Vol. XIX No. 9. **READER'S POST-WAR 1½-LITRE HIGH-PERFORMANCE CAR** *September, 1943.*

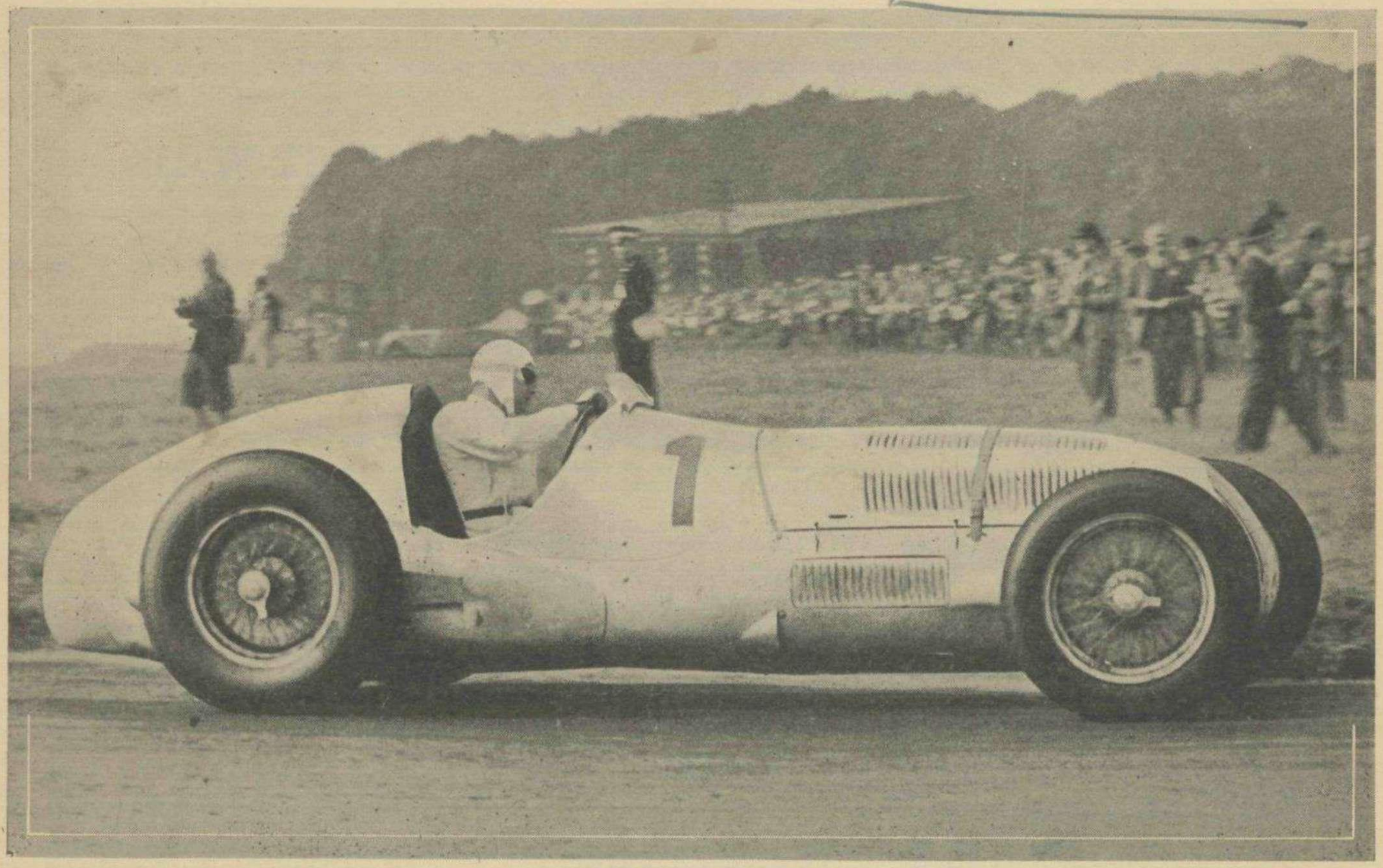
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A DESIGN FOR A 1½-LITRE POST-WAR SPORTS CAR

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DURING a long motor-less period—I have not touched a steering wheel for some 15 months—I have been thinking a little about the sort of car that I should like to own when the present nonsense is over. I find that my ideas correspond roughly with those expressed in the late Ft.-Lt. Scafe's letter published in MOTOR SPORT in June, 1942, in which he indicates that the solution is along the lines of the Type 328 B.M.W., but that I have gone into rather more detail than he has.

The fundamental requirements on which the details of my design are based are as follows :—

(*a*) Comfortable accommodation for two people, with luggage space and emergency accommodation for a third person.

(*b*) Performance to give 75-80 m.p.h. cruising speed, and 100 m.p.h. maximum with a high rate of acceleration, to be provided at a minimum running cost.

(*c*) It is also assumed that a person buying the type of car envisaged would not want his motoring confined to smooth roads, and that he would probably enter occasionally for trials of the not too fearsome variety, and would, therefore, expect good ground clearance and hill-climbing capacity, as well as a fairly sturdy motor-car that would not break up too quickly.

These requirements can be met in a car of quite moderate dimensions—say 7 ft. 10 in. wheelbase and 4 ft. track—housing some 1½ litres of engine in a rigid chassis with soft independent front suspension, and either independent rear suspension or a De Dion type axle, the whole being covered over by a streamlined body of the enveloping type (open, of course). This body, quite apart from the gain in performance resulting from its aero-dynamic shape, offers the great advantage that the inevitable third passenger who always turns up when the car is already loaded with its normal complement of two, is comfortably accommodated behind the windscreen on the bench-type front seat, and does not have to be stowed away by himself in a draughty seat at the back. The merits of front-engined front-drives and rear-engined rear-drives have been considered, but the disadvantages resulting from these layouts more than outweigh the advantages when applied to a moderate-sized sports car, so that the normal layout is retained, except that the gearbox is in unit with the final drive rather than with the engine, for reasons which become apparent later.

Now to consider the design, component by component, in more detail : Firstly, the frame, which has to provide a rigid foundation on which the whole structure of the car is built, and which at the same time must only occupy space which is not otherwise required.

For any closed car and, for that matter, for an open racing car, the correct form of frame construction is surely either the unified body-chassis construction as exemplified by the front-drive Citroen or the Vauxhall Ten, to name two of many examples, or, for cars not built in large quantities, the basically similar built-up tubular structure used on the original Burney Streamline some 12 years ago, on the Aston Martin "Atom," and, since I have included racing cars, Robert Waddy's very brilliant design, "Fuzzi." On an open car, however, unless one expects the crew to climb over the side (which is rather a lot to ask of a fair passenger when dressed up for an evening festivity—more than I intend to ask, anyway), this type of construction is rather out of the question, due to the very small depth available where the door is placed. (Yes, I can remember the early Lancia "Lambda" which was open and which embodied combined body-chassis construction, but the "Lambda" was not a very low-built car, neither were the doors very deep, which makes it a rather different proposition.)

One is, then, left with the alternatives of a frame of more or less conventional layout, with either tubular or box-section side members, or the backbone-type of frame. Brief consideration will show that the backbone frame has many merits. First, there is considerable saving in weight and, secondly, it only occupies space in the passenger compartment that is already occupied by the propeller shaft tunnel, so that the seats and the floor can be placed as low as other considerations will allow. I lay great emphasis upon the lowness, as not only is it a means of reducing air resistance to a minimum, but also the lower the centre of gravity can be arranged, the softer can the suspension be without the car behaving like an American saloon when cornering, braking and accelerating—which is a very important consideration. Actually, the height of the seat cushion is governed by visibility over the front wings, but it is still considered necessary to have a flat floor as low as possible, as a driving position in which the feet are no lower than the seat cushion is not comfortable on a long run, and the nearer that one can approach to a kitchen-chair sitting position, the more comfortable does driving become and the more control one has over the motor-car. The desirable end of making the floor boards the lowest part of the car is achieved in the Morgan 4/4 without departing far from the conventional type of frame, but if the front seat is to be wide enough for three, this can only be done at the expense of an undesirably sharp and pronounced kink in the plan shape of each side member where it has to sweep in behind the seat to a width that can be accommodated between the rear wheels.

Of various examples of backbone frame construction, the Tatra arrangement, in which the crankcase and gearbox unit and the final drive unit form part of the frame and are connected by the tubular steel backbone to which both are bolted, offers rather serious objections as regards accessibility and makes impossible the resilient mounting of the engine or gear-

box ; but the R-type M.G. Midget frame, which overcame these objections and at the same time was very rigid and weighed only 57 lb., if I remember rightly (though I may be thinking of the famous 57 varieties), surely indicates the lines along which to work.

Briefly, then, the arrangement visualised is something very much like the R-type M.G., shaped in plan view like a tuning fork, but with a smaller fork at the rear end in which the gearbox is mounted, the whole affair being of welded rectangular-box-section construction.

Incidentally, I rather hope that since this is to be an open car the noise and vibration from a rigidly-mounted gearbox can be overlooked, and that the gearbox casing can be bolted into the rear end of the frame, where it will serve very nicely to brace together the two arms of the rear fork.

At the front I am afraid that modern practice will insist on flexible mounting of the engine, and so a large box-section cross member, either in line with, or just in front of, the front wheels, is needed. This cross member may be connected to the side members by a multiplicity of small bolts all drilled, and split-pinned or wired, so that the engine can be comparatively easily removed by sliding it forward when the cross member has been taken out. Another cross member will be required right at the front of the frame, which should end in such a way that a bumper can easily be fitted. (This, I freely admit, sounds rank heresy, and I would hate my own car weighed down front and rear with such a fitment, but in countries where it is normal for a car to be used as a shunting locomotive when parking, one's wings definitely need protection. Fortunately there are other bumpers than the chromium snowploughs fitted to the latest American cars, and it should be possible to build a narrow bumper with a coloured rubber surface on to the front of a streamlined body with much less offence to the eye than mounting an ordinary one on to, say, a vintage Bentley.)

The detailed design of the frame is very closely tied up with that of the suspension, so that must now be considered. Of the possible arrangements at the front end, I rather suspect, perhaps unjustly, that the Lancia vertical guide system does not allow very large wheel movements and so rather restricts the softness of the springing. This difficulty definitely arises with the trailing link arrangement unless the links are made very long, in which case difficulty is found in making them sufficiently stiff in a lateral direction. In any case, both of these systems necessitate cross members running almost the width of the track and carrying the weight of the car, whereas the twin-wishbone system fits very nicely indeed on to a frame of the backbone type, is very rigid in a lateral direction, and is well able to resist brake torque and, if used with either a transverse leaf spring or torsion bars connected to the wishbones, does not need any cross member other than that bracing the two side members of the frame together. I am inclined to favour the torsion bar suspension rather than the transverse leaf spring, mainly on the grounds of weight saving, but partly because it requires less maintenance. To reduce unsprung weight to a minimum, the stub axles should be ball-jointed direct to the suspension links, as in the case of the Citroen front-drive or the Porsche suspension of the Auto-Union and the E.R.A. From the point of view of safety, it would appear desirable to connect the upper link to the torsion bar, but this is not essential if the torsion bar cannot be accommodated in this position on the frame. A point that I do consider rather important is that

Capt. J. S. Moon, M.E.F., outlines a suggested high-performance car of great merit

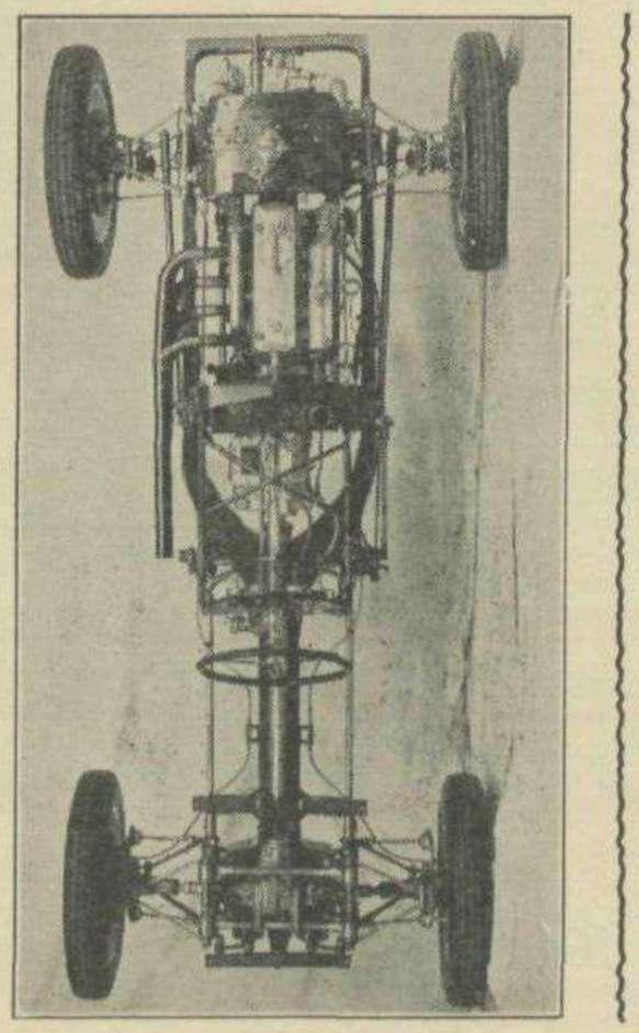
the shock absorbers, of the piston hydraulic type, should be built on to the hinge of the same link as the torsion bar, as I rather dislike shock absorbers connected up by rubber links, and also I think that all the control of the wheel motion should be vested in one link only. As an alternative, I am partial to the direct-acting, hydraulic shock absorber, but this needs fairly substantial struts and stays to provide a rigid mounting for the fixed end, which should be as far out from the centre line as possible.

As regards the rear suspension, I am endeavouring to keep an open mind between the respective merits of the De Dion axle and various systems of independent rear suspension. Much has been written and spoken regarding the respective merits of these since the two German G.P. cars switched over from swing-axle suspension to the De Dion type axle, and I am inclined to think that all types of independent rear suspension are being condemned because the swing-axle type has been tried and found wanting for very high speed work. There has been no evidence that the rear suspension of the G.P. Alfa-Romeo or the R-type M.G. Midget were other than satisfactory, and there is positive evidence of good results obtained on the Alta, since this feature was continued in the latest car completed at Tolworth during the first few weeks of the war. The same state of affairs holds with regard to touring cars, though there is an undoubted decreased resistance to roll with independent rear suspension of types other than the swing-axle, as compared with axled suspension. (Incidentally, it has always been one of life's more curious conundrums that where many makers found it necessary to increase the stiffness of their suspension against roll by adding torsion-bar stabilisers, Lancia, having adopted in the "Aprilia" an all-independent suspension, which is supposed to have a lower than normal resistance to roll, reduces this further by arranging that only half the rear suspension resists roll, and that the pivoted leaf spring only acts, presumably, when both wheels drop into a gully.)

Until definite evidence is produced that it is unsatisfactory, I propose to plump for a wishbone suspension system at the rear, very much the same as at the front end, with the same torsion bars used as the springing media. In case difficulty is experienced in accommodating a long torsion bar, either as regards the space that it occupies or if it means introducing a mounting stress on the chassis at an inconvenient place, it must be remembered that Vauxhall's have shown that it can easily be doubled back on itself by enclosing the torsion bar in a torsion tube.

If the wishbone rear suspension really has unknown vices, then the De Dion axle must be used in its place. The use of long radius arms usually employed to locate this type of axle is ruled out by the low seating position, but as the reduction of unsprung weight to a maximum dictates that the brakes be carried on the frame-mounted final drive unit there is no brake torque to be resisted by the axle, which can, therefore, be controlled and located by shackling its ends to wishbones in the same place as the lower ones of the usual twin-wishbone suspension. The axle must be located laterally either by the Mercédès system of two triangular members, ball-jointed together at their apices and hinged, respectively, to transverse axes on the frame and on the axle, or preferably, to my mind, by Watt's straight-line motion consisting of two transverse radius rods connected at their outer ends to the axle and at their inner ends to a short link ball-jointed at its centre to the frame.

