SECTION O

WHEELS AND TYRES

Section O.1

DESCRIPTION

The Austin-Healey 100 'Six' is fitted with 5·90—15 tubeless tyres upon 15×4J ventilated steel disc wheels, or, as an optional alternative, with 5·90—15 Dunlop Road Speed tyres upon 15×4J wire spoked wheels with knock-on type hub caps.

Section O.2

ADJUSTMENTS IN THE VEHICLE

The purpose of the following adjustments is to obtain the best performance from the wheels and tyres. Proceed as detailed below. Other faults should be diagnosed after consulting Section O.5.

(1) When the car is new: After the first long run or after 50 miles (80 km.) of short runs, jack up the wheels and hammer the nuts to make sure they are tight. Always jack up the wheel before using the hammer.

(2) Tighten the road wheel nuts (or knock-on hub caps). In the case of disc wheels tighten the nuts to a torque wrench reading of 60 to 62·5 lb. ft. (8·3 to 8·64 kg.m.). **Do not overtighten.**

(3) Check the tyre pressures regularly with a gauge and inflate them to the recommended pressures.

Section O.3

WHEEL AND TYRE ASSEMBLIES
(Tubeless)

To Remove

(1) Apply the handbrake and scotch one of the wheels.

(2) Jack up the vehicle sufficiently to ensure that the wheel with a fully inflated tyre can be removed or installed.

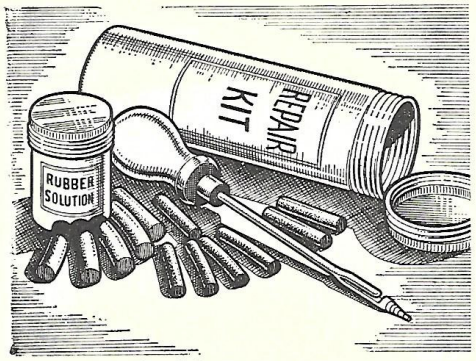

Fig. O.1. Tyre Repair Kit.

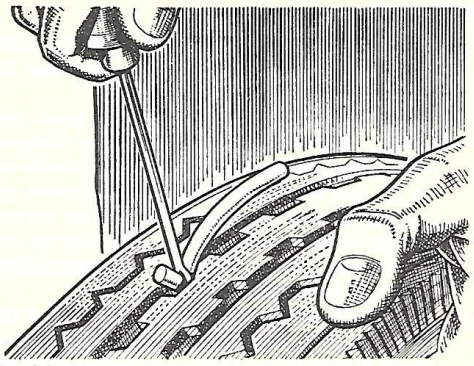

Fig. O.2. Inserting the plug and needle through the hole in the tyre.

(3) Remove the hub cover.

(4) Remove the five wheel nuts, which have right-hand threads, *i.e.* turn anti-clockwise to loosen. Lift off the wheel.

To Repair Simple Tyre Penetrations

Normally a tubeless tyre will not leak as the result of penetration by a nail or other normal puncturing objects provided that it is left in the tyre, but a repair should be effected at the earliest convenient time.

In the case of a nail penetrating the tyre, a repair can be carried out externally without removing the tyre from the rim, providing the special repair kit is available. If the hole fails to seal, mark the spot and extract the nail, taking note of the direction of penetration. If the tyre is leaking and the puncturing object cannot be located by sight, immerse the wheel and tyre in water.

Repair the tyre as follows :—

(1) Insert the needle of the repair kit through the hole in the tyre in the same direction as the penetration to free it from road grit. Dip the needle into the rubber solution and re-insert it through the hole, repeating this operation until the hole is well lubricated with the solution.

(2) Select a repair plug of about twice the diameter of the puncturing object, stretch and roll it into the eye of the needle, about ¼ in. (6 mm.) from its end. Dip the plug into the rubber solution and insert the needle through the hole in the tyre so that the end of the rubber plug passes through the hole into the interior of the tyre. Withdraw the needle, leaving the plug in the tyre, and cut off the plug about ⅛ in. (3 mm.) from the surface of the tread.

(3) Inflate the tyre (see **"To inflate the tyre"**).

To Dismantle

(1) Lay the wheel on the ground, with the valve uppermost. Deflate the tyre by removing the valve cap and interior.
(2) Using tyre levers, which must be in good condition, separate the beads from the rim flange in the manner shown in Fig. O.6 until both beads are in the base of the rim. As inextensible wires are incorporated in the edges of the tyre, no attempt should be made to stretch the edges over the rim as the beads must in **NO WAY BE DAMAGED.** Keep the levers moistened with water.
(3) With the bead of the tyre held in the base of the rim at a point diametrically opposite the valve, insert a lever close to the valve and carefully lift the tyre over the rim. Using two levers at intervals of about 6 in. (15 cm.) apart, continue to lift the tyre bead over the rim until it is entirely free.

