are perfectly balanced—that is to say, they apply an even pressure all round the drum without putting any

Fig. 8



bending stress on the internal shafts, thus making possible the absence of bearings between the gear drums.

(3) They are self-wrapping in the "drive," and unwrapping in the "over-run," i.e., when the car is driving the engine. This enables the driver to change down suddenly without jerk or harm to the car or transmission, and a moderate tension on the brake is sufficient to cause it to grip the drum very firmly.

Once adjusted at the Works these brakes require no further attention. The system is so efficient that it has been possible to run 160,000 miles without the brake bands having to be relined.

Fig. 9 shows the arrangement of the brakes. Each drum carries two braking bands fitted one inside the other. The balancing is obtained by anchoring the two bands at diametrically opposite points, their operation being brought about by contracting the outer band. **The brakes work in oil.**

At E, Fig. 6, are seen the self-adjusting nuts. They are tightened by special patent coil-spring ratchets shown immediately below them, which automatically compensate for any wear in the linings.

THE CONTROL

The pre-selector mechanism is mounted upon the side cover of the Gear Box (Fig. 6, left), and is instantly removable for inspection. It enables the driver to pre-select the next speed required and to engage same at the proper instant. These operations are effected by means of two special devices, viz., a camshaft actuated by the selector lever, and a buss-bar operated by the clutch pedal.

The selector lever, placed on the steering wheel, rotates the camshaft A (Fig. 6, left) through a certain angle, thus allowing one of the spring-loaded plates B to come forward. This plate, in its motion forward, pushes the corresponding strut D against the buss-bar C. When this bar is depressed by the pedal, the strut is pressed into engagement in its groove, and as soon as the pedal is

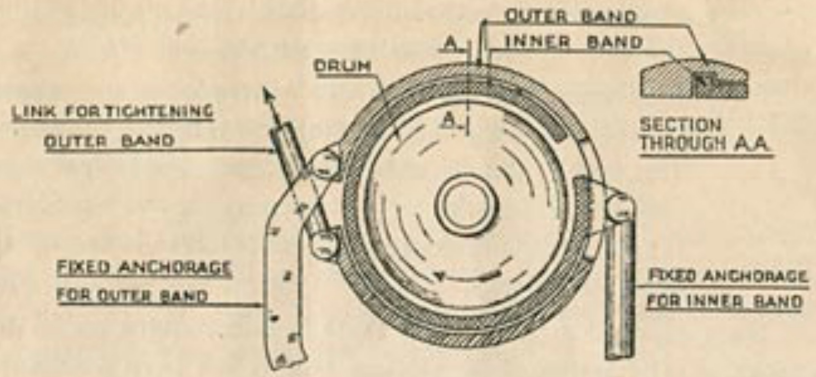


Fig. 9

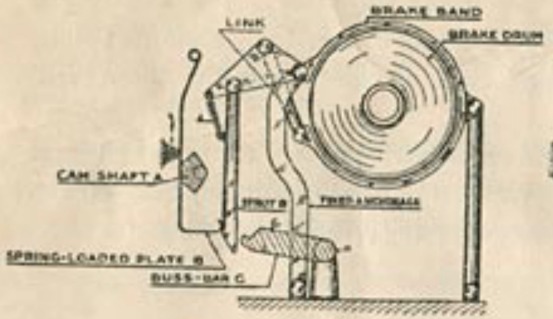


Fig. 10

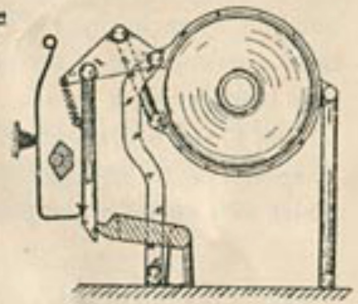


Fig. 11

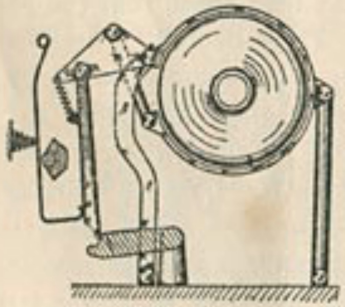


Fig. 12

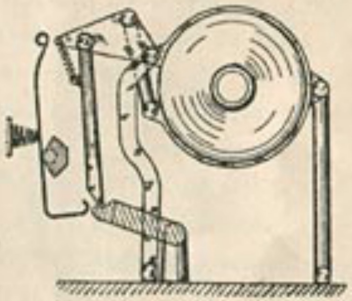


Fig. 13

released the buss-bar is forced up by a strong spring, thus contracting the brake which brings the selected gear into action.

Illustrations 10 to 13 show in a diagrammatic form the pre-selecting and braking mechanisms at different stages of operation.

In Fig. 10 the component parts are shown in neutral position, with their usual designations. There is a similar arrangement for each one of the first three speeds and the reverse.

Fig. 11.—Gear selected, but not engaged. The operation of the selector lever has caused the camshaft to turn round, thus enabling the selector plate to press the strut against the buss-bar in readiness to engage therein as soon as the bar is depressed.

Fig. 12.—Buss-bar depressed by the action of the foot on the pedal. Strut engaged.

Fig. 13.—Buss-bar raised on the pedal being released ; brake contracted ; gear engaged.

It will be seen that it is at the instant when the buss-bar is depressed that the struts change over, the one previously engaged being released and pulled back by its coil spring, while the one corresponding to the new selected speed engages with the buss-bar.

Depressing the clutch pedal **always gives free engine**, whatever the position of the selector lever. The interlocking pieces F (Fig. 6, left) render it impossible for two gears to be engaged at the same time.

Please see overleaf for Recommended Lubricants.

THE RECOMMENDED LUBRICANTS FOR THE WILSON PRE-SELECTIVE GEAR BOX.

Car	Grade
A. C.	CASTROL F
ALVIS	CASTROL F
ARMSTRONG SIDDELEY	CASTROL XL
B. S. A.	CASTROL F
CROSSLEY	CASTROL F
DAIMLER	CASTROL F
INVICTA	CASTROL F
LAGONDA	CASTROL F
LANCHESTER	CASTROL F
M. G.	CASTROL F
RILEY (Imp)	CASTROL F
RILEY (Other Models)	CASTROL XL
SQUIRE	CASTROL F
STANDARD	CASTROL F
SUNBEAM (automatically lubricated from the engine)	ENGINE OIL
TALBOT (automatically lubricated from the engine)	ENGINE OIL