The steering is closely connected with the type of front suspension. The B.M.W. and other continental cars show us that with a properly laid-out steering geometry, a simple rack and pinion system can be employed with perfectly satisfactory results and, this being so, there seems no excuse for adding weight and expense (and a lot of ball-joints) in



The author favours the tubular-backbone form of chassis construction and refers more than once to the layout of the R-type M.G. Midget, seen here in chassis form.

adopting one of the modern proprietary steering boxes, excellent though they are.

An integral part of the suspension is the tyres, and here I suggest that right from the start the car be equipped with different tyre sections front and rear, instead of leaving it to the enthusiastic owner to find that the front and rear wheels have rather different roles to perform, and that these are better performed by a smaller section at the front than at the rear. In the interests of lowness and of saving of unsprung weight, wheel diameters should be as small as possible; 6.00″×15″ rear and 5.00″×17″ front are suggested. These sizes have the same nominal diameter, so that with one spare the same size as the front, a journey interrupted by a puncture at the rear can be completed without the car being lopsided or the differential having to work overtime. Our pre-war tyres were very reliable and punctures were quite rare, but whether the same will apply to post-war tyres remains to be seen. Incidentally, I am not sure whether 6.00″×15″ tyres are made (5.00″×15″ and 5.50×15″ are used on the "1,100" and "1,500" Fiats), but if Mr. Dunlop will not oblige, then the rim sizes suggested above will have to be increased by one inch in diameter.

With such small rim diameters as 15″ and 17″, the Rudge type of wire wheel is heavier than a cast light-alloy or pressed steel wheel, so that, if the enthusiastic owner can possibly forgo the pleasures of rapid wheel changing, a 4-studded, bolt-on wheel is preferable. (The Austin Seven wheel construction saves a lot of time in wheel changing and gives no trouble if the nuts are tightened intelligently from the beginning of the car's life.) If, however, a centre lock system must be used, then the wheel can be located on conical faces on four or six false wheel studs and can be held up against them by a large eared nut in the centre with a simple locking device of some kind.

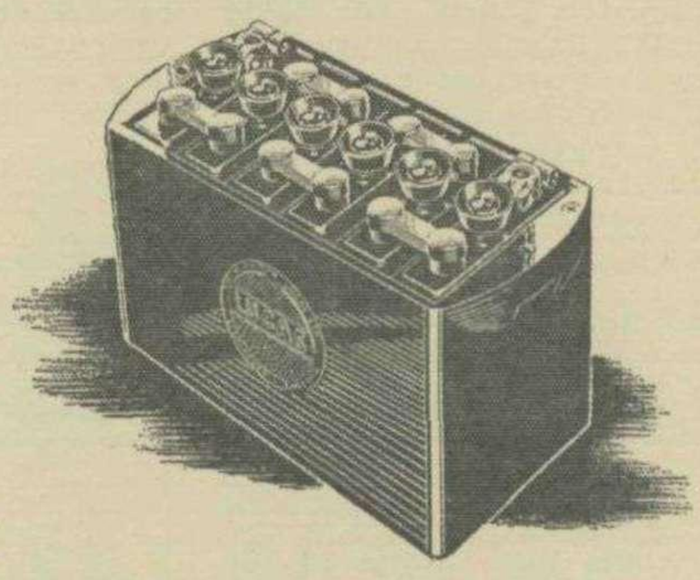
The braking problem is solved by the use of one of our excellent proprietary systems, between which there is little to choose, but whatever system is used, hydraulic actuation is indicated. The disc type brake is now an accomplished fact and is giving excellent service, and is therefore worthy of consideration, particularly at the rear where the wishbone suspension imposes a certain amount of restriction on brake diameter, if the brake is to be dismantled without having to take down the suspension as well.

Before describing the transmission in detail, a few words are necessary in explanation. The need for a low centre of gravity and a bench-type front seat indicate that the propeller shaft must pass through the frame and not along the top of it as in the R-type M.G. Midget, and that the frame must be as low as ground clearance (say 7″) will permit. This in turn indicates that something must be done to bring the propeller shaft down to the low level required. This end is reached by using a two-piece shaft, with a centre universal and a steady bearing somewhere in the region of the front edge of the seat, and by changing the gearbox design so that (in effect) the primary shaft is thrown away and the propeller shaft drives the front end of the layshaft, the bevel pinion, of course, being on the rear end of the mainshaft.

This, of course, makes the provision of a direct drive in the normal sense impossible (though it is actually the same as the Frazer-Nash, which was claimed to have a direct drive on all "gears"), but I cannot see that this is a serious disadvantage, as what one loses in efficiency in top compared with the direct drive, one gains on all other gears by taking the drive through only one pair of gears instead of through two pairs, while with well cut helical gears (or straight gears for that matter) the noise factor is negligible. Also, one can quote at least two high-quality cars which have indirect top gears, namely, 4¼-litre Bentley and 20-h.p. Daimler, and many not such good quality American cars fitted with overdrives. Also, to obtain effortless cruising and at the same time good acceleration at high speeds, I consider that two close ratios are necessary, the highest in effect an overdrive, too high to give maximum road speed, and the lower one such that the car's maximum speed is attained at, or past, the engine's peak speed, and as these two gears will be used as alternative top gears, there is little justification for discriminating and making one direct and one indirect.

To provide a bottom gear low enough for easy starting on a very steep grade will necessitate three further gears if

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wide gaps in the ratios are to be avoided, so that the gearbox will be called upon to provide a total of five ratios, in addition to a reverse.

And now to consider the transmission in more detail. Few, I think, will find fault with the selection of a Borg and Beck single-plate clutch mounted in the flywheel, especially since this is rendered relatively accessible by the banishment of the gearbox to the back end of the frame.

The propeller shaft can be relatively slender and light, as it now only has engine torque to transmit and, being in two short lengths, does not have to have a large diameter to prevent whipping, although it must be remembered that its maximum speed is limited, not by the maximum speed of the car, but to that speed at which the engine blows up. As it is desirable that the centre main bearing of the shaft be as low as possible, the front and centre joints will run at a certain amount of angularity and should, therefore, be of Hardy Spicer needle-roller type, but the angularity of the rear joint can be laid out to be nil, so that a Layrub rubber-bushed joint can be used here.

While on the subject of propeller shafts, the two universally-jointed half shafts can be mentioned. With the wishbone suspension, the wheel remains approximately parallel to the frame, so that Hardy Spicer shafts with the wide-angularity-type, needle-roller joints, as used in the R-type M.G., can be utilised, as they can be laid out so that the variations in angular velocity from the two joints cancel each other out; but with the De Dion axle it may be preferable to use constant-velocity joints.

The general layout of the gearbox has already been dealt with and it only remains to detail this a little further. The chief difficulty with the type of gearbox suggested is that of providing an adequately low bottom gear without having to add a compound gear train. However, a 13⅓ to 1 bottom gear, which should be quite adequate with the good power/weight ratio and the comparatively small wheels (27″ nominal diameter), can be obtained with 2⅔ to 1 gearbox reduction and 5 to 1 crown wheel and pinion, and these ratios should be attainable without a crown wheel so large as to lack rigidity and thus be noisy, and without increasing the centre distances of the two gearbox shafts to an unwieldy figure. With an engine of 90-mm. stroke, developing some 70 b.h.p. at 5,500 r.p.m. and running safely to 6,000 r.p.m., I suggest that the remaining ratios be 8.8, 6.1, 4.5, and 3.6 to 1, giving maxima of 36, 54, 78, 106, and a very theoretical 132 m.p.h. at 6,000 r.p.m. (3,550 ft./min. piston speed) and 93 and 74 m.p.h. on the two highest gears at a piston speed of 2,500 ft./min. (4,220 r.p.m.). With these ratios, of course, both fifth and fourth are, in reality, overdrive ratios.

As regards the actual construction of the box, this should be an aluminium or electron casting, divided into four compartments by transverse positions, all of which carry bearings for the two shafts, the rear compartment containing the crown wheel and pinion and differential, and the other three the first and reverse gears, second and third gears and fourth and fifth gears, so that each gear is adjacent to a bearing and noise will be reduced to a minimum. All gears should be engaged by dog clutches without synchromesh, to reduce to a minimum the motion required on the selector mechanism, except possibly for the bottom and reverse gears, where by sliding it along the splined shaft the same large wheel may be used for both gears. The two highest ratios should have double helical teeth for quietness and to avoid end thrust, but I think that well-cut straight gears would not prove unpleasantly noisy for the remaining two gears, though these should still run in constant mesh and be engaged by dog clutches. To ensure that all gears rotate as slowly as possible and thus reduce churning losses, the fixed gear of each pair should be smaller, so that the sliding dog will be on the driving shaft in case of the top two gears, and on the driven shaft for the others, which indicates that the selector mechanism should be along one side of the box.

As regards the gear-change arrangements, I am afraid that the consensus of opinion will be that I am becoming influenced by living in a land of American motors, as with a seat designed to take three people the only place that I can see for the gear lever is on the steering column. I do specify, however, that the mechanism must be very carefully laid out with a view to rigidity and correct feel, and, granted this, I am convinced that a satisfactory arrangement can be made. Many modern American cars definitely lack rigidity in their gear-change mechanism, so that it is doubtful if the gears could be engaged without synchromesh, but it must be remembered that they follow on in the tradition that used to provide a yard-and-a-half of chromium plated ¼″ wire with which to effect changes of ratio!

It also becomes necessary to utilise a dashboard hand-brake and, here again, I think that the pistol-grip arrangement, as it already exists, could, with sufficient care in manufacture and in selection of the right leverages, be made to suit the rather fastidious taste of the sporting motorist.

And so at last to the power unit, which, frankly, has not been dealt with before because my ideas with regard to it are rather more tentative. To give an easily attainable maximum of 100 m.p.h. together with brilliant acceleration will require some 70 b.h.p., a very awkward figure, since to produce this will require a rather exceptional unsupercharged 1½ litre, judging by pre-war standards, while 2 litres, I feel, is getting a little large for a high-speed engine with only 4 cylinders. My solution, then, is the unblown 1½, with the alternative of the same motor bored a few millimetres larger, to a capacity of 1¾ litres, for the customer who is not fussy about being a few c.c. over the international capacity limit.

As a first step towards attaining the reliable 70 b.h.p. from 1½ litres, the stroke can be reduced by breaking away from the almost standard dimensions of 69×100 mm. and adopting instead 72.5×90 mm., which gives 1,486 c.c. and will cost another 25s. per year (13.03 h.p. R.A.C. rating). (The 1¾-litre version, incidentally, has 78 mm. bore, giving 1,720 c.c. and 15.09 h.p. R.A.C. rating.)

If we then reckon on the 1½ litre peaking at 5,500 r.p.m., it has to develop some 47.1 b.h.p. per litre and to have a b.m.e.p. of 110 lb./in., which is a high figure, but not one which is inconsistent with reliability, given an individual type of engine with good porting and cylinder head layout, a high compression ratio (say 9 to 1) and a rigid bottom half, plus, possibly, a slight gain from the higher octane fuels which post-war conditions may give us.

To provide the efficient porting and cylinder head an inclined valve layout with hemispherical combustion spaces is indicated, which, in turn, means that a certain amount of complication must be introduced into the valve gear. However, while one may deduce from the successful operation of E.R.A. valves by means of a push rod and a bell crank rocker at up to 9,000 r.p.m., and of the inlet valves of the Type 328 B.M.W. at up to two-thirds of this speed through two push-rods and two bell crank rockers each, that valve mechanisms no longer cause designers the severe headaches that they did at one time, it is considered that the valve mechanism should be as simple as possible in the interests of long life. This end may be conveniently attained by a single camshaft, chain driven, mounted in the cylinder head just offset from the centre line so as to clear the sparking plugs, operating the valves through rockers mounted on two rocker shafts, one on each side of the head midway between the camshaft and the end of the valve stem. With a chain drive, the overhead camshaft offers no more complication than one in the crankcase, while it offers the advantages of a narrow crankcase (which fits neatly into the backbone frame) and a symmetrical cylinder block with its freedom from distortion.

The whole cylinder head will be covered over by one rather extensive head cover, the sparking plugs either being protected within a tube extending from the head through the cover, or dealt with in the Lancia "Aprilia," in which they are contained within a sort of permanent "box-spanner" affair.

I must confess to being rather conservative as regards engine design, and for the sake of rigidity prefer to use a solid block of cast iron as a basis on which to build the engine. The Type 46 Bugatti construction, however, in which the main bearings are cast as part of the cylinder block, and the light alloy crankcase merely forms a box which encloses the lower half of the engine, indicates a method of combining rigidity of the integral block and crankcase, with the weight saving of the separate cast-iron block-light alloy crankcase construction. Since the crankcase is completely unstressed apart from the weight and torque reactions of the engine, one can even go so far as to use electron, which is lighter, but even less rigid, than aluminium.

Unlike Bugatti, however, the cylinder head will be detachable, as this component can then be cast in a light alloy, with advantages from weight saving and thermodynamic points of view, though great care will be needed to ensure that its "buttoning down" is very thorough, to avoid gasket troubles.

Three main bearings will be sufficient for the crankshaft, which will gain in

stiffness due to the short stroke and also due to the reduction which can be made in the length of bearings by using high duty bearing metals, though at the expense of having to harden the shaft to prevent a high rate of wear.

I must admit a liking for the Aston-Martin camshaft drive, using a pair of two-to-one helical gears to drive the lower chain sprocket from the crankshaft, so avoiding a high linear chain speed. The intermediate spindle can then be used to drive the water pump, the dynamo can be directly driven from the front of the crankshaft, and by taking another leaf out of Bugatti's book and driving the Scintilla Vertex magneto directly from the rear or the front of the camshaft, all of the auxiliaries can be disposed of except the oil pump, which can be mounted under the front main bearing cap and can be driven by a spur gear meshing with the gear already provided on the crankshaft to drive the timing chain shaft.

Dry sump lubrication has the advantage of reducing the engine height as well as of keeping the engine-oil cool during prolonged running at high speeds, while if undershielding is used, the amount of air passing through the bonnet can be reduced to a minimum. The oil tank can be accommodated between the radiator and the radiator grille, or else alongside the crankcase, in which case an oil radiator will have to be provided.

I should very much like to see the induction system arranged as on the Type 328 B.M.W., in which the mixture drops straight from the downdraught carburetter into the cylinder head by means of inlet ports which lead into the top face of the inclined valve head instead of in at the side as is usual. This is, however, impracticable as it means raising the bonnet level to accommodate the carburetters and two horizontal or semi-downdraught S.U.s, mounted on a manifold on the side of the head, will have to be used instead.

As already indicated, the cooling water is circulated by pump so that directed flow cooling is available for the exhaust valve seats, and also because the radiator header tank will be rather low for efficient thermocycle cooling. A fan I very firmly bar, as I am convinced that most fans use up far more b.h.p. than is generally appreciated and that one is quite unnecessary if the radiator is properly designed. In order to accommodate the forward projecting dynamo and possibly the magneto as well, the radiator can be divided into two blocks, with a vertical gap some six inches wide between them.

The details of the body I leave to a better brain than mine, except for specifying a construction of aluminium panelling on a welded tubular-steel or light-alloy framework and for suggesting that the Bugatti that graces the cover of the March, 1943, MOTOR SPORT illustrates the lines along which to work.

Having thus laid out the design for the car, it remains to consider with what effect it can be operated. 70 b.h.p. should suffice to accelerate its 15–16 cwt. to a speed of a mile per minute in not much over 12 seconds, and comparison with the 42-b.h.p. 90-m.p.h. Fiat saloon indicates a maximum of 106 m.p.h. if one assumes (not unreasonably, I think) that the better streamline shape of the aerodynamic saloon is compensated by the lower frontal area of the 2/3-seater. Its high top gear ratio, streamline shape, and soft suspension should make possible cruising at 80 m.p.h. with about 27 m.p.g., even on roads that are not ultra smooth, without fatigue to either itself or to its driver.