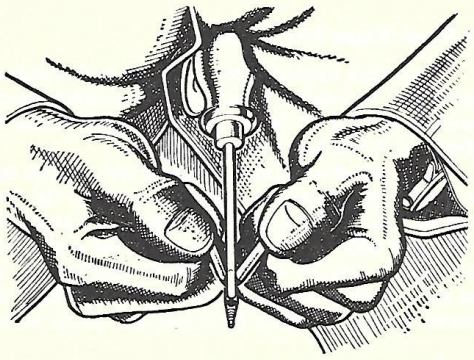

Fig. O.3. Rolling the plug into the needle eye.

(4) Stand the tyre and wheel upright, keeping the bead in the base of the rim. Lever the bead over the rim flange, and at the same time push the wheel away from the tyre with the other hand to completely remove the tyre off the wheel.

To Repair Severe Tyre Penetrations

Severe penetrations which are outside the scope of the small repair kit can be repaired in a similar manner to conventional covers which will necessitate the removal of the tyre (see above).

Repair the tyre as follows:—

(1) Inspect the tyre for damage and remove any puncturing objects.

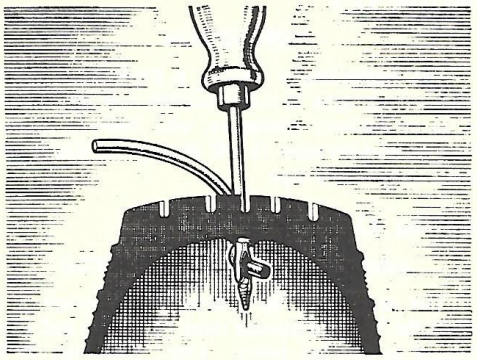

Fig. O.4. The inserted plug prior to withdrawing the needle.

(2) Clean the area around the hole on the inside of the tyre, roughen with a scratchbrush and apply a rubber solution to the surface to receive an ordinary tube patch such as the Dunlop "Vulcafix" patch, or preferably use an uncured rubber patch and vulcanise it in position.
(3) In the event of more serious damage, the tubeless tyre can undergo a major vulcanised repair in the same way as a normal tyre. The tubeless tyre can also be re-treaded.

To Prepare the Rim before Fitting the Tyre

(1) Examine the condition of the wheel and renew if cracked, or if the attachment holes are elongated.
(2) Check for loose rivets in the base of the wheel rim and fit oversize rivets if necessary, ensuring that they do not protrude beyond the height of the original rivets. An airtight seat must be maintained.

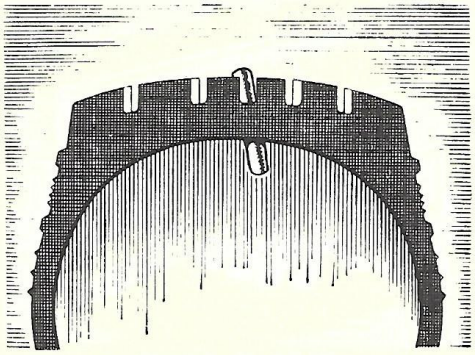

Fig. O.5. Plug inserted in the tyre and cut-off.

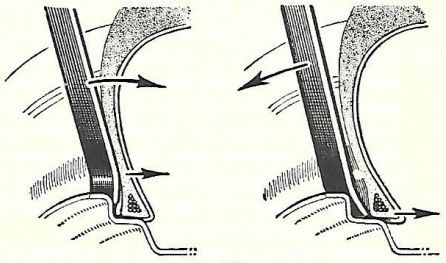

Fig. O.6.
Removing a tyre bead off the rim.

(3) Clean off all rust, rubber, etc., from the wheel flange and rim seat, using steel wool, emery or similar cleaning medium. In extreme cases of rusty rims it may be necessary to use a wire brush or even a file.
(4) Remove any dents in the flange by hammering out carefully to maintain an airtight seat.
(5) High spots in the welded joint of the rim must be filed or buffed away.

To Renew a Valve

A valve must never be refitted once it has been removed from the rim, and it must be renewed every time a new tyre is fitted.

Cut out or pull outwardly the old valve from the rim.

Lubricate a new valve with soap solution and pull it through the rim hole from the inside. The valve should be pulled until the flange on the rubber base of the valve is in full contact with the inner rim surface. If the valve is pulled too far, the base will be damaged and another new valve will have to be fitted.

The use of the Schrader valve mounting Tool No. 553 is recommended, so as to avoid damage.

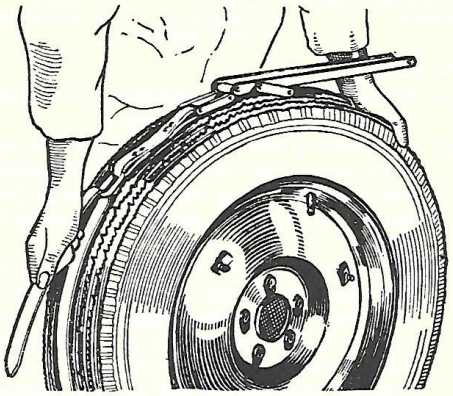

Fig. O.7.
The use of a tourniquet to seal the beads.

To Reassemble

When replacing the tubeless tyre a similar technique has to be employed to that used for removal, first fitting the tyre into the base of the rim at a point opposite the valve. Make sure the valve interior is removed and that the balance spots near the tyre bead are at the valve position. Wipe clean and moisten the beads of the tyre, rim flanges and tyre levers with clean water. Do not use petrol. Carry out the final fitting of the tyre, using levers which are in good condition and free from burrs. Take small "bites" with the levers.

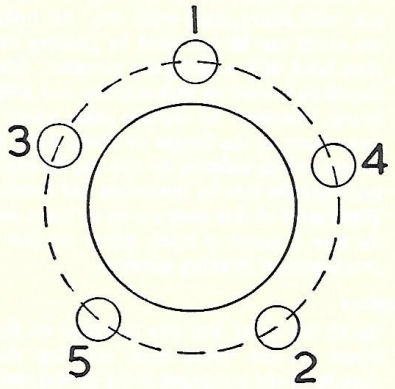

Fig. O.8.
Order of tightening the wheel nuts (disc wheels).

To Inflate the Tyre

(1) Before inflating the tyre, bounce the crown of the tyre on the ground at various points round its circumference, to snap the beads home against the rim. This will provide a partial seal.
(2) Connect an air line to the valve, with its interior plunger omitted, and inflate the tyre with the wheel in an upright position. If a seal cannot be effected by the first rush of air, bounce the tyre on its crown at various points round the circumference with the air line still attached. In cases of difficulty apply the special tourniquet consisting of a strap incorporating a lever, but a suitably strong cord or rope around the circumference of the tread and a twisting bar or stick will also serve. If no air line is available and the tyre has to be inflated by a foot- or hand-pump, then the use of a tourniquet is essential to force the beads outwards against the rim flanges to effect a seal. Remove the air line, insert the valve interior and re-inflate, for test purposes, to 40 lb./sq. in. (2·8 kg./cm.²).

(3) Allow the tyre to stand for a few minutes so that any free air trapped between the flange and the bead clinch can escape. Test the complete assembly in a water tank to check for leaks, special attention being paid to the areas at the beads, valve and wheel rivets. Should leakage occur at the valve base, this can only be rectified by renewing the valve. Loss of air around the bead seat and flange is generally due to a high spot on the rim (foreign matter, rust, weld, etc.) and in most cases this can be cured by holding the tyre bead away from the rim, with the tyre deflated, in order to effect further cleaning of the rim bead seat with emery, steel wool, etc. Air leakage at the rivets can be remedied by peening over the rivet head with a ball-pane hammer. The rivet should be backed up with another, and preferably larger, hammer. In extreme cases where major leaks occur at the flanges or rivets, mark off the position of the leaks on the tyre and the rim before removing the tyre for inspection and rectification.

(4) When satisfied that there are no air leaks, and that the tyre is correctly fitted, adjust the tyre to the recommended working pressure.

To Replace

(1) Install the wheel and tyre assembly on the hub.

(2) Screw on the wheel nuts, ensuring that the chamfered end is engaged in the conical seat in the wheel, and tighten them in the sequence shown in Fig. O.8.

(3) Release the jack and scotch; check the wheel nuts again with a torque wrench set to 60 to 62·5 lb. ft. (8·3 to 8·64 kg.m.).

(4) Place the rim of the hub cover over two of the buttons on the wheel centre and give the outer face a sharp blow of the fist over the third button.

Section O.4

WHEEL AND TYRE ASSEMBLIES (Spoke Wheels)

Wheel Changing

(1) First loosen the "knock-on" hub cap, then jack up the car. If it is a front wheel which is to be changed the lip on the platform of the screw type jack must project into the recess in the spring plate, whilst the platform should be across the outer rim of the spring plate, the flat end between the lower wishbone links.

(2) For lifting the rear wheels, place the lifting platform across the lowest spring leaf, to the rear of the axle, with the lipped end on the outside of the spring and up against the spring "U" bolt, this avoids any turning movement.

After jacking, the hub cap can be screwed right off. The wheel is then pulled off the splined hub.

(3) Refitting the wheel is simply a reversal of this removal procedure, but the splines of the hub and wheel are so fine that the operator should be careful not to jam the splines. A little grease should be smeared upon the splines and cone faces of the hub and wheel before refitting. The hub cap threads will also benefit from an occasional application of grease.

Remember that hub caps fitted to right-hand side hubs have left-hand threads, left-hand hubs have right-hand threads, however, the direction for turning is clearly marked on each cap. Caps should be finally tightened with a mallet.

Once a year remove the wheels for examination and regreasing.