There, very briefly, are my ideas, and now all that remains is for my fellow enthusiasts who avidly devour MOTOR SPORT each month to point out to me just why it cannot be done.

[Capt. Moon deserves the very greatest credit for setting down on paper the outline of a design which is so excellent as to require no excuse on the grounds that its originator is very busy indeed in the Middle East, and is away from his collection of data, although such is the case. Readers should certainly consider the points he makes and the layout he suggests with more than usual care. Suggestions for other "ideal" high-performance cars that would enliven the prospect of peace are invited.—ED.]

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II.

The Editor describes the M.G. Magnette Victory in the 1933 Mille Miglia.

IT is well, sometimes, to recall some of the greater deeds which British motor-cars have done in the face of unquestionably severe opposition, and no better example exists than the showing of the M.G. Magnette on the occasion of its first public appearance—the 1933 Mille Miglia. In the 1932 race of this classic series Lord Howe was a spectator. He saw Borzacchini win with an Alfa-Romeo at 68.2 m.p.h. and Lord de Clifford's supercharged 746-c.c. M.G. average 52 m.p.h. for nearly three-quarters of the course before retiring with a sheared camshaft drive. Lord Howe had seen enough; he returned to England and to Abingdon and persuaded Cecil Kimber, of the M.G. Car Company, Ltd., to let him bear the expense of an M.G. team to compete in the 1933 race. The 1,087-c.c. M.G. Magnette had just gone into production and it was this new and unraced car which formed the basis of the Mille Miglia cars. A supercharged engine was produced, built up with extreme care from standard parts under the direction of H. N. Charles, Harry Robinson, and Cecil Cousins. Initial tests revealed an output of 100 b.h.p. and the future obviously held promise. This engine was assembled in a standard chassis in which was installed a pre-selector gearbox, which, apart from Sir Malcolm Campbell's recently rebuilt 4-litre Sunbeam, was an innovation.

Thus was the "K3" M.G. Magnette born. The 57×71 mm. 6-cylinder engine followed accepted M.G. practice, and used 14-mm. plugs. The elektron sump contained 1¾ gallons of oil and was replenished from a dashboard tank holding just under 2 gallons and feeding *via* a float valve. The supercharger was a Powerplus No. 9 running at approximately three-quarter engine speed and drawing from an S.U. carburetter. The Wilson gearbox had a central control lever working in a positive gate on an extension of the gearbox cover and the half elliptic underslung springs gave a ground clearance of approximately 12". The cable-operated brakes were made largely of elektron and had a drum diameter of 13". The 23-gallon rear fuel tank fed by twin electric pump and the electrical system was 12 volt. Dunlop 19"×3½" rims and Hartford shock-absorbers were used. This specification really applies to the production version of the car, which sold at £795, so let us return to our story. While Abingdon prepared this first Magnette, Howe carefully selected his drivers. They had to be experienced and very fit, able to stand acting as passengers in the race, and possessed of plenty of spare time to enable the preliminary work before the race to be successfully completed. In the end his lordship secured the services of the late H. C. Hamilton, the late Sir Henry Birkin, Bernard Rubin, Capt. George Eyston and Count Giovannino Lurani—certainly a splendid team, and one that requires no introduction. All these folk were to meet in Milan on January 19th, 1933, barely 12 weeks before the race, to try out the practice M.G., which would be followed round the course by Howe's Alfa-Romeo and Mercédès-Benz. Consequently, "Jacko" Jackson went off a week before that with the car, which he drove to Newhaven, where Howe and his mechanic Thomas were waiting with the Alfa and Mercédès. Landing at Dieppe they undertook a 200 mile run to Nancy,



Capt. G. E. T. Eyston who, with Lurani as co-driver, won the race at an average of 56.9 m.p.h.

to enable Jackson to run-in the Magnette. Weather conditions were distinctly wintery and in spite of a cowled radiator the water temperature never rose above 60° C., but the M.G. cruised happily at 60–65 m.p.h. Incidentally, the excellent fuel consumption of 18 m.p.g. was recorded on this first day's run.

The next day was easier, as Lord Howe wished to transact some business at the Bugatti works at Molsheim, but on the third day the party got as far as Lucerne. Howe now drove the M.G., touching 98 m.p.h., alongside the Rhine, although ice still persisted. It was during this run that Howe decided that the team cars would need a bigger steering lock—lesson No. 1. The next section of the journey, to Milan, proved difficult, as the cars had to be put on a train at Erstfelt, the further stretch of the St. Gotthard Pass being snow-bound. The loading was tricky, because no proper loading equipment existed and, although Howe remembered to telephone to Biasca for hot water to be available, arrived there the Mercédès alone started up without needing a tow. The run into Milan was unpleasant, the cars lunging into snow-drifts, the M.G.'s lamps coming loose and Jackson and Thomas both experiencing hectic skids on the final autostrada, so that Howe got into the city with the Alfa-Romeo well ahead of them. The M.G. had now covered 700 miles, and in checking it over the day before the drivers were due to arrive, more valuable lessons were learnt. The oil filter had developed a leak, as the cold oil had bent the aluminium top, the gearbox needed half-a-pint of oil, due to a leaking oil seal, and Jackson decided that the body sides offered insufficient protection from rain and spray. It is significant that subsequent cars had an oil reservoir for the gearbox and higher body-sides. Eyston, Lurani, Birkin and Rubin duly arrived in Milan, but Hamilton had business ties and could not get away. Howe had hoped to go round the entire course, but wintry conditions were against him. Lurani lent an Alfa-Romeo saloon, and on the first practice day Howe's Alfa, the Mercédès, and the M.G. completed the 129-mile run to Brescia without incident, Rubin and Jackson taking the saloon Alfa direct to Bologna. Hereafter conditions became worse. The next day Howe set out alone in his Alfa for Florence, Eyston and Lurani sharing the Mercédès, which carried the luggage and equipment, Birkin and Rubin the M.G., and Jackson and Thomas the closed Alfa-Romeo.

The M.G. began to boil on the Raticosa Pass and eventually became snow-bound, while Howe, far ahead, was stopped by a long column of Italian cavalry and tanks. The cars were obliged to return to Bologna and take an alternative route to Florence, but Lurani, Eyston and Birkin were able to handle the Magnette. Still more lessons were learnt—the plugs tended to oil up and Eyston decided that a slight modification to the inlet manifold would be necessary, while Birkin wanted a stronger front axle beam, which the team cars had. The following day the party went on to Rome, Eyston finding that he could leave Howe's Alfa-Romeo over the difficult Radiofani Pass. When Rome was reached the M.G.'s rear wheels were found to be on the point of collapse, so George had obviously enjoyed his drive—and another lesson was recorded.

In Rome the drivers were given audience by H.M. the King of Italy and by Signor Mussolini (good boys, in those days!) and I love the photograph of our racing men in boiled shirts and coat-tails. Eyston now had to return to England, but before he left a conference was held at which it was decided that a higher second gear would be needed on the team cars, and that a gear gate would be preferable to a quadrant. Eyston asked for a rigid, as distinct from "spring," steering wheel. All agreed that more steering-lock was essential and high oil temperature was a cause for concern, although this subsequently proved curable by reducing the radiator and dumb-iron cowling. After Eyston's departure Thomas and the luggage returned to Bologna in the saloon Alfa, and the others went on to Perugia, *en route* for which city they were met at Terni by Borzacchini, who escorted them in one of the Mille Miglia Balilla Fiats, with great verve. Weather conditions became worse thereafter, and as the objects of the expedition had been achieved, it was decided to return to Bologna and leave out the north-east section of the course. Rubin got in his spell of fast driving on the M.G. on the last day's run into Bologna

and all four cars went on to Milan. Monte Carlo was reached the day after the Monte Carlo Rally had concluded, and the late Penn-Hughes, his car having blown up, was taken aboard and given a run home. He at once offered his help in connection with the coming race, and Lord Howe then decided to enter his Mercédès-Benz and let it run round the course behind the M.G.s as a travelling tender. There was only one job, thereafter, for Penn—he would drive the Mercédès.

When the practice car arrived back at Abingdon, barely six weeks remained in which to build the team cars and practise with them in Italy before the race. Work went ahead at full speed, and a lorry ran for days just collecting connecting rods from the forge, taking them to a machine shop and then rushing them to the M.G. works. The first team engine gave only 72 b.h.p. at 4,500 r.p.m. on test, a drop of 4 b.h.p. The run concluded at 10 o'clock at night, and as the engine was stripped it became evident that the bearing metal was at fault, apparently due to using counter-balanced crankshafts in the team cars made of a different metal less able to conduct heat. The people who supplied the bearing metal suggested slacker big-ends and more oil, and by the time the third engine was run all was well. Then came a spell of gasket trouble, because, although the heads were lapped to the blocks, the copper element of the gasket failed to contract as the engines cooled; H. N. Charles then specified stainless steel gaskets, which were used in the race, although subsequently a revision was made to mild steel, which Charles had just adopted for the 1932 T.T. While the engines were assembled Jackson, Tayler and Marney were preparing the chassis and coachwork. Modifications from the "prototype" included uncowled radiator, new blower mountings, full scuttle fairing, better instrument panel and roomier cockpit, larger fuel tank (range about 280 miles), etc. Howe's M.G. carried his colours of blue and silver as a band down the great body and Eyston's, which used a rigid steering wheel, had the Italian flag on the scuttle in honour of Lurani, all having Union Jacks on either side of the bonnet.

It was planned that Howe with the practice M.G., Penn-Hughes in the Mercédès, Thomas in the Alfa-Romeo, and a mechanic with a lorry would go overland to Milan, while the team cars would be shipped from Fowey, in Cornwall, to Genoa, for economy. The

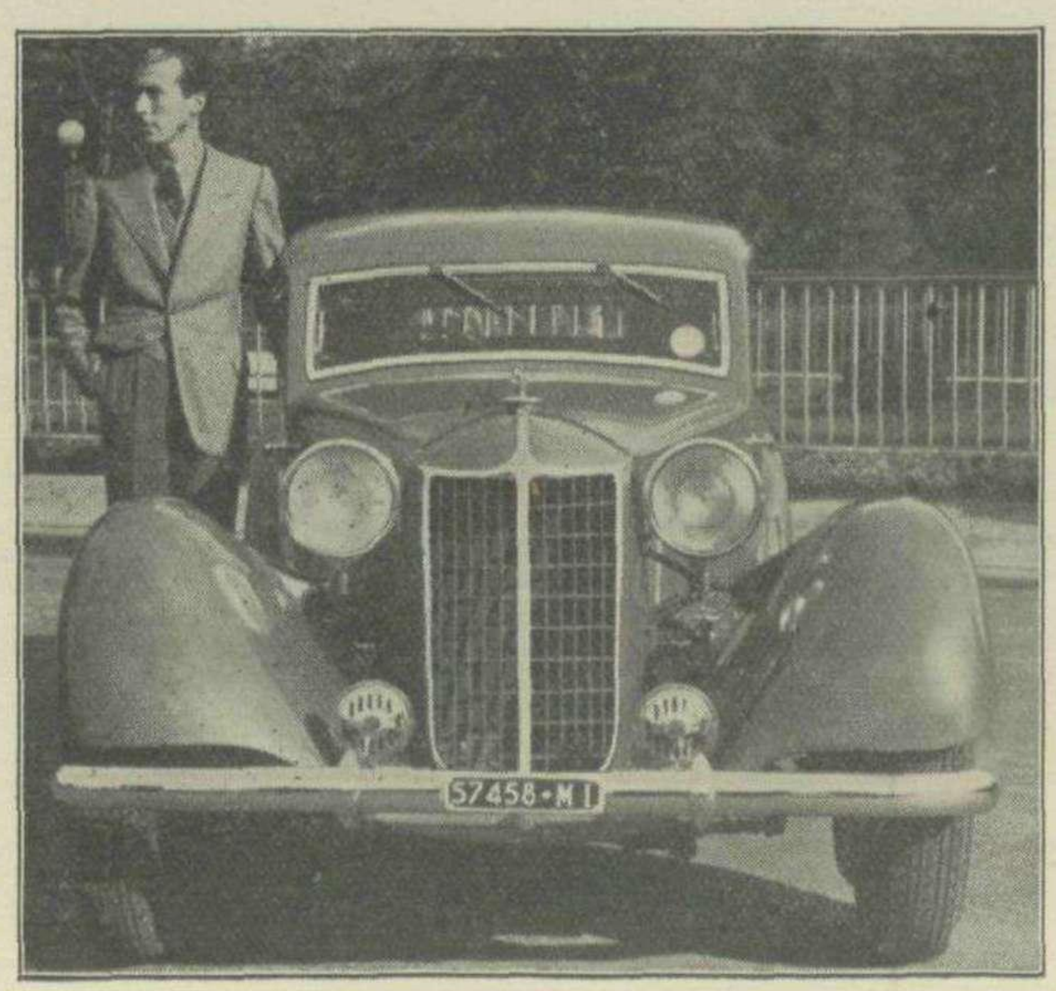


The late Penn-Hughes, who drove the Mercedes tender-car in the race, averaging only a little lower speed than the M.G.s.

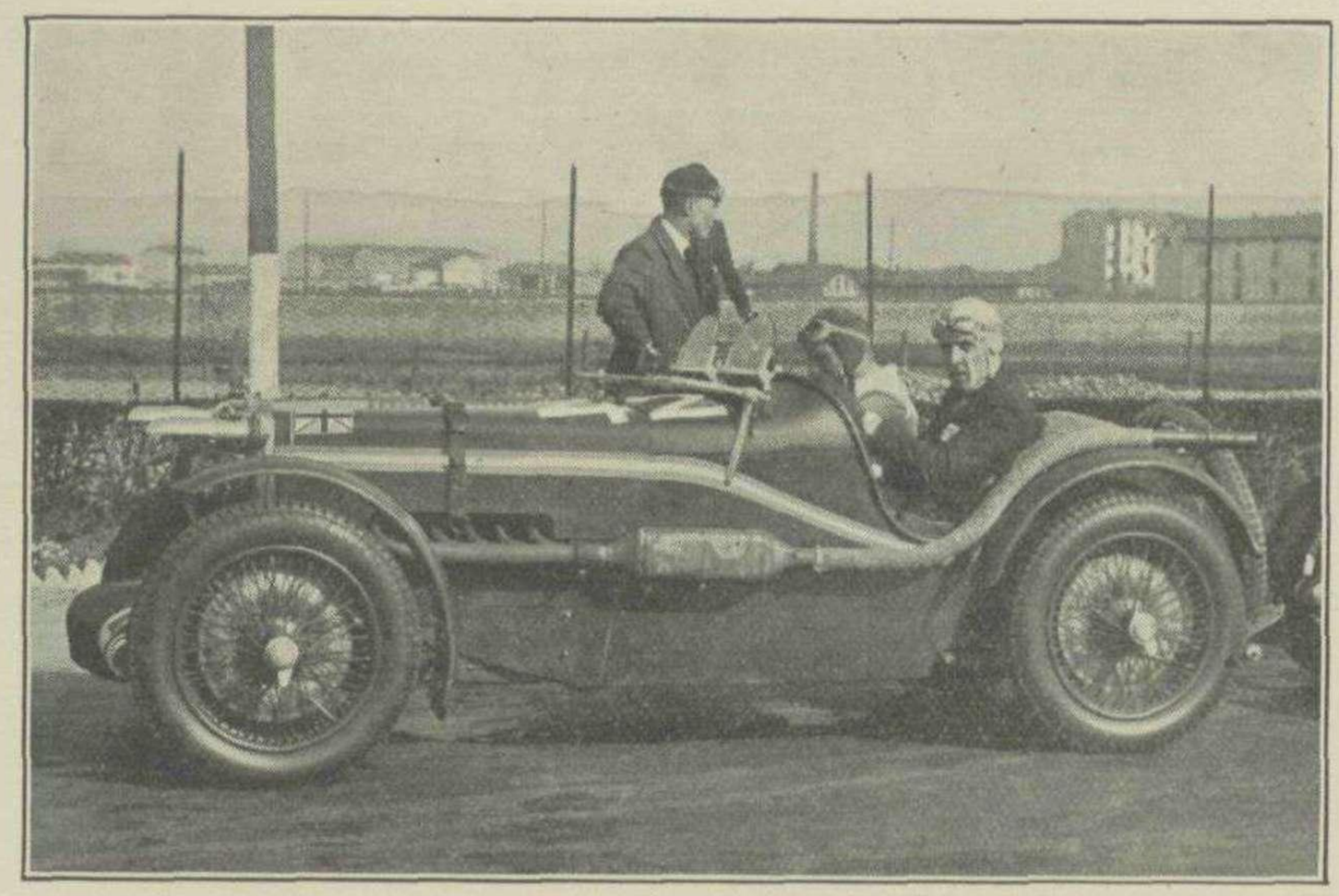
mechanics worked continuously for the last three days and nights at Abingdon, and Marney put in 73 continuous hours devoid of sleep or rest. On March 12th, after very brief tests, the three M.G.s were driven, with open exhausts incidentally, to the railway station, and it is pleasing to record that quite a crowd gathered in the chilly darkness to see them entrain. Apparently no cars had ever before been shipped from Fowey, and there was some excitement stowing the Magnettes amongst the cargo of china clay and fish.