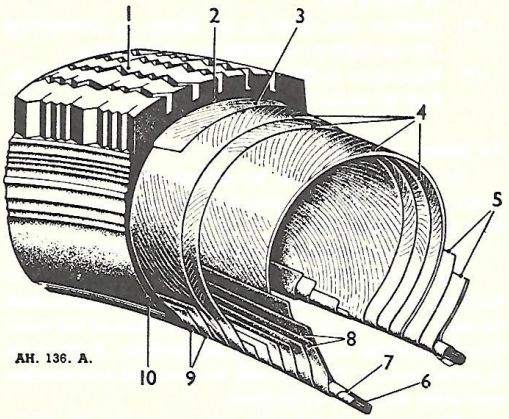

Fig. O.9. Diagrammatic illustration of tyre construction.

1. Tread.
2. Soft cushion rubber.
3. Breaker.
4. Casing plies.
5. Fillers.
6. Bead wires.
7. Bead wrapping.
8. Fillers.
9. Chafers.
10. Wall rubber.

Tyre Removal

(1) Remove all valve parts to deflate the tyre and push both tyre beads off the rim seats.

(2) Commence to remove the bead on the valve side of the cover. Insert a lever at the valve position and, while pulling on this lever, push the bead into the well of the rim diametrically opposite the valve.

(3) Insert a second lever about 2 in. away from the first lever and gradually prise the bead over the rim flange. Remove both beads one at a time, over the flange on the side of the rim which has the narrower bead seat. If the tyre is removed with the tyre lying flat, the narrower bead seat should be upwards.

(4) Continue with one lever while holding the removed portion of the bead with the other lever. The tube can then be removed.
(5) Stand the cover upright with the wheel in front.
(6) Insert a lever from the front between the bead and the flange and pull the cover back over the flange.
(7) If difficult to remove, keep the strain on the bead with the lever and tap off with a rubber mallet.

Tyre Replacement

(1) Place the cover on top of the wheel and push as much as possible of the lower bead by hand into the well of the rim. Insert a lever to prise the remaining portion of the lower bead over the rim flanges.
(2) Slightly inflate the tube until it begins to round out and insert it in the cover with the valve through the hole in the rim. Take care that the valve, which is fitted in the side of the tube, is on the correct side of the rim and that the tube and spot markings coincide ; a point of balance already described.
(3) Commence to fit the second bead by pushing it into the well of the rim diametrically opposite the valve.

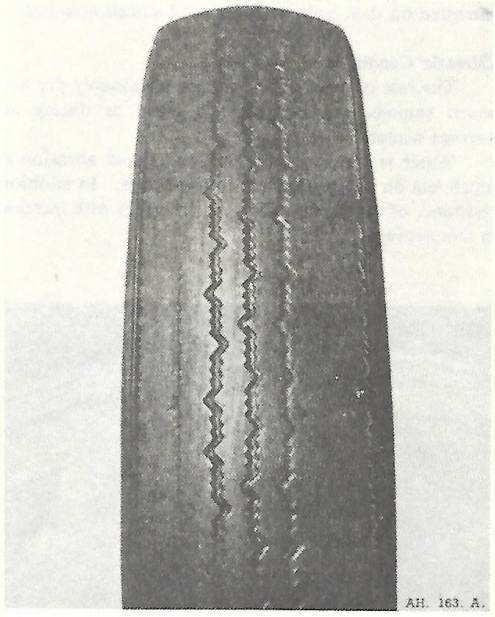

Fig. O.10. Excessive tyre distortion from persistent underinflation causes rapid wear on the shoulders and leaves the centre standing proud. If the effects of underinflation are aggravated by other factors, such as camber and excessive braking, the irregular and rapid wear is more pronounced.

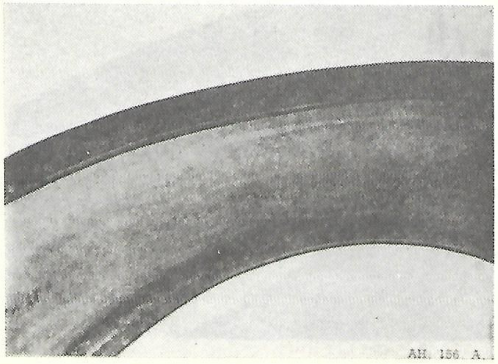

Fig. O.11. This casing is breaking up due to over-flexing and heat generation.

(4) Lever the bead over the flange either side of this position, finishing at the valve, when the bead will be completely fitted.
(5) Ease the valve in the rim hole and push upwards by hand to enable the beads to seat correctly and then pull the valve firmly back into position.
(6) Inflate the tyre and see that the beads are seated evenly round the rim: check by the line on the cover.

During fitting, check pressure frequently to make sure that 40 lbs./sq. in. (2·8 kg./cm².) air pressure is not exceeded as there can be a risk of severe bead damage. If 40 lbs./sq. in. (2·8 kg./cm².) pressure will not seat beads properly, deflate, lubricate, centralise the tyre and re-inflate.

IMPORTANT:—Lock wheels down when using a fitting machine. Stand clear of the tyre when inflating and do not lean over it until the beads are properly seated.