Lord Howe had another flash of genius just before he left for Italy—he asked the late Hugh P. McConnell to come out and attend to the thousand and one worrying details—a better man could not have been chosen. Troubles now came thick and fast. Jackson, Marney and Denby were obliged to leave the tools at Ventimiglia after a bout with the Customs, and no news was to hand of the *S.S. Florentine* on which the cars had sailed. Moreover, Howe had been unable to practise with the hack M.G. because it refused to exceed 60 m.p.h. However, Thomas found the technicians in Genoa and drove them rapidly to Milan in the Mercédès, and the practice car's trouble was traced to an elusive ignition short-circuit, after which it gave Denby an easy 106. Then the team cars were unshipped safely, although Customs wanted some £1,000 to release the spares, which the edits of Lurani, the Reale Automobile Club d'Italia and, they do say, Mussolini, reduced to about £40. The cars were accommodated in the basement of a Milan garage and things soon began to happen. Howe, Penn-Hughes and Lurani were all present and correct, Birkin and Rubin arrived the next day, and Eyston soon followed. Then came Hamilton and, when he was most needed, McConnell. Eyston chose Monza for his tests, the others the Brescia autostrada. Immediate worry! The brakes were found to be hopeless and cars uncontrollable on corners. Little Denby confirmed the latter trouble by nearly "losing the model" at some 110 m.p.h. It was found that now the brakes could be used to the full, which in winter on the practice car they could not, the dovetails of the cast-iron liners in the elektron drums had cracked on all three cars. A telephone call was promptly put through to England for new drums. Birkin then suggested that the brake torque-cables should run straight out to the king pins and not at an angle. He seized an oil tin, cut a pattern for new brackets which "Antonio," who had automatically attached himself to the team, made up, and the steering trouble was a thing of the past. Finally, the warmer weather and 6.6 to 1 compression ratios calling for a new fuel mixture, an Italian expert came from Rome to mix anything required, while from England came Kesterton, of S.U.s, and Guest, of Wilson gearboxes, who worked on any jobs going apart from their own specialities.

As the race day drew near the cylinder heads were removed and replaced, the new brake drums fitted, and then a petrol consumption check was made, Eyston and Hamilton trying one sort of fuel on a run from Bologna *via* Vicenza to Brescia, while Howe drove over the first part of the course on another fuel, Birkin and Penn-Hughes following in the Mercédès. Howe suffered repeated oiled plugs and at Florence he gave up and Thomas took the car back. A loose valve guide was discovered, which Thomas, aided by Newport, the Bristol Aeroplane representative at Alfas, was able to rectify. A lot of practice was ultimately accomplished, and Hamilton on one occasion missed a turn and actually took to a railway line—thereafter 75 watt bulbs in the off headlamp and 50-watt bulbs in the near-side lamps were specified. McConnell now discovered that silencers



Count Lurani, who partnered George Eyston in the M.G. Magnette which won the 1,100 *c.c. category so conclusively.*



Lord Howe at the wheel of the blown K.3 M.G. Magnette, with the late H. C. Hamilton beside him. Thomas, Howe's chief mechanic, is behind the car.

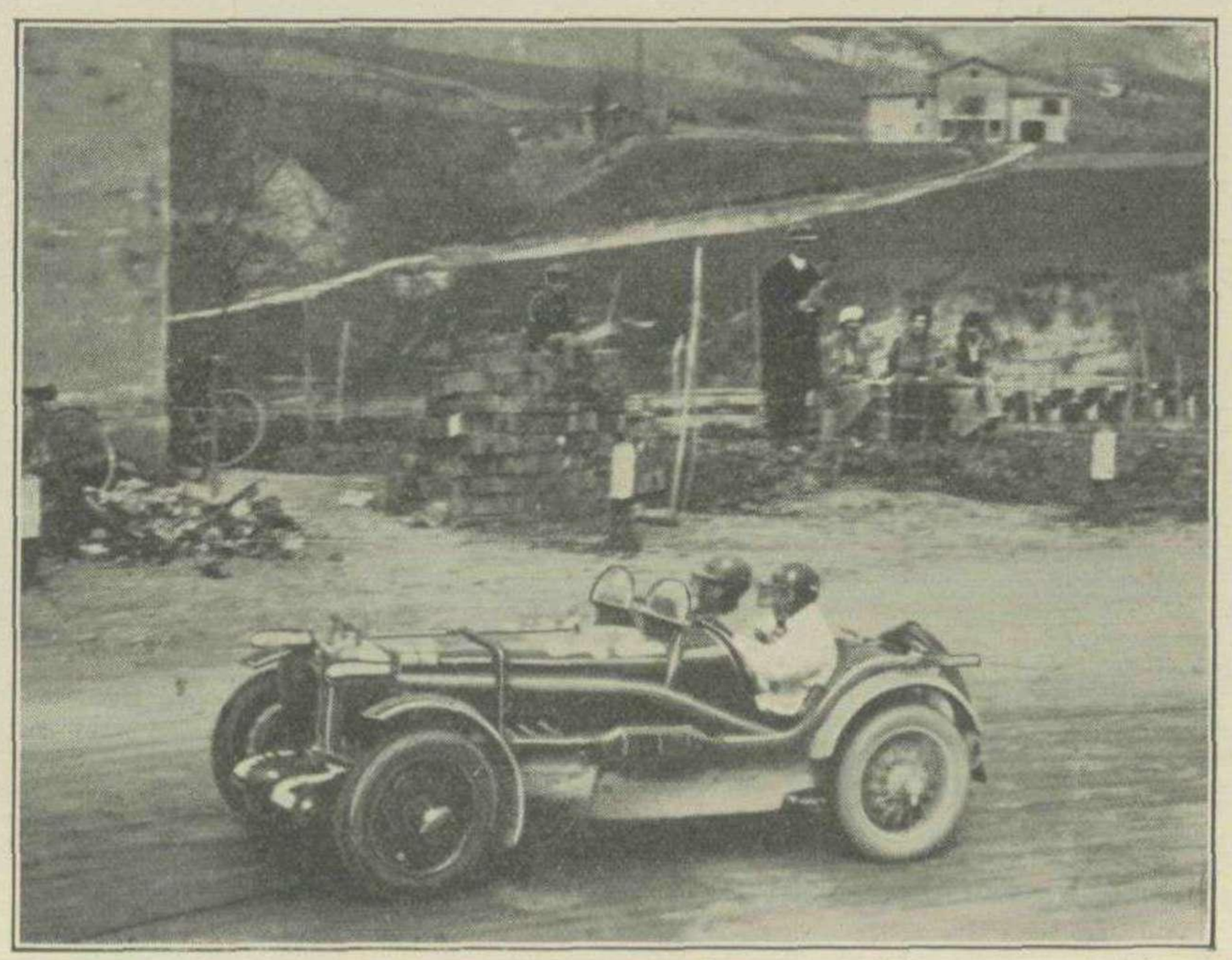
would be needed, but these Antonio produced most effectively from very rough drawings. The pits were to be at Siena, Perugia and Bologna, and three days before the race the lorry left with the replenishments, Denby and Guest going to Siena in the practice car a day later.

So came the start of the *Coppa Mille Miglia*. At 8 o'clock Eyston and Lurani moved off, followed three minutes later by Birkin and Rubin, then by Howe and Hamilton. Their rivals were Tufanelli and Tabarrelli with Maseratis and a whole group of special Fiats, of which Ambrosini's was the fastest. Howe's job was to break up Tufanelli. Eyston was soon doing 100 m.p.h., but two plugs gave trouble, and Birkin passed, though both cars were close together at Piadena. Howe hit the central hump of a wooden bridge over the Po at 70 m.p.h., but kept his car straight, and soon the Magnettes were seen to be really fast, overtaking the Fiats and Bianchis which had started before them. Birkin averaged 87.95 m.p.h. to Bologna, 130 miles from the start, where Eyston, a mere two minutes behind, handed over to Lurani. On the Raticosa Pass Birkin's car stopped with plug trouble, and this also stopped Howe on two occasions.

In spite of his stop, Birkin was two minutes ahead of Lurani at Florence, but Howe was 11 minutes behind. The leading M.G. had broken all 1,100 c.c. records, averaging 61.7 m.p.h. over 228 very difficult miles. Alas, Birkin's valiant drive now ended, as a valve had burnt out. However, before Siena Tufanelli retired also, with gearbox trouble, so Birkin had accomplished the task Howe would have done had not his plugs slowed him. The second Maserati was 40 minutes behind Howe at Siena.

The rest of the story is quickly told. Lurani went on at speed, somewhat troubled in overhauling the fast Balilla Fiats up the Radiofani Pass, while Howe was held back by dust-clouds between Viterbo and Rome. Lurani reached the Rome control after 6 h. 16 m. driving, or 58.2 m.p.h. for 365 miles, controls and all—this broke the existing class record by 25 minutes. Forty miles on, at Terni, the leading M.G. had actually raised its overall average to 58.7 m.p.h. Rain resulted in some hectic moments thereafter, and more plugs needed changing. Eyston took the wheel again at Perugia, after 483 miles racing. Howe had driven for 8 h. 36 m., and still did not give over to Hamilton, who was to drive after darkness fell. In the dark the M.G.s were, if anything, faster than before, and at Bologna Howe had averaged 56.9 m.p.h. against his 53.1 m.p.h. to Ancona, where night had closed in. He had exceeded 100 m.p.h. by the light of his headlamps after being at the wheel for some 12 hours, and was now only two minutes behind Eyston. Eyston took on a new battery to offset his dynamo's failure to charge, and Howe's car had a broken shock-absorber bracket needing replacement. As the M.G.s left Bologna the race, barring accidents, was clearly theirs. The nearest 1,100 c.c. car was Ambrosini's Fiat and that was 40 minutes behind, while Tabarrelli's Maserati did not appear for an hour after Howe had left. On the last stretches Hamilton closed on Eyston, until delayed by more plug changes and a puncture, while Eyston, too, had to make a wheel-change. Finally, Eyston crossed the line winner of the 1,100 c.c. class after 18 h. 1 m. 4 s., a record average of 56.89 m.p.h. for the 1,024 miles. Howe came in 90 seconds later, second in the class, and enabling M.G.s to win the Team Prize, as no complete teams finished. Penn-Hughes came in later in the Mercédès, having had a difficult drive, yet averaging nearly as high a speed as the M.G.s, and not using the supercharger.

Thus a very brave experiment came to a successful conclusion. That British small cars, properly prepared and organised, could beat the best Continentals of like size was proved conclusively. When it is remembered, too, that this was the first racing appearance of the supercharged K3 M.G. Magnette, one's admiration knows no bounds. Lord Howe, by his inspiration in picking on the M.G. Car Company, Ltd., to produce him a team of cars, by his willingness to meet the not inconsiderable expenses involved, and his splendid powers of organisation, enabled British prestige to be indisputably upheld in the world's most exacting road-race. Let us, therefore, never forget the showing of these green Magnettes in Italy ten years ago.



Lord Howe climbing the Raticosa Pass during the race.

Austin Seven "Cans" and "Can'ts"

F/O A. M. R. Mallock, R.A.F., supplies some useful Austin Seven conversion hints

MUCH information has been published in the past on the subject of Austin Seven tuning and conversions—some of it good, but most of it, unfortunately, confused, if not inaccurate.

All my facts, therefore, are based on first-hand knowledge unless otherwise stated.

(1) *Lowering a standard chassis.*—The rear end of a standard chassis may be lowered by removing the rear springs and flattening them or by substituting already flat springs, such as "Ulster," "Nippy," or post-1934 standard types. The transmission line, braking arrangements, and shock-absorbers need not be altered.

(2) *Track road clearance.*—Some lowered front axle conversions employ a very deep bend in the track rod which leads to steering trouble. If the steering arms are changed over from left to right and inverted, an extra clearance of about 2" can be obtained, thus allowing a standard track rod and steering arms to be used on an "Ulster" or similar axle, providing, of course, that dropped "Ulster," "Nippy," or W. special-type radius rods are used.

(3) *Adjustment of castor action.*—Oversteering is not an inherent feature of the Austin Seven suspension as sometimes suggested, and it is, in fact, adjustable to personal requirements.

To increase the castor action, slacken off the nuts securing the front end of the radius rods and twist the rods down and outwards with a wrench. Without allowing the rod to twist back, tighten up the securing nut. The alteration in castor angle can be clearly seen as the rod is twisted.

Under heavy braking torque this adjustment will probably slip back, but with "Ulster" radius rods this can be prevented by taking a strap from the rod to the shock-absorber securing bolt. Increasing the castor angle in this way tightens up the front brake adjustment, while apparently hopeless cases of steering instability can be cured in this manner.

(4) *Fitting a 4-speed gearbox.*—When a 4-speed gearbox is fitted to a 3-speed chassis it will be found to foul the near side body-mounting bracket. This bracket should be unrivetted, reversed, and bolted back in place. When a 4-speed gearbox is fitted to a 3-speed chassis, either the prop. shaft must be shortened or the engine moved forward. The latter has the advantage that the normal speedometer drive can be used, which is not possible with a shortened prop. shaft, but, on the other hand, moving the engine may lead to difficulties with fan-clearance, etc. In any case, a pre-1929 self-starter must always be used, as the 1929-30-31 type will not clear the gearbox top, and even with the older type starter some "carving" is necessary before it can be fitted.

If a 4-speed engine and gearbox unit, either "Standard" or "Nippy," is put into a 3-speed chassis, no alteration need be made to the prop. shaft length, and there is clearance for the speedometer drive.

In general, 3-speed or "Ulster" speedos. cannot be used with a 4-speed gearbox, although I believe that some of the very earliest 4-speed boxes may be an exception to this rule; the reason is that the gearbox reduction ratio is different.

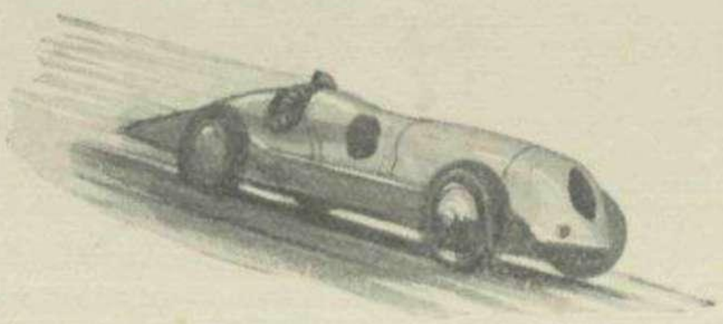
The reduction ratio of the 1934 standard 4-speed is the same as the 1936 "Nippy" close-ratio 4-speed.

(5) *Interchangeability of front universals.*—I have "swopped" over the engines and gearboxes of a 1936 "Nippy," and 1934 standard chassis, which was possible because the front part of the spider on the 1934 fabric universal was splined on to its gearbox in the same way as the Hardy-Spicer universal of the 1936 "Nippy." This combination of 1936 "Nippy" engine and gearbox with 1934 spider was later fitted to a 1928 chassis.

I am told, however, that the 3-speed spider is not splined on to its shaft in this way, so that anyone wishing to install a Hardy-Spicer equipped gearbox in a 3-speed chassis must first obtain a 1933 or 1934 spider.

(6) *Interchangeability of crown wheels.*—It would be possible to write a whole article on this subject alone, due to there being nearly a dozen different types and variations of back axle. Unfortunately it is a subject on which I have no first-hand knowledge. The following is, however, from a "reliable source." It is only a most general survey, and is not guaranteed infallible in every case.

The 5.67 to 1 "Ulster" crown wheel requires an extra large case, and can only be used in its own axle. In general, all crown wheels and pinions having a thread on the rear end of the pinion shaft, just in front of the pinion, are interchangeable. This includes most crown wheels and pinions made after 1930.



The 1931 axle is of this type, and is therefore a valuable acquisition because: (*a*) a 5.25 or 5.625 to 1 crown wheel and pinion can be fitted, thus giving a choice of three ratios in a narrow axle; (*b*) its crown wheel and pinion can be fitted to a wide axle, thus giving a higher ratio (4.9 to 1) if desired. The 1931 type is believed to be the only 4.9 to 1 axle of this description.

(7) *Banjo joints and transmission lines.*—The Austin Motor Co., Ltd., seem to think that flattened rear springs require a raised transmission line. The "Ulster," "Nippy," and post-1934 standard engines have a higher transmission line than the older standard motors. This necessitates the use of an extra long "banjo joint" between the rear universal and chassis ball joint. Therefore indiscriminate swopping of engines may require modification to the transmission line.

Altering the wheel-base alters the transmission line, but some adjustment of the effective banjo-joint length can be made with packing pieces which will compensate for this.

A few examples will demonstrate my point: I started out with a 1928 "Chummy," and fitted a 1934 engine and 4-speed gearbox. These went straight in with a little adjustment. I later swopped this unit for a "Nippy" engine and gearbox, and found the transmission line was a long way out. I could cure this by raising the front of the engine about $\frac{3}{8}$" on blocks, but this introduced snags with the radiator clearance. I removed these and tried fitting a standard 1936 long banjo-joint, which is approximately $1\frac{1}{2}$" longer than the old ones. This was very much too long, so I cut it down by 1", which served the purpose.

A similar effect could be obtained by inverting the chassis-mounting ball-joint bracket, as the ball is mounted eccentrically on the bracket. Similarly, if a 1927 engine is put into an "Ulster" chassis it is necessary to pack up the rear end about $\frac{3}{8}$".

(8) *Interchangeability of back axles.*—All back axles of the same width are interchangeable provided the correct length prop. shaft is used. There are two lengths of short prop. shaft, one being $\frac{3}{8}$" longer than the other. I was under the impression that the 5.67 to 1 "Ulster" was the only axle requiring the shorter shaft, but I recently found one fitted to a 1930 saloon. The 1928 "Chummy" and 1931 saloon use the longer "short" shaft. The 5.67 to 1 "Ulster" axle has a very large casing, which may foul the body.

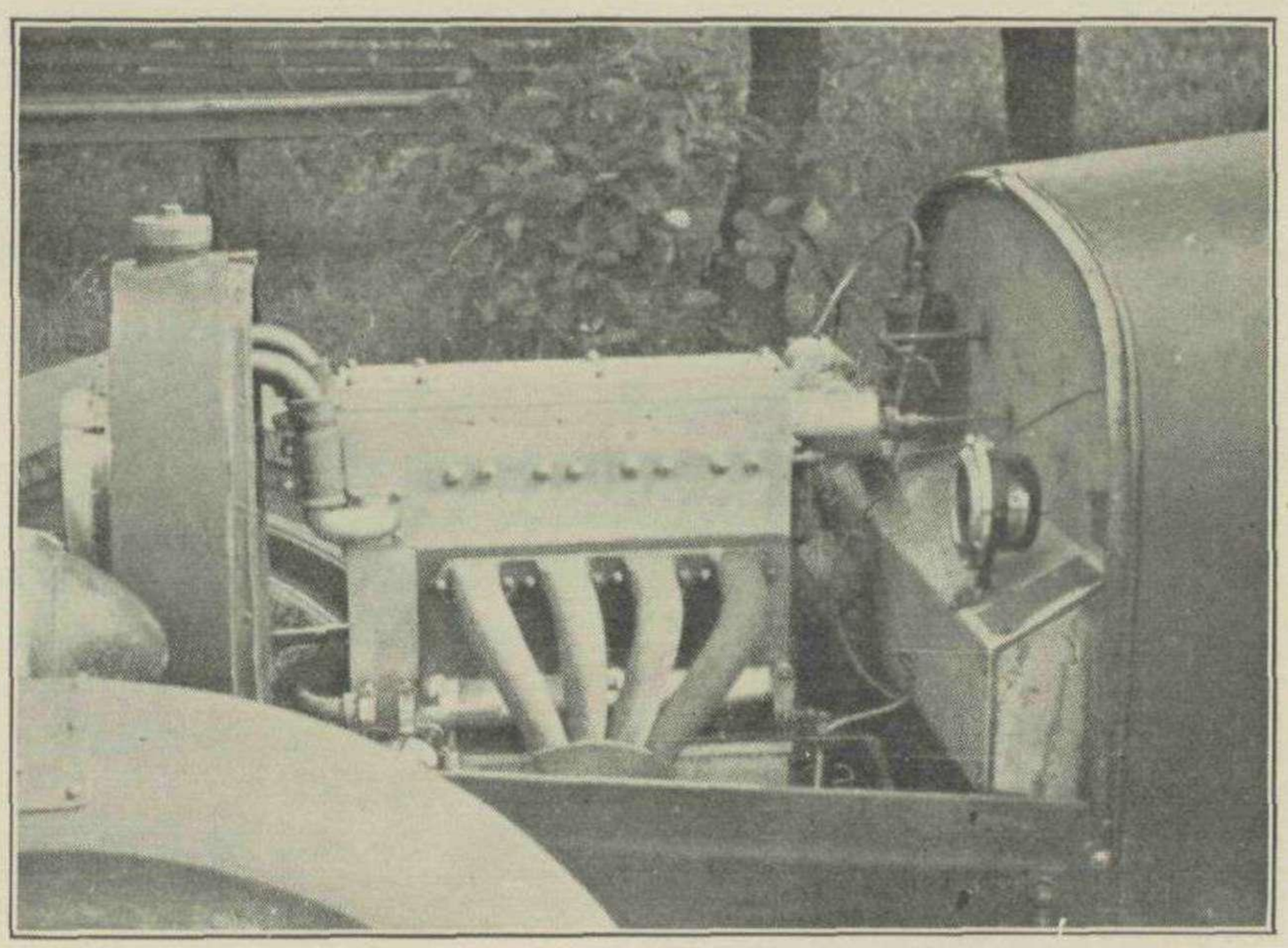
(9) *Exhaust manifold.*—When fitting an "Ulster" exhaust manifold, make sure that the centre manifold stud hole is properly blocked up. I was once somewhat shaken, when filling my radiator, to observe water pouring from the exhaust pipe!

If anyone has any queries, or requires further information, I shall be glad to be of what assistance I can.

BRESCIA *versus* TYPE 40

A comparison of the characteristic features of these two models, with a suggestion as to the benefits to be derived from owning one of each

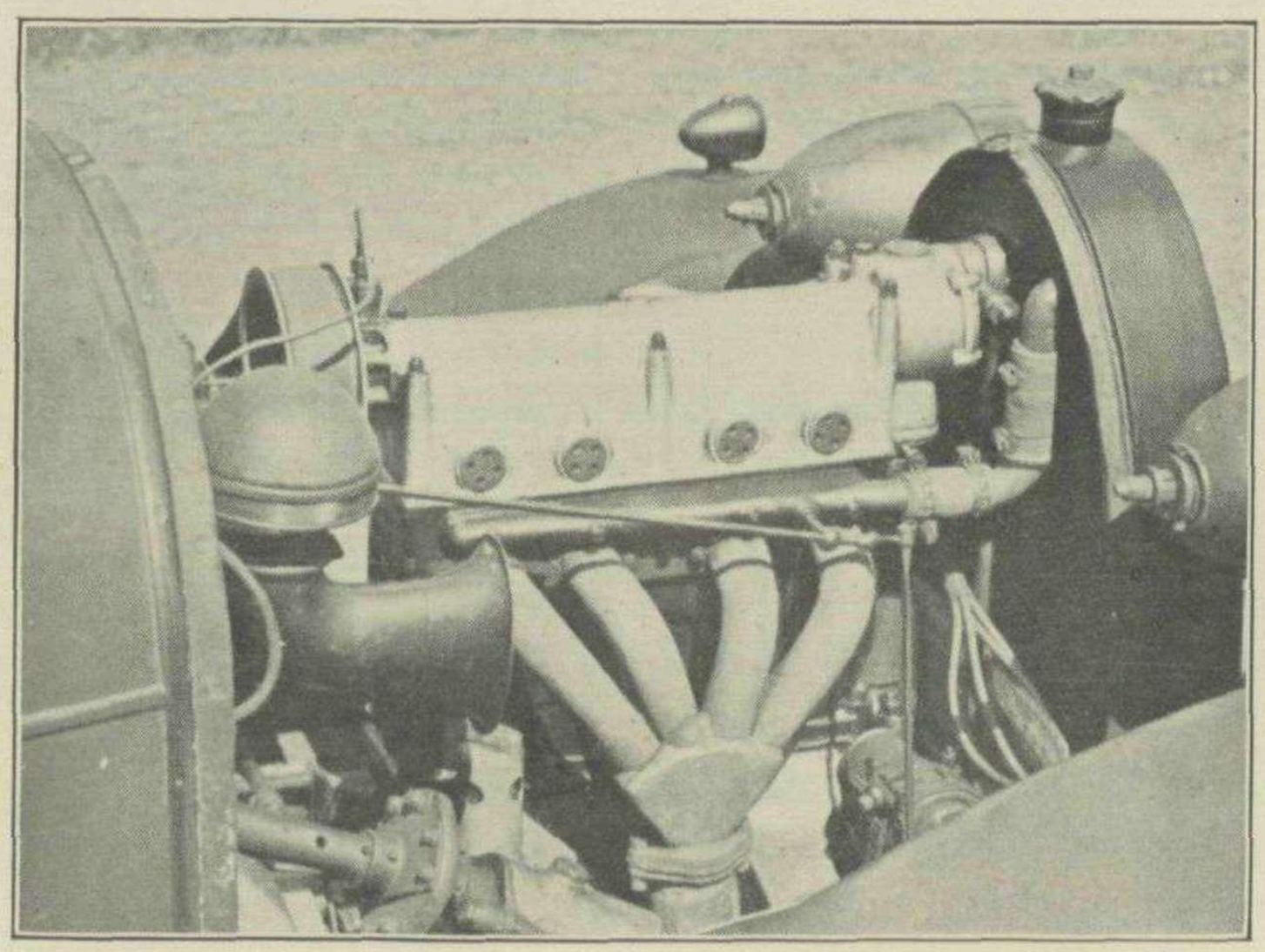
WE have received from Fawcett, whom we met unexpectedly after the Zoo meeting, which he attended from Leeds, a comparison between the Type 23, or Brescia, Bugatti and the Type 40 of the same make. Mr. Fawcett, who owns one example of each model and has had Bugattis for many years, realises that impecunious enthusiasts are obliged to limit themselves to the 12-h.p. Bugatti models, which are now fairly inexpensive to acquire, but he feels that so often the Brescia and the Type 40 are thought to be much alike, so that these folk do not take advantage of the existence of the two types by owning one of each. Fawcett bought his Brescia from F. H. Hambling for £15 in 1937—it is a 1926 modified Brescia—and his Type 40 from a breaker for £20, this being a 1929 car. He has spent about £50 on each, exclusive of labour, in rebuilding these cars. The Brescia, due to its low weight and high gear ratios, runs very easily at 2,500 to 3,000 r.p.m. on not more than two-thirds throttle, 1,000 r.p.m. being equal to 8, 12.5, 18 and 23 m.p.h., respectively, on top, third, second and first gears. The engine, which runs up to 4,000 r.p.m., is not as smooth as that of the Type 40, but is quieter mechanically at normal speeds. Fawcett claims the remarkable fuel consumption of 42 m.p.g. cruising at 2,000 r.p.m. from the Brescia, and says that its acceleration from rest to maximum about equals that of a Ford V8, going up to 60 m.p.h. in third gear.



Exhaust side of the engine of Fawcett's 1929 *Type* 40 *Bugatti.*

The engine now has a compression ratio of 6.8 to 1 and the vertical Solex carburetter. Its owner asks where can one find any other car able to cruise at 70 m.p.h. at 3,000 r.p.m., and at over 30 m.p.g. at that? The Type 40 has yet to be tried for performance, but if it will cruise at 3,750 r.p.m. it will equal the Brescia's 70 m.p.h., and contemporary reports give the maximum for this model as 75 m.p.h. or even 82 m.p.h., and from 62.5 to 65 m.p.h. in third, equal to 4,500 r.p.m. Acceleration is expected to better that of the Brescia, due to the lower gear ratios which, at 1,000 r.p.m., give 6.75, 10.25, 14.4 and 18.5 m.p.h., respectively, with 5″×19″ tyres.

Road-holding is rather better, probably due to the longer wheelbase, wider track and greater weight (approximately 17½ cwt.). Although the Type 40's brake drums are larger than the Brescia's, the braking is not so much improved, although a greater mileage is hoped for between having to effect the awkward shim adjustments. The Type 40 gearbox is noisier than that of the Brescia, but the lower gears are used much less, as top-gear performance is good and could be further improved by using the 13×54 rear axle and 16″ wheels, which would give 20 m.p.h. per 1,000 r.p.m. in top. The 3-valve per cylinder engine of the Type 40 is believed to develop about the same b.h.p. as the 16-valve Brescia unit, *i.e.* about 45 to 50. Parts from later Bugatti models, such as the tubular front axle, large brakes, "square" cam-box, etc., are interchangeable with the Type 40 but not with the Brescia. Fawcett has lowered the body lines of his Type 40, while his Brescia has only required from Brixton a set of third-speed wheels (90s.), two rear brake drums (60s.), valve springs and tappet shims. Which seems to bear out the owner's contention that a stable comprising a Brescia and a Type 40 can be kept with no greater outlay than that needed for other makes of similar age and power, and with immeasurably greater satisfaction.



By way of contrast; the exhaust side of the same owner's 1926 *Brescia Bugatti. The famous Bugatti exhaust manifold is found on all models, even on pre-*1914 *8-valve cars, and also on the Baby Peugeot of the last war.*

RESISTANCE TO SPEED

F. W. Roberts analyses three factors which affect high performance

THIS article is an attempt to provide a few notes detailing the main causes of power loss, since, in general, the whole of the engine output is absorbed in the following ways :—

1. Acceleration.
2. Gradient climbing.
3. Transmission losses.
4. Tyre drag.
5. Air resistance.

The first is outside the scope of this article, while the second is inevitable unless all motoring is done upon level roads. The remainder are all, theoretically at least, susceptible to reduction, and we will consider them in a little more detail.