Note: Water on levers considerably eases the fitting and removing of beads.

Section O.5

FACTORS AFFECTING TYRE LIFE AND PERFORMANCE

Radial-ply tyres

Radial ply tyres (Dunlop SP41) should only be fitted in sets of four, although in certain circumstances, it is permissible to fit a pair on the rear wheels, tyres of different construction must not be used on the same axle. A pair must never be fitted to the front wheels with conventional tyres at the rear.

Inflation Pressures

Pressures which are higher than those recommended for the car reduce comfort. They may also reduce tread

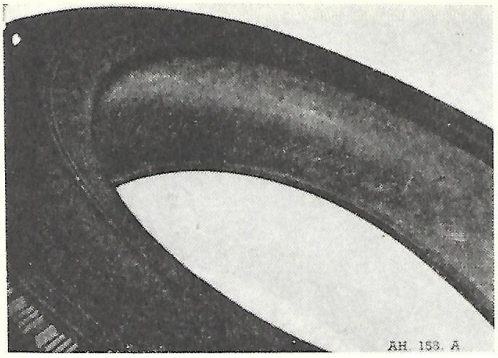

Fig. O.12. Running deflated has destroyed this tyre.

life due to a concentration of the load and wear on a smaller area of tread, aggravated by increased wheel bounce on uneven road surfaces. Excessive pressures overstrain the casing cords, in addition to causing rapid wear, and the tyres are more susceptible to impact fractures and cuts.

Effect of Temperature

Pressures in warm tyres should not be reduced to standard pressure for cold tyres. "Bleeding" the tyres increases their deflections and causes their temperatures to climb still higher. The tyres will also be underinflated when they have cooled.

Speed

High speed is expensive and the rate of tread wear may be twice as fast at 50 m.p.h. (80 km./hr.) as at 30 m.h.p. (48 km./hr.).

High speed involves :—

(1) Increased tyre temperatures due to more deflections per minute and a faster rate of deflection and recovery. The resistance of the tread to abrasion decreases with increase of temperature.

(2) Fierce acceleration and braking.

(3) More tyre distortion and slip when negotiating bends and corners.

(4) More "thrash" and "scuffing" from road surface irregularities.

Braking

"Driving on the brakes" increases the rate of tyre wear, apart from being generally undesirable. It is not necessary for wheels to be locked for an abnormal amount of tread rubber to be worn away.

Other braking factors not directly connected with the method of driving can affect tyre wear, for instance correct balance and lining clearances, and freedom from binding, are very important. Braking may vary between one wheel position and another due to oil or foreign matter on the shoes even when the brake mechanism is free and correctly balanced.

Brakes should be relined and drums reconditioned in complete sets. Tyre wear may be affected if shoes are relined with non-standard material having suitable characteristics or dimensions, especially if the linings differ between one wheel position and another in such a way as to upset the brake balance. Front tyres, and particularly near front tyres, are very sensitive to any condition which adds to the severity of front braking in relation to the rear.

"Picking-up" of shoe lining leading edges can cause grab and reduce tyre life. Local "pulling-up" or flats on the tread pattern can often be traced to brake drum eccentricity, fig. O.13. The braking varies during each wheel revolution as the minor and major axis of the eccentric drum pass alternately over the shoes. Drums should be free from excessive scoring and be true when mounted on their hubs with the road wheels attached.

Climatic Conditions

The rate of tread wear during a reasonably dry and warm summer can be twice as great as during an average winter.

Water is a rubber lubricant and tread abrasion is much less on wet roads than on dry roads. In addition resistance of the tread to abrasion decreases with increase in temperature.

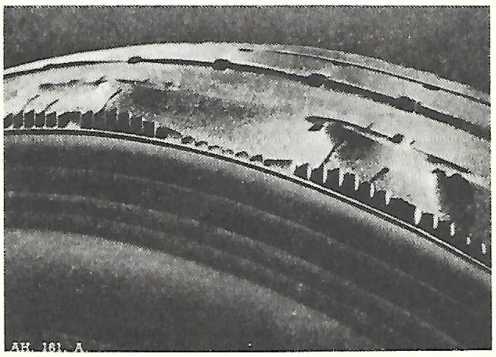

Fig. O.13. Local excessive wear due to brake drum eccentricity.

When a tyre is new its thickness and pattern depth are at their greatest. It follows that heat generation and pattern distortion due to flexing, cornering, driving and braking are greater than when the tyre is part worn.

Higher tread mileages will usually be obtained if new tyres are fitted in the autumn or winter rather than in the spring or summer. This practice also tends to reduce the risk of road delays because tyres are more easily cut and penetrated when they are wet than when they are dry. It is, therefore, advantageous to have maximum tread thickness during wet seasons of the year.

Road Surface

Present day roads generally have better non-skid surfaces than formerly. This factor, combined with improved car performance, has tended to cause faster tyre wear, although developments in tread compounds and patterns have done much to offset the full effects.

Road surfaces vary widely between one part of the country and another, often due to surfacing with local material. In some areas the surface dressing is coarser than others; the material may be comparatively harmless rounded gravel, or more abrasive crushed granite, or knife-edged flint. Examples of surfaces producing very slow tyre wear are smooth stone setts and wood blocks, but their non-skid properties are poor.

Bends and corners are severe on tyres because a car can be steered only by misaligning its wheels relative to the direction of the car. This condition applies to the rear tyres as well as the front tyres. The resulting tyre slip and distortion increase the rate of wear according to speed, load, road camber and other factors, fig. O.14.

The effect of hills, causing increased driving and braking torques with which the tyres must cope, needs no elaboration.

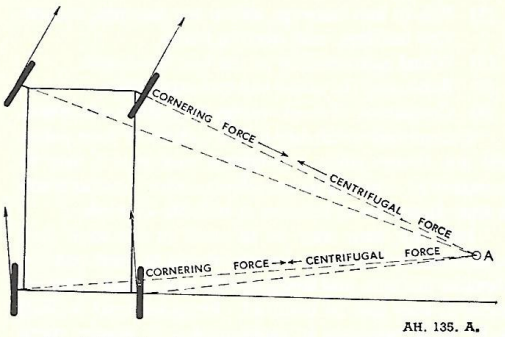

Fig. O.14. Slip when cornering causes increased tyre wear.

Impact Fractures

In order to provide adequate strength, resistance to wear, stability, road grip and other necessary qualities,

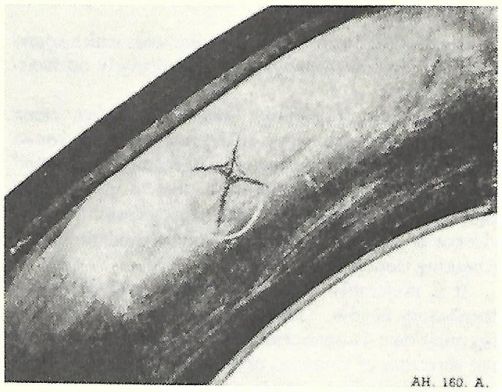

Fig. O.15. Severe impact has fractured the casing.

a tyre has a certain thickness and stiffness. Excessive and sudden local distortion, such as may result from striking a kerb, a large stone or brick, an upstanding manhole cover, or a deep pothole may fracture the casing cords, figs. O.15 and O.16.

Impact fractures often puzzle the car owner because the tyre and road spring may have absorbed the impact without his being aware of anything unusual. Only one or two casing cords may be fractured by the blow and the weakened tyre fails some time later. Generally there is no clear evidence on the outside of the tyre unless the object has been sufficiently sharp to cut it.

This damage is not associated solely with speed and care should be exercised at all times, particularly when drawing up to a kerb.

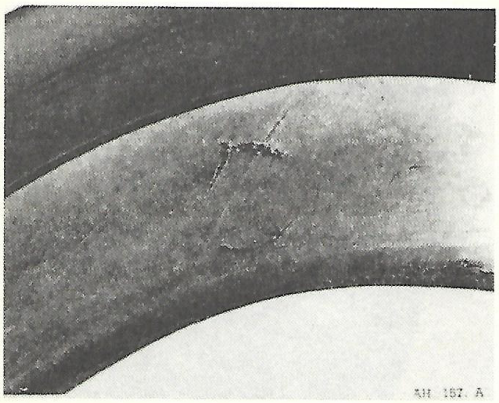

Fig. O.16. A double fracture caused by the tyre being crushed between the rim and an obstacle, such as the edge of a kerb.

"Spotty Wear"

Fig. O.17 shows a type of irregular wear which sometimes develops on front tyres and particularly on near-side front tyres.

The nature of "spotty" wear—the pattern being much worn and little worn at irregular spacings round the circumference—indicates an alternating "slip grip" phenomenon, but it is seldom possible to associate its origin and development with any single cause. There is evidence of camber wear, misalignment, underinflation, or braking troubles.

It is preferable to check all points which may be contributory factors. The front tyres and wheel assemblies may then be interchanged, which will also reverse their direction of rotation, or better still the front tyres may be interchanged with the rear tyres.

Points for checking are :—

(1) Inflation pressures and the consistency with which the pressures are maintained.
(2) Brake freedom and balance, shoe settings, lining condition, drum condition and truth.
(3) Wheel alignment.

Fig. O.17. Irregular "Spotty" wear, to which a variety of causes may contribute.