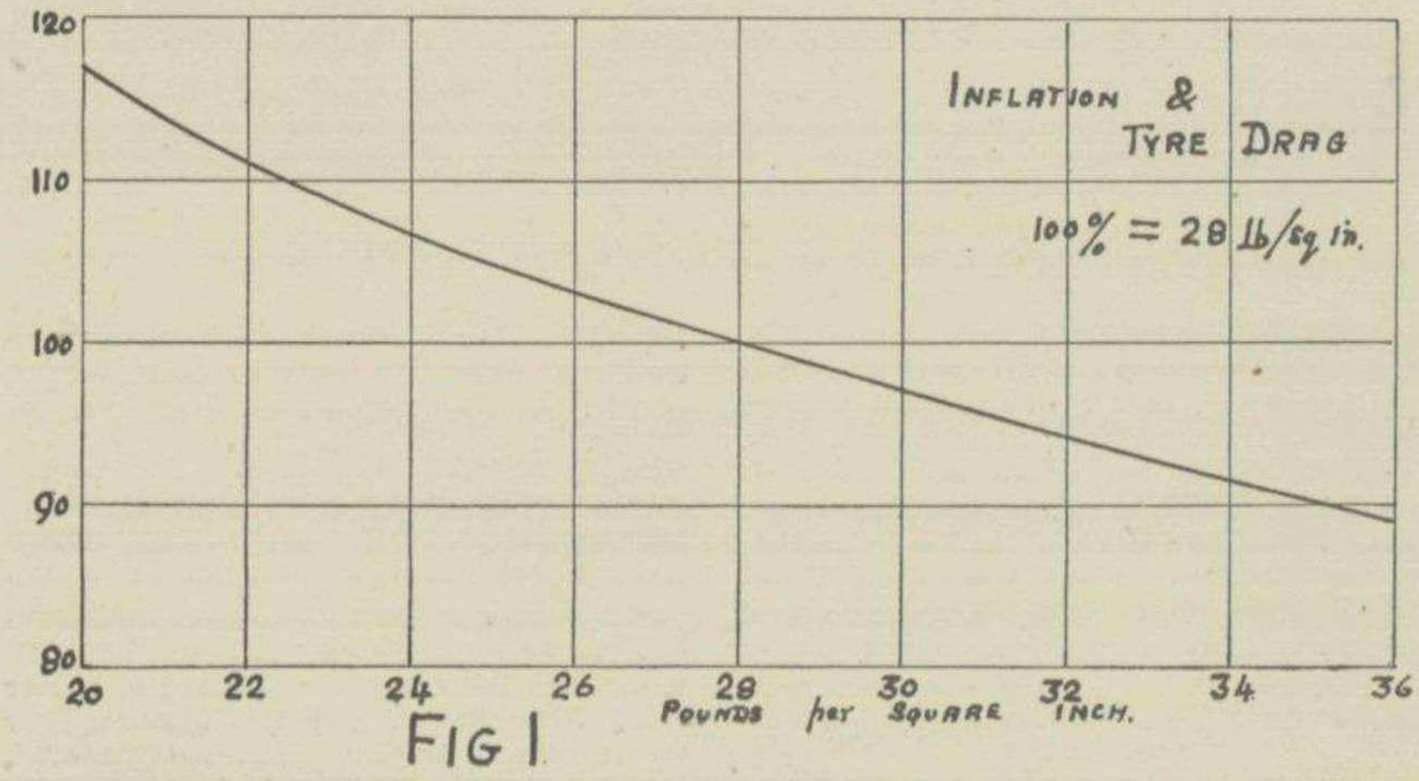


FIG 1

Leaving item (3) for the time being, we will tackle the tyres. There have been a number of excellent articles in various technical journals on this subject, in particular a paper read before the S.A.E. in 1941. Taking fairly liberal extracts from this, we find that the percentage loss due to the tyres is not extremely large, except at low speeds. Numerous factors affect the amount of power the tyres consume and which they convert into heat. The loss is increased by increase of speed and load. Larger rim diameters and increased slip-angle of the front wheels when cornering will increase the loss, while higher inflation pressure and wider rims decrease it. Some tyres have a four-ply base while others have six-ply ; the latter consume more power, the increase being roughly 7 per cent. at 30 m.p.h., falling to 4 per cent. at 60 m.p.h.

Drag due to the tyres is commonly expressed in lbs. per ton load, or lbs. per 1,000 lb. load ; the latter is American practice, but as it is a very convenient notation it will be used here. Curves were published in MOTOR SPORT last month —in the article on a method of measuring power output—which showed for a few typical tyres the effect of speed on drag. Those curves were, strictly speaking, applicable to 16-in. diameter rims, and can be converted to h.p. by using the formulæ given in the same article. Typical figures, for comparison, are about $3\frac{1}{2}$ h.p. at 30 m.p.h. and 9 h.p. at 60 m.p.h. tyre loss for a car weighing 3,500 lb. and shod with $6.00 \times 16''$ tyres. If smaller rims (15″) were used, the power loss would decrease to 90 or 95 per cent. of the value for 16″ rims. Now that there is a tendency to use wider rims, it is of interest to note that the paper mentioned (S.A.E. 1941) quotes a decrease of loss to 85 or 95 per cent. of its previous value when changing to the widest rim then available ; exact sizes are not mentioned. The saving is due to the decreased tyre deflection with the extra rim width.

Various authorities, including the S.A.E. and, in this country, Dunlops, have published data concerning the saving both in power and rubber due to high inflation pressures ; rubber wastage data seems conflicting, but the curves reproduced here give average values for both power and material loss (Figs. 1 and 2). There is no particular virtue in taking the 100 per cent. values at 28 lb./sq. in. except that that is a common pressure. If your recommended pressure is some other value, alter the figures in proportion, making 100 per cent. whatever is the correct inflation for your tyre. It should be noted that it is not recommended that the pressures be increased much above their correct values, as the tyre makers suggest that other troubles would then be experienced.

A few miscellaneous items are worth noting. Part-worn tyres, in general, have less loss than new ones, the saving being of the order of 14 per cent. A new type of tyre, having rayon in place of cotton in the carcase, saved something in the neighbourhood of 3–5 per cent. The effect of power being transmitted by the rear wheels is interesting ; in general, the increase of h.p. output from zero to 25 h.p. increased the loss in the rear tyres by about 10 per cent. Finally, there is the question of the slip angle of the front tyres. The S.A.E. paper gave two curves, one at 30 m.p.h. and one at 60 m.p.h. Taking a few points from these, we find that at 30 m.p.h. the power loss varied from 1 h.p. at zero angle to $2\frac{1}{4}$ h.p. at 3 degrees, and rose to over 10 h.p. at 8 degrees. Similarly, for a speed of 60 m.p.h. the losses at the same angles were 3 h.p., 5 h.p. and some very high value at 8 degrees. At 6 degrees and 60 m.p.h. the loss was nearly 14 h.p. The moral clearly is : do not expect good tyre life if you corner at high speeds.

Leaving the tyres for the moment, let us consider wind resistance. This is the predominant loss at speeds much over 30 m.p.h., and the efforts to reduce it have resulted in various forms of stream-

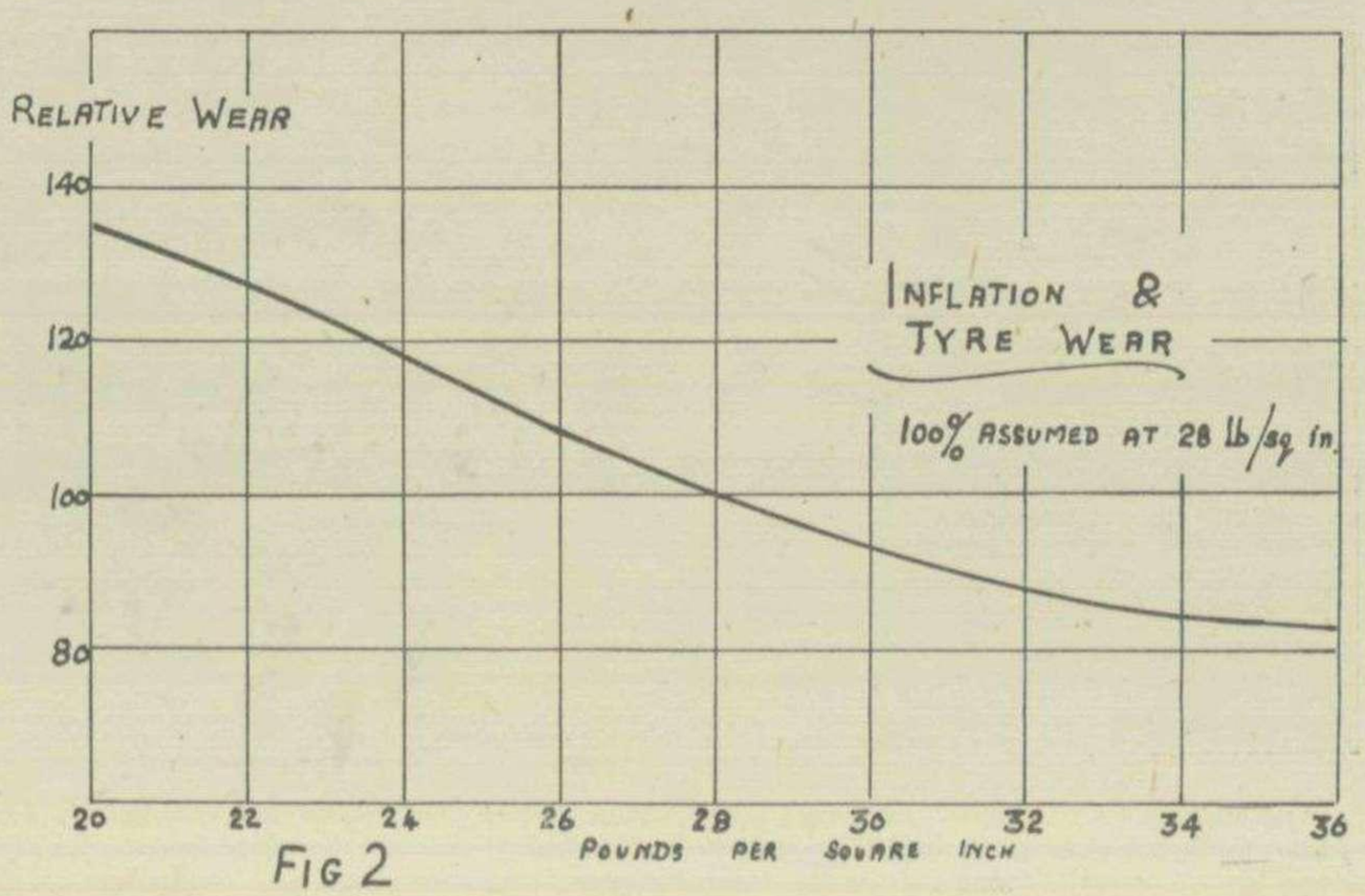


FIG 2

lining. The subject was discussed in another paper read before the S.A.E., also in 1941, and from which some of the following is extracted. The paper stresses that streamlining would be much easier if very long tapering tails could be added, and rear passengers would lie down rather than sit up. This tapering tail effect is so important compared with the frontal shape that experiments even proved that a typical saloon had less air drag in reverse than when going forward, since, in reverse, the bonnet was a sort of tail.

Commonly used formulæ in connection with air resistance are :—

$$\text{Drag} = k \times A \times \text{m.p.h.}^2 \text{ lbs.}$$

$$\text{Power} = \frac{k \times A \times \text{m.p.h.}^3}{375} \text{ horse power}$$

In these formulæ, " A " is the frontal area in square feet, while " k " has various values. A simple flat plate—the worst case—has a " k " value of about 0.0032 ; a very perfectly streamlined solid has a " k " value of about 0.00008. Common values for " k " were suggested in the article in MOTOR SPORT mentioned earlier.

Before considering what relationship these losses bear to each other, a very tentative suggestion is made for transmission losses. The writer has not been able to get any authoritative data on this subject except the fact that gearboxes are very nearly ideally perfect and have an efficiency usually better than 97 per cent. Rear axles are an unexplored subject as yet, and until data are collected the curve given in Fig. 3 might be tried as a rough approximation. It should be noted that high torque—*i.e.* hill climbing on low gear at low speeds—will pull the rear axle efficiency down, due to high gear-tooth pressures, while high speed, even at low torque, will also give a comparatively low efficiency due to oil churning.

Now to compare the relative magnitudes of these losses. Take as our example a car weighing 2,000 lb. and having a frontal area of 5′ × 4′, *i.e.* 20 sq. ft. ; its " k " could be taken as 0.002. We might assume that the tyre loss is in accordance with the 5.00″ line of Fig. 1 in last month's article. We can now make up a table of tyre, air, and approximate transmission losses thus :

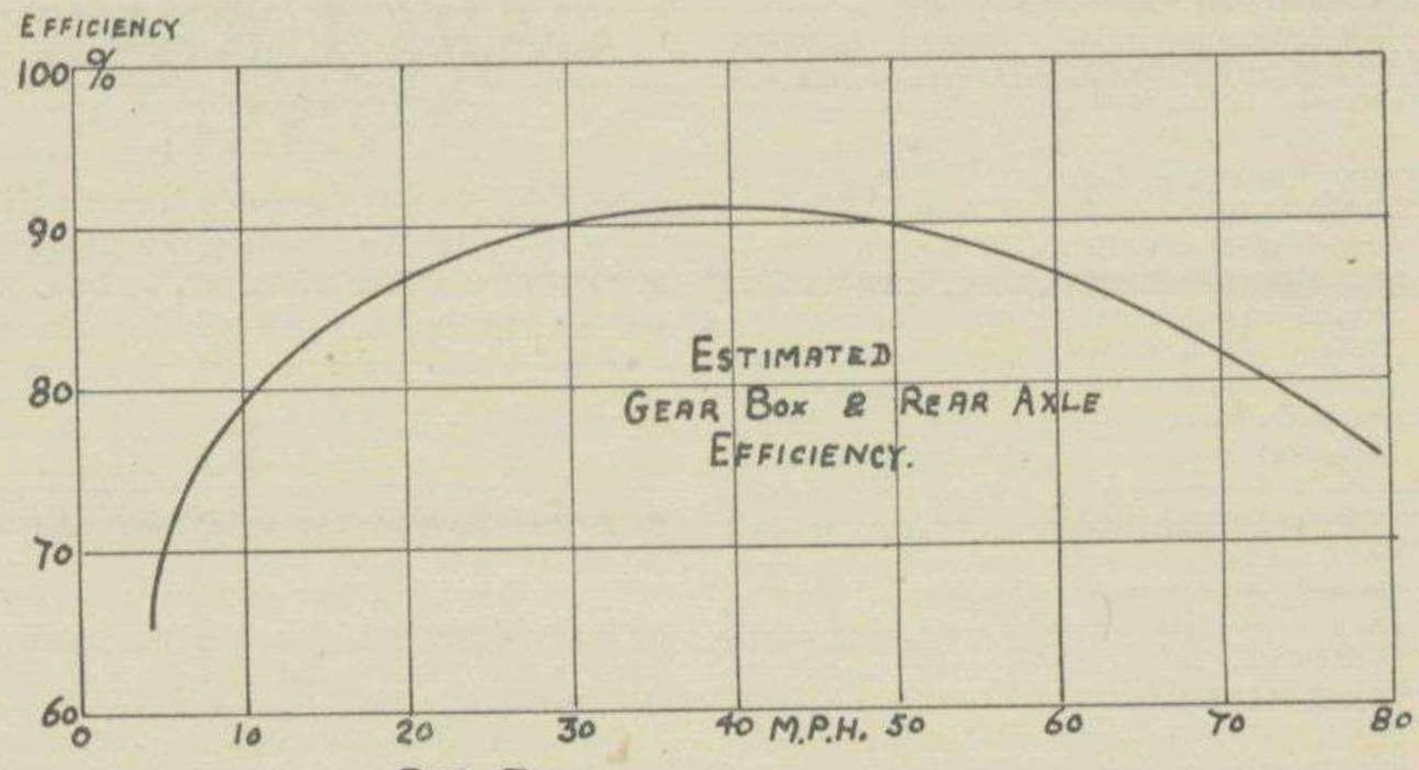


FIG 3.

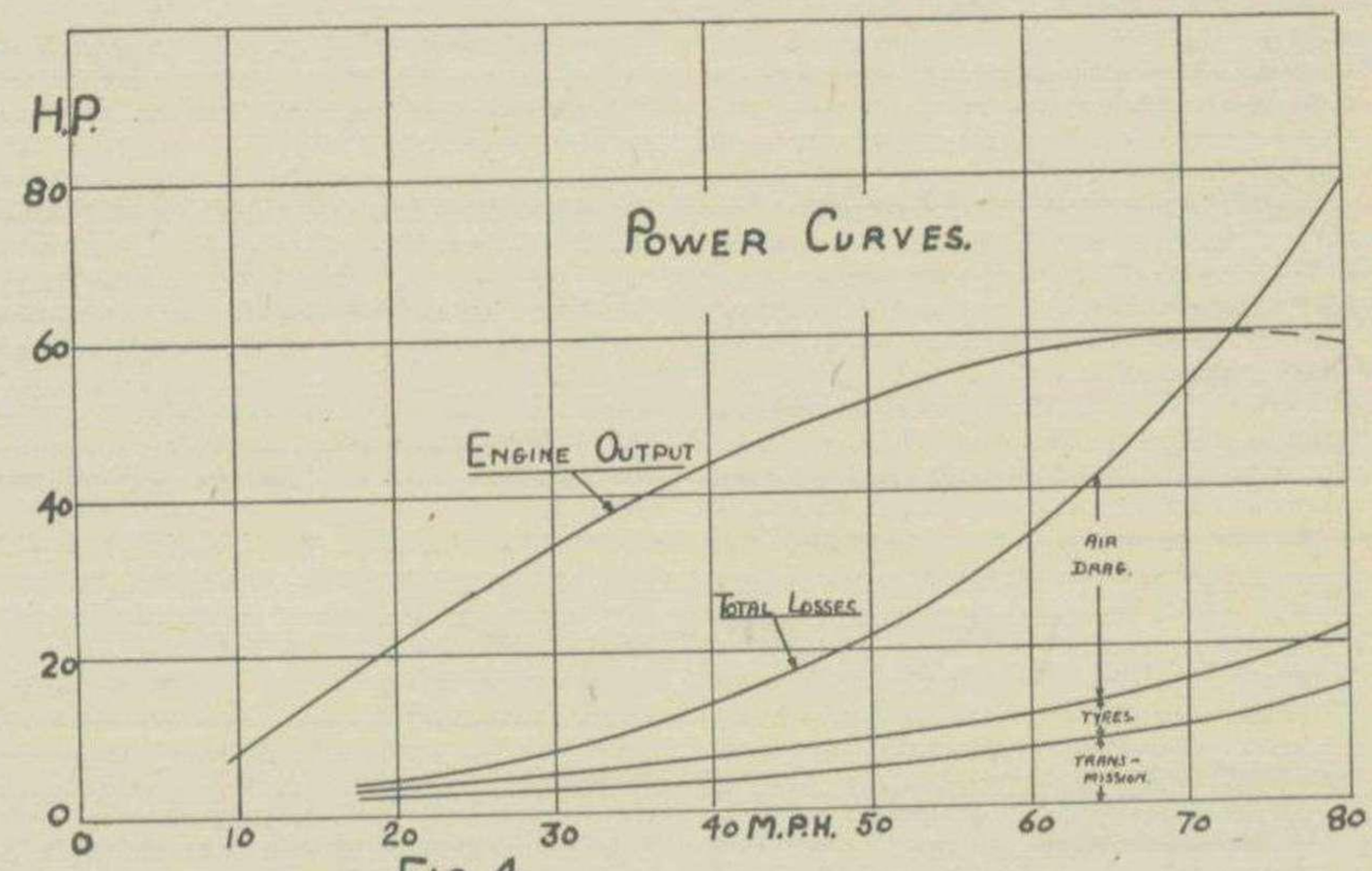


FIG 4.

M.P.H.	Tyre Drag		Air Drag		Tyre + Air	Trans. Loss	Total Losses	Typical Max. Engine
	lb.	h.p.	lb.	h.p.	h.p.	h.p.	h.p.	h.p.
0	13	0	0	0	0	—	0	—
10	15	0.4	4	0.1	0.5	1.5	2	8
20	17	1	16	0.8	1.8	2.7	4.5	20
30	19	1.5	36	3	4.5	3.5	8	34
40	21	2.2	64	6.8	9.0	4	13	44
50	23	3.1	100	13.3	16.4	5.1	21.5	52
60	26	4.2	144	23	27.2	7.3	30.5	57
70	30	5.6	196	37	42.6	10.9	53.5	60
80	36	7.7	256	55	62.7	14.3	77	58

The column for maximum engine output is added here purely for comparison and is not derived from the other columns. Let us plot some of these figures on squared paper to a base of m.p.h. as in Fig. 4.

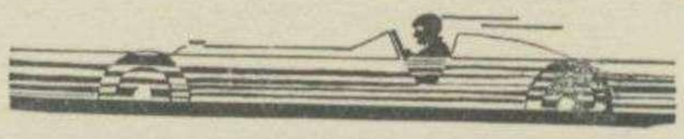
The first thing to note is that the engine output is above the total loss line until a little over 70 m.p.h. is reached. At that point the two curves cut, and therefore that is the expected maximum speed of the car. The next and more pertinent thing to notice is that at the higher speeds, the " Tyres + Air " line lies considerably above the " Tyres only " line ; the increase is due solely to air resistance. In percentages, we can express this by saying that although at 10 m.p.h. air drag absorbs only about 1¼ per cent. of the available engine output, and at 30 m.p.h. it takes 8.5 per cent., at 60 m.p.h. it has increased to take over 40 per cent. The method of calculating the power absorbed by acceleration and by hill climbing appeared in the previous article.

In conclusion, therefore, in order to put up your maximum performance, reduce your weight to lower the tyre loss and at the same time improve your acceleration ; reduce the rear axle loss by careful assembly and use of the correct oil at the correct level ; most important of all, reduce your frontal area and taper off the tail if possible so as to decrease your air resistance drag. A smooth under surface is also very helpful in this connection.

Incidentally, if any reader can augment the estimates made for transmission losses, he will be performing a valuable service.

CARS I HAVE OWNED

John Garden, of Inverurie, recalls the cars and motor-cycles—many of rare conception—which have given him 20 years' motoring, terminating in a distinct enthusiasm for the Riley.—Ed.



MY first taste of motoring or, rather, motor-cycling, started in 1919, when I managed to get an old Sun-Villiers 2-stroke running after it had been stored "for the duration." This experience made me determined to become a motorist, and in 1921 I became the proud owner of a 2¼-h.p. 2-stroke Enfield for the sum of something over £70. Petrol at this time cost over 3s. 6d. a gallon.

Even at that time, as now, I always liked to have something to tinker with and something else in 100 per cent. condition that needed no tinkering, so a succession of machines came and went, including a Lincoln-Elk, Premier, a Peugeot big-twin with automatic inlet valves, Calthorpe, Scott, A.B.C., Quadrant, Indian, etc. I ran the Enfield two years, then the craving for something faster got me and I bought my father's 8-h.p. Enfield when he bought his first car in 1923. This was the model with the "Vickers" engine which was famous at that time for smooth running and silence. The "family" side-car was removed and a new lightweight sports built. Sports bars with twist grips fitted, footrests, "George Dance" knee-grips, etc., completed the conversion and I had a really fast and sweet-running machine, giving over 70 m.p.g. with fast driving. By the spring of 1926 I had saved enough to buy something new, so I started to look around. I had practically settled on another make when the Enfield distributor offered to get something special for me. This he did in the shape of an 8-h.p. "Competition" machine at the list price of the standard model. This machine had many non-standard fittings, including for that time huge hub brakes, foot-operated back and front, and special gearbox, and above all, a very special engine, with marvellous hill-climbing powers. Incidentally, the rear tyre of this machine never lasted 1,000 miles. At that time I was also running a 3½-h.p. Norton O.H.V., which was an actual T.T. machine and was capable of showing a clean pair of "heels" to almost anything on the road.

About this time I built my first machine; this was a motor-scooter complete with seat, which gave endless fun for young and old, as many had their first taste of motoring on it. My next attempt was more ambitious and involved a considerable amount of work in its construction. This machine consisted of a Scott frame lowered 6" with two straight tubes running from the head to rear axle *a la* Cotton, a twin-port 2-stroke Enfield engine with Enfield gearbox and wheels were fitted. I had to convert the front hub to take a knock-out spindle to suit Scott forks and a special shaped tank had to be made up. The completed machine was given the name "Nulli Secundus," and licensed as such. It proved very satisfactory on the road and cornered as on rails. Among other machines which I used sometimes to ride at this time was an o.h.c. Chater Lea 2¾-h.p., which, when its high-compression piston was fitted and running on Discol, was really fast.

Early in 1928 I was trying to have a deal with my Enfield for a T.T. Scott and side-car, when my thoughts turned to a motor-car and my Enfield went in exchange for a 1926 Austin Seven. Needless to say, this car did not prove very satisfactory after the urge of a big-twin, so I bought my father's Sports 2-seater Airedale when he bought his first Riley Nine. Incidentally, this was the first Riley Nine in Aberdeenshire.

To my knowledge very few of these Airedales were built, but it really was an excellent car in every respect, and although it was not fitted with shock-absorbers, it held the road very well at speed. Geared at 4 to 1, it gave an effortless cruising speed of 60 m.p.h. with 60 m.p.h. on third gear and a petrol consumption of 35 m.p.g. The engine had twin camshafts with outside hollow tappets actuating inclined overhead valves. The cylinder block was aluminium with wet liners. The crankshaft was counter-balanced and ran on two bearings, the front an enormous roller race and the rear a plain bearing 5" in length. Big-ends were enormous and never needed adjustment during the whole life of the car. After I sold it it was run by a garage proprietor, a police inspector and, finally, after he had an argument with a bus, it was cobbled up and used as a fruit lorry, but the gearbox gave out and I bought her back for old times' sake and I still have the engine. After about 100,000 miles everything in the engine except valve springs is original, including pistons (cast iron) and rings. Cylinder boxes are in perfect condition, surely a tribute to the makers, Messrs. Dorman, of Stafford. The back axle is now incorporated in a small tractor I built some years ago and looks like lasting indefinitely at this job, although it is given some pretty hefty work to do.

About this time a friend of mine in the Trade telephoned me that he had procured a G.N. and he thought it would suit me, so I asked him to deliver it. He declined, but offered to come for me and take me to his garage to collect it. His reason for this was soon apparent when we arrived there, as nothing was right, and lights were practically non-existent, the accumulator was flat and, the dynamo being driven off a shaft, no light was available until you really got going; to crown all, the cut-out was rather erratic. By the time my friend and I were ready to set out it was quite dark, but we decided to risk it. After innumerable stops, including one to remove framework from under the seat cushion so that we could look through the wind-screen instead of over it, we arrived home with no lights at all, fortunately meeting no policemen. After some titivating, this machine provided lots of fun and used to corner well at speed; most of the running was done sitting on the floor boards, as with the cushion in the driving position was far too high. One incident I will always remember was when climbing our local test hill with nothing in hand on a rather high bottom gear and landing at the worst bend among a large herd of cattle coming down, forcing me to stop. With brakes that were unable to keep me from running back and the high gear ratio, I do not know how I managed to re-start, but it was managed somehow and no damage was done.

After this came a Belsize Bradshaw 9-h.p., oil-cooled. This was a marvellous little car. The engine was very powerful and she used to climb hills with a rush. The design of this car was really good, the engine having detachable aluminium heads. A very sweet clutch and gearbox were fitted, but the back axle had straight-cut teeth and was inclined to be noisy. Even at the present day a car on these lines should prove very satisfactory as the big twin engine gives plenty of punch. I regret now that I scrapped the car, as it could have been re-built as an economy car for wartime use. Some running was also done at this time with a Rover Eight twin, and apart from cracking exhaust valve seats if the heads were carelessly fitted, these cars were quite good. A 7-h.p. Citroen came next, giving very cheap running, and although not fast it was quite pleasant to handle. In passing, how many present-day cars have adjustment for meshing camshaft drive pinions, as fitted to the small Citroen?

About 1930 I thought I would like a 4-seater, and exchanged the Airedale for a Peugeot Twelve, about which the less said the better, as I only kept this car a week and then bought a Riley Twelve Special tourer, a really beautiful car with lines somewhat similar to a Bentley. After a short time oil consumption proved to be very heavy and I decided to have the engine re-bored and fitted with Laystall lightweight cast-iron pistons. The firm who did the job for me delivered the car with the warning that she was very stiff and would have to be very carefully driven. However, after covering a considerable mileage the engine had never eased off and I decided to dismantle it. In these engines the front and rear pistons were off-set to overhang the front and rear main bearings and the second and third pistons to overhang centre bearing. All pistons had been fitted the same way round, so the condition of Nos. 2 and 4 pistons and cylinder bores can well be imagined. She was again bored-out, but as I could not afford Laystall pistons again she was fitted with "Covmos," and after running in, gave many trouble-free miles' running. The driving position of this car was, I think, the most comfortable I have ever tried. Genuine Marles steering was also fitted.

During the time I had the Riley Twelve I also had a Salmson 2-seater with the four tappets. This car was quite lively, but I did not run much with it. An 8-h.p. "Amilcar" was then offered in a local paper, so I immediately set out to see it. She looked hideous, as a body had been put on that "fitted where it touched," so to speak, and the bonnet sloped at an alarming angle to meet the scuttle. However, the engine and chassis looked interesting, so the deal was closed and the car delivered to me for the sum of £4. The first job was to hack off the

existing body, leaving a very pretty little chassis. The engine was stripped and the only new parts found necessary to put it in perfect order were a set of valve springs; these were made up by Terry. Ball races in the front hubs were replaced and new 7.00×80 tyres fitted all round. A light 2-seater body with no doors was fitted and the car was ready for the road. It was really fast and never gave any trouble. I sold it and the new owner stated that he covered the distance of 15 miles between his garage in Stonehaven and another garage in Aberdeen in exactly 17 minutes. Later, when demonstrating the cornering capabilities of the car he removed both back tyres from the rims and did not overturn. After he sold it it caught fire and was again re-built. The last time I saw it a Citroen radiator was fitted as the original one was ruined in the fire. I then tried a D'Yrsan 3-wheeler with 4-cylinder engine offered at £7. This was an actual machine which had been used for records and was fitted with extra large petrol tanks low down at each side of the engine. The rear wheel protruded through the streamlined tail and was covered with a cowl; when a bump was hit the tyre used to send this cover spinning skywards! The gear ratios of this machine proved far too high for road use and I did not buy it.

A 1929 Riley Nine then took the place of my Riley Twelve and it proved so satisfactory that I became a confirmed Riley Nine enthusiast. The first was a "Monaco" saloon, followed by a "Gamecock." In all, my father and I between us have had 14 Rileys. After the "Gamecock" I tried to get a "Brooklands" model, but have never managed to do so. I started to build an underslung chassis, and after two years' work the car was put on the road in 1936. It was a good deal lighter than the "Gamecock" and had a much better all-round performance and could be cornered fast with safety, although the wheelbase was rather long. I have another chassis practically finished with a 7′ 6″ wheelbase on which I intend fitting a very light body, but pressure of work meantime has stopped this. The chassis is underslung at the rear and the front dumb-irons lie between the front springs. The top of the chassis is 10″ from the ground and it is made from a mixture of Bugatti and Riley. All holes have been bored by breast drill and H.T. steel bolts and spring washers used. The Bugatti chassis mentioned is from a 1926 model I had and intended to re-condition; I gave up the idea as the gearbox pinions were rather the worse for wear and a half-tooth was missing from the crown wheel. I have still got the engine, which is in good condition and, in my opinion, would make an excellent unit for a Frazer-Nash. I have also a pair of beautiful Zeiss headlamps from this car which I intend fitting to my Riley when I can find time to finish it.