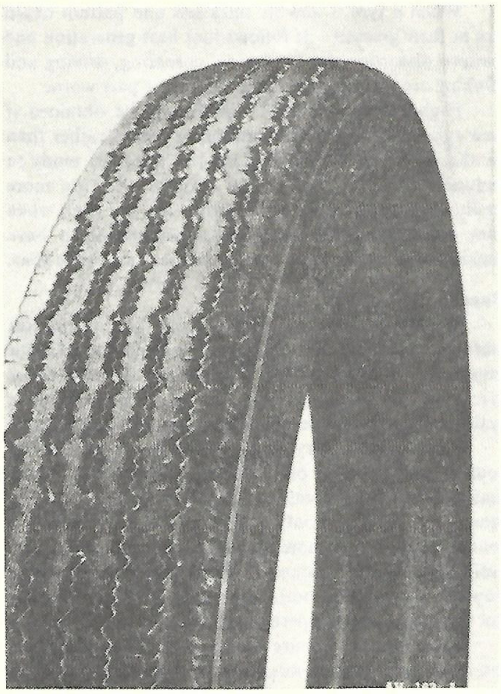

Fig. O.18. Fins or feathers caused by severe misalignment. With minor misalignment, probably aggravated by road camber, the ribs may have sharp edges instead of upstanding fins. These conditions will usually be accompanied by heel and toe wear across the tread due to its being distorted and worn away laterally instead of in a true rolling direction.

(4) Camber and similarity of camber of the front wheels.
(5) Play in hub bearings, swivel pin bearings, suspension bearings, and steering joints.
(6) Wheel concentricity at the tyre bead seats.
(7) Balance of the wheel and tyre assemblies.
(8) Conditions of road springs and shock absorbers.

Corrections which may follow a check of these points will not always effect a complete cure and it may be necessary to continue to interchange wheel positions and reverse directions of rotation at suitable intervals.

Irregular wear may be inherent in the local road conditions such as from a combination of steep camber, abrasive surfaces, and frequent hills and bends. Driving methods may also be involved. Irregular wear is likely to be more prevalent in summer than in winter, particularly on new or little worn tyres.

Wheel Alignment and Road Camber

It is very important that correct wheel alignment should be maintained. Misalignment causes a tyre tread

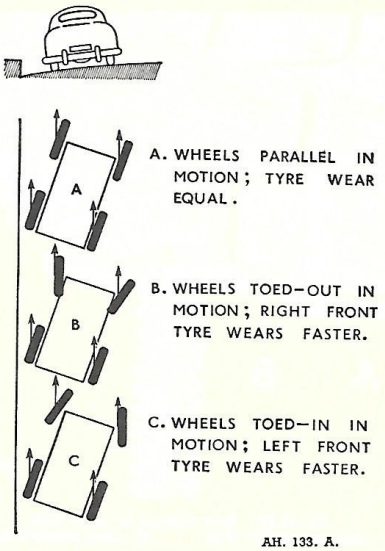

Fig. O.19.
Exaggerated diagram of the way in which road camber affects a car's progress.

to be scrubbed off laterally because the natural direction of the wheel differs from that of the car.

An upstanding fin on the edge of each pattern rib is a sure sign of misalignment and it is possible to determine from the position of the "fins" whether the wheels are toed in or toed out, see fig. O.18. Fins on the inside edges of the pattern ribs—nearest to the car—and particularly on the off-side tyre, indicate toe-out.

With minor misalignment the evidence is less noticeable and sharp pattern edges may be caused by road camber even when wheel alignment is correct. In such cases it is better to make sure by checking with an alignment gauge.

Road camber affects the direction of the car by imposing a side thrust and if left to follow its natural course the car will drift to the near side. This is instinctively corrected by steering towards the road centre. As a result the car runs crab-wise. Fig. O.19 shows, in exaggerated form, the effect this has upon the tyres.

The near front tyre sometimes persists in wearing faster and more unevenly than the other tyres even when the mechanical condition of the car and tyre maintenance are satisfactory. The more severe the average road camber the more marked will this tendency be. This is an additional reason for the regular interchange of tyres.

Camber Angle

This angle normally requires no attention unless disturbed by a severe impact, however, it is always advisable to check this angle if steering irregularities develop, see L6.

Wheel camber usually combined with road camber, causes a wheel to try to turn in the direction of lean, due to one side of the tread attempting to make more revolutions per mile than the other side. The resulting increased tread shuffle on the road and the off centre tyre loading tend to cause rapid and one sided wear. If wheel camber is excessive for any reason the rapid and one sided tyre wear will be correspondingly greater. Unequal cambers introduce unbalanced forces which try to steer the car one way or the other. This must be countered by steering in the opposite direction which results in faster tread wear.

Section O.6

TYRE AND WHEEL BALANCE

Static Balance

Unbalance in wheel and tyre assemblies may be responsible for various effects such as wheel wobble, abnormal wear of tyres and suspension parts, vibration in the steering or, in extreme cases, in the whole car. If any of these faults develop for which no other cause can be found, wheel and tyre balance should be checked and corrected according to instructions supplied by the manufacturer of the balancing machine.

When wheels are to be re-balanced it is essential that the weight of the car be removed from the tyres as soon as possible after a run so that temporary flat spots do not form on the tyres. Nylon tyres are particularly prone to this and re-balancing with the tyres in this condition is pointless.

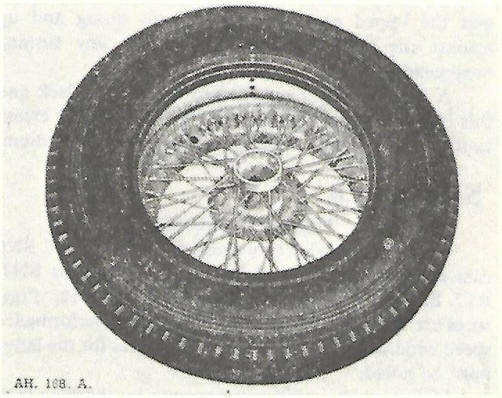

Fig. O.20.
Correct fitting relationship of Dunlop covers and tubes.

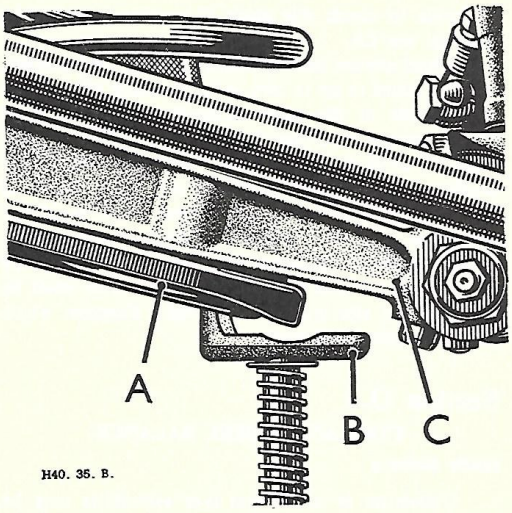

Fig. O.21. Front position for screw jack.
A. Front suspension spring plate. B. Jack platform.
C. Front suspension lower wishbone arm.

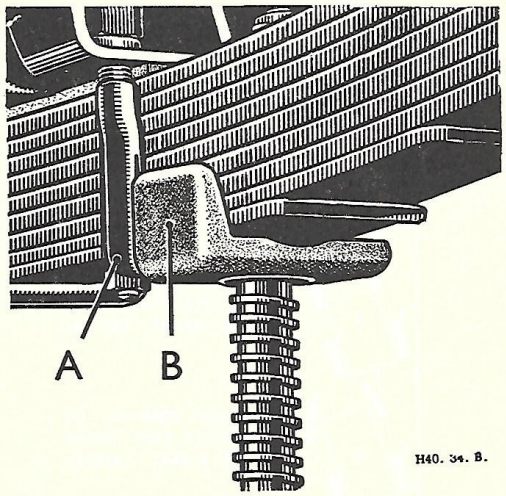

Fig. O.22. Rear position for screw jack.
A. Rear spring "U" Bolt. B. Jack platform lip.

Section O.7

LIFTING GEAR

The Under-Axle Type of Screw Jack

This type of jack is used for all models. For the front wheels the lifting platform of the jack should be placed across the outer rim of the spring recess in the spring plate.

For lifting the rear wheels, place the lifting platform across the lowest spring leaf, to the rear of the axle, with the lipped end on the outside of the lower plate, so that the flat end is between the bottom wishbone links and the lipped end projects into the spring and up against the spring U-bolt; this avoids any turning movement.

A long handle is required to operate the jack and this is obtained by joining together the provided extension and tommy bars, the latter being the turning medium.

Section O.8

TYRE PRESSURES

The recommended tyre pressures for BN4 and BN6 cars are given on General Data page 8, and for BN7, BT7, BJ7 and BJ8 cars on General Data page 18. Pressures are quoted for normal and maximum performance speed conditions. The increase in pressures for the latter must be noted.

Maintain the correct tyre pressures by checking with an accurate tyre gauge at least once a week, and inflating if necessary.

Any unusual pressure loss must be investigated. Under-inflation causes rapid tyre wear, and even more serious is the possibility of damage to the fabric of the tyre owing to the excessive flexing of the tyre walls.

At Car Nos. 10300 (BN7) and 10299 (BT7), Road Speed tyres with an improved tread pattern were introduced. The new tyres can only be fitted to earlier cars in complete sets, and the bolts securing the rear bump rubber brackets to the wheel arches must be reduced in length by 0·5 in. (12.7 mm.) to prevent fouling between the bolts and tyres.

Section O.9

CARE OF TYRES

To obtain the best mileage occasionally interchange the front and rear wheels and bring the spare into use.

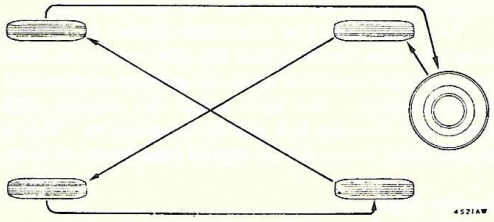

Fig. O.23.
System of tyre changing to regularize tyre wear.