The fastest Riley saloon I had was an early 1928–29 fabric model with triple diffuser Zenith carburetters, and it certainly had something the others had not got. It is still running in the district and appears to be going as well as ever. At present we are running an "Alpine" Riley Six, which my father took delivery of in 1931 at the Works, and it looks as if it is going to last for ever. When a Riley Twelve "Adelphi" was bought, the "Alpine" was set aside for the use of our business and gets all the donkey work to do. Just before war broke out we had occasion to go down to Coggeshall in Essex to buy a motor cultivator. A start was made on a Thursday night with no previous preparation except for filling up with petrol. Driving through the night, together with two passengers, on an entirely strange road, we arrived at our destination on Friday forenoon, and after having lunch, saw the machine working and decided to dismantle it and take it home with us. Weighing well over 3 cwts. the various parts were packed into the car and we set out for home just before dark on the Friday evening, arriving home on Saturday afternoon, taking only 44 hours for the journey of 1,080 miles—good going for an old car. Oil consumption worked out at over 2,000 miles per gallon, and the car has still original rings, etc. Petrol consumption worked out at 25 m.p.g., but since then the car has been de-carbonised and new valve springs fitted, also a "Cox Atmos" atomiser, and it now does 28 m.p.g. on a decent run on "Pool."

The "Adelphi," together with a new Standard Eight, both belonging to my father, are on blocks for the duration. The Standard was just run in and had promise of being a very good small car. I myself have also a Standard Ten, bought new in 1934, and I maintain this was one of the best Standards ever produced. It is fitted with a free-wheel and with an engine which runs with turbine-like smoothness, and it is very pleasant to drive. Colloidal graphite has been used in the engine since new, and it has proved its worth as the engine is still in perfect condition in spite of some really long and fast runs at an average speed of over 40 m.p.h. Petrol consumption with a Cox atomiser is 32 m.p.g. on "Pool." Incidentally, the original Lucas battery is still in use and at present my friend is using it in his Sunbeam Talbot, his own one having given out.

Recently I managed to procure an M.G.750 c.c. "Montlhèry Midget" in excellent condition, having done a very small mileage. Three of the original Dunlop "Forts" are still in use and two new B.T.R.s have just been fitted to rear wheels. Actually, this car has only been licensed for 27 months and has never been raced. I do not know the actual mileage as no speedometer was fitted to these cars, although a drive is provided. The car is blown and runs very well on "Pool," and it is quite reasonable on petrol if speed is kept down to 65–70. All-out speed is about 90 and she handles very well. A windscreen has been fitted in place of the wire-mesh affair fitted as standard. With extras this car cost over £600. Since buying the car I have managed to procure a spare cylinder block with Laystall hardened liners and special "Diatherm" pistons, but there is no sign of these being required, as the engine, etc., is in 100 per cent. condition.

I have also a Morris "Minor" saloon which I am overhauling when time permits and fitting with an "M"-type M.G. engine which I have stripped and am completely re-building with new bearings, pistons, valves, guides, etc. This engine has an overlap camshaft and should provide an interesting turn of speed when finished. M.G. brakes are also to be fitted.

I have owned various other cars not mentioned above, including Singer and Lanchester Ten, and just before the war I bought an F.W.B. Alvis which I intended converting to a rear-engined car. Plans were complete, but as things turned out I sold it and it is now being run by an R.A.F. officer.

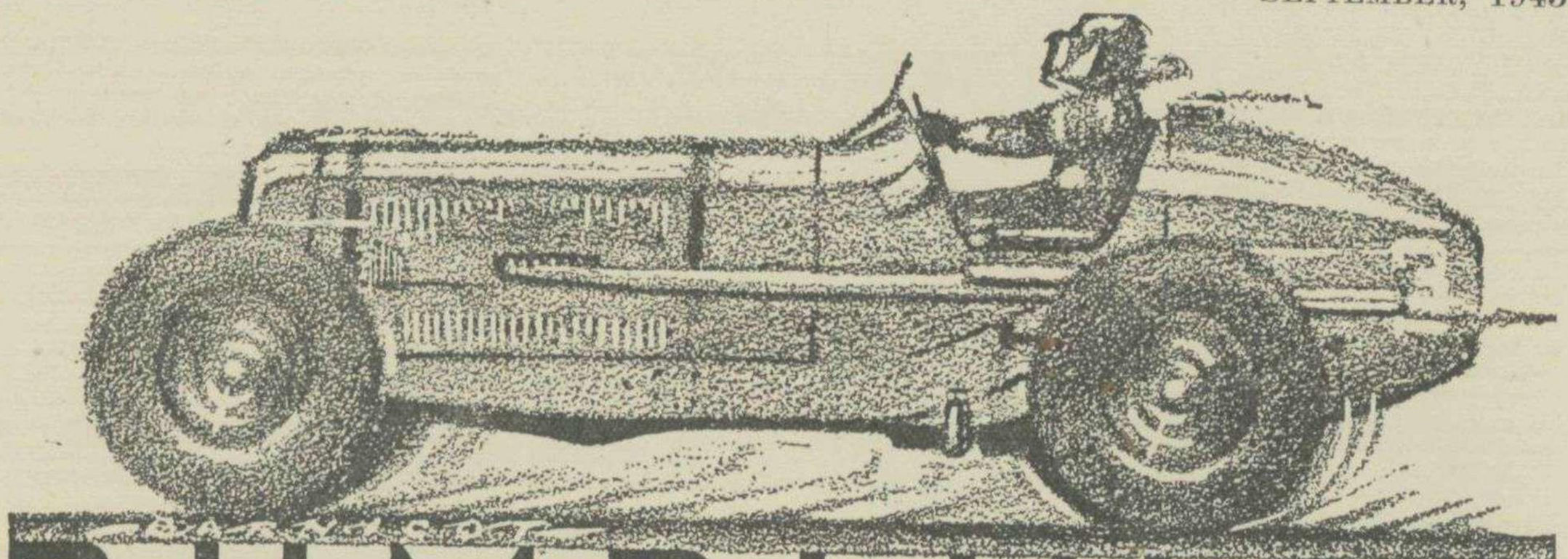
Summing up my motoring for the last twenty years I have come to the conclusion that speeds of cars have not improved to a great extent, and certainly the average car is not so economical as 15 years ago; both my Airedale and the heavy 12-h.p. Riley 4-seater gave over 35 m.p.g., driving fast. How many twelves of the present day can do this? Engine speeds have certainly gone up, but gear ratios have gone down, hence the loss of economy and shorter life of engines. Perhaps after this present bother has been settled manufacturers will give us lighter cars with higher axle ratios. My ideal car would be a Riley Nine weighing not more than 15 cwt. Before this car was discontinued it was certainly over-bodied, which did not give its excellent engine a chance.

In conclusion, I hope that cars of this type will be produced again so that we will not be compelled to use the high-revving, slim-built cars coming into favour recently; surely there will be enough enthusiasts left to warrant their production, failing which we will just have to stick to the "old 'uns" and try to keep them in 100 per cent. condition.

Some considerable time has elapsed since I wrote the above, and I have reluctantly sold my M.G. "Montlhèry" to an enthusiast from St. Bees in Cumberland, who came up to see the car and later came back to drive it home during a severe snowstorm, but was forced to take it by train. Car is at present on the road and motoring very fast. I intend concentrating on my Riley special, and when time permits I am slowly rebuilding the engine from as many new parts as I can procure. I have had the block sleeved and am fitting h.c. solid-skirt B.H.B. pistons, together with new rods, timing pinions, etc., so that it should be in good trim when things return to normal.

A word of praise to Riley (Coventry), Ltd., for their prompt attention to orders for spares in these times, especially to their deputy service manager, Mr. A. Farrar, who is always ready to assist in any way he can. And, thanks to those who are responsible for the publishing of MOTOR SPORT under the present difficulties, and may they continue to manage to do so; it is a special treat when I get home from work and find it awaiting me.

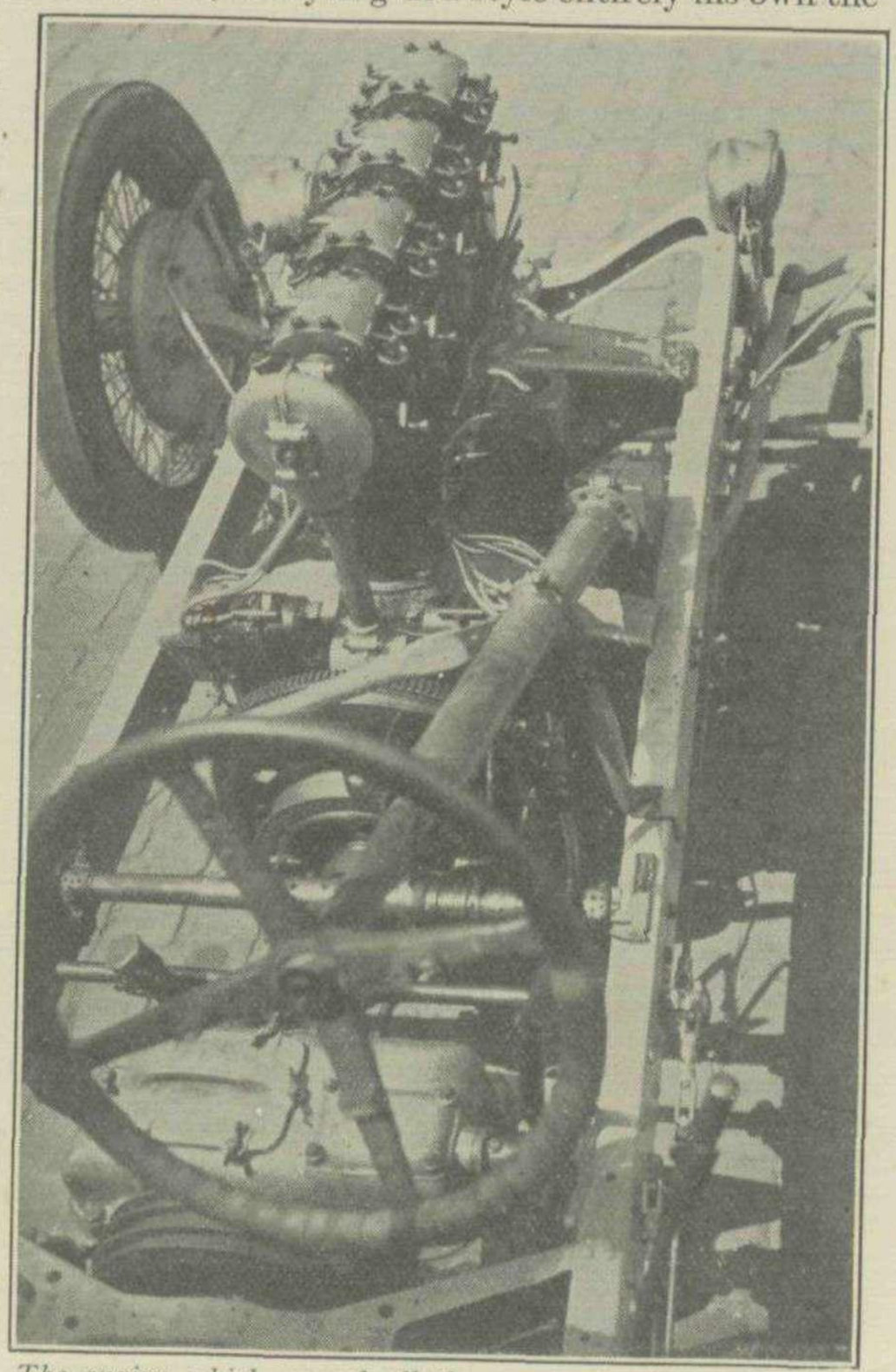
I would always be very pleased to have letters from any other Riley enthusiasts as no doubt there are a great many who read MOTOR SPORT, especially from anyone who is building or has re-built one of these cars, as perhaps we could exchange views and ideas and, better still, spares, etc. My address is: Old Station Road, Inverurie, Aberdeenshire.



RUMBLINGS

Mercedes Mystery

In 1914, after the Mercédès one, two, three victory at Lyons, motor-racing and aeronautical circles discussed the question of which came first—the racing engine or the aero engine—and of what had become of the Grand Prix Mercédès left at the mercy of the Allies on the outbreak of war, until a first-class topical mystery developed. It was thought by some that the cars were designed to test a new aero engine, but this theory has of recent times apparently been proved false, because it is said that the 1914 Mercédès aircraft motors were, basically, of the same design as those built about three years earlier. There remains the question of whether one of the cars was really rushed to Derby for examination by Rolls-Royce engineers, resulting in the "Hawk" aero engine, built also by Straker-Squire. We had long known that something had been written on this intriguing subject when the mystery was topical, during the last war, by the late Geoffrey de Holden Stone, in *The Aeroplane*, which was, incidentally, then much more of a political newspaper than it is to-day, with Charles Grey retired. When Peter Clark wrote-up his 1914 G.P. Mercédès in the "Veteran Types" series (MOTOR SPORT, October, 1940) he quite definitely stated that this was the car which was lent to Rolls-Royce, Ltd., "for technical purposes," and he suggests that to it we owe the designs of the Rolls-Royce "Hawk," the Straker-Squire Six car engine and the engine of the 3-litre Bentley. This made us all the more anxious to read what *The Aeroplane* had said on the subject, and last month the opportunity arose. The article in question certainly proves that the "mystery" was being freely discussed during the last war and did not accrue afterwards, aided by legend. Unfortunately, however, it does not say where the car, that had been in England, went to on the declaration of war, and it falls into the apparent error of closely linking the six-cylinder Mercédès aero engine with a racing car engine, while, at the time when Holden Stone was writing, it was presumably too early for any tendency of the British to copy the Germans through the medium of a dissected racing car engine to be apparent, although he certainly hints strongly that such would happen. Although these references to the matter do not solve all aspects of the "Mercédès mystery," they are of very considerable interest. Incidentally, Holden Stone, who also wrote some very fine verse, ran his article through most of 1915 and 1916, analysing in a style entirely his own the



The engine which caused all the comment. The 1914 G.P. Mercedes is now owned by Peter Clark's wife, Ariel.

good and bad points of all the aero engines available to the allies and the enemy. He also gave delightfully worded dismantling and maintenance notes, which were no doubt of much value at a period when the production of official air publications was far less highly organised than it is now. Altogether, we regret that we are only able to devote a brief period of a busy day to his writings. Make way, then, for Geoffrey de Holden Stone, writing under the heading, "Aero Motors—In Kind and Construction," in *The Aeroplane*, dated October 27th, 1915 :—

"Concerning the Mercédès—one of the chief troubles of an author by pennyworths is that he so seldom dare yield, for the sake of the book-to-be, to the constant temptation to be a journalist, and garnish his too-solid meat with the green herb of to-day's news interest, which survives no to-morrow. Otherwise, I would dwell upon the hitherto agreeable mystery of the Mercédès aero motor : done away with by some person or persons unknown. You may remember how some lucky ones beheld two-thirds of it before the war, in the chassis with which Lautenschlager, having sneaked into France for clandestine road practice, virtually stole the last Grand Prix. Then for a week or so, how it was displayed to the curious in Long Acre. And then, as Mr. Gordon Watney did not buy it—well, perhaps it disappeared with those Russians who came to London *via* Llantysiliogogoch to join the notable legions so ably led by Mr. Arthur Machen at the Battle of Mons. Or perhaps the Admiralty—who are great hands at getting hold of the most expensive cars—tossed-up for it with the friends of Germany at the Foreign Office, who wanted a memento of a characteristic German triumph. You never know. Anyway, I don't. I am only content to believe—just as I did in those Russian long-bowmen—that it is used in about four out of five of the Hun warplanes, in 6-cylinder form : although ever since the last Aero Show you could not buy a Benz or an Argus motor for any money. Yet, following the manner of journalism in its vogue for sheer surmise, I dare say we may yet see its counterpart numerously in British aeroplanes. That would be just the sort of thing our misrulers would love to attempt. Let us wait and see if I am right. At any rate—to rein down from fancy to the jog-trot of fact—in this Mercédès aero motor we have a 6-cylinder water-cooled motor with o.h. valves and camshaft, the cylinders being jacketed in pairs, and having a content of 120 mm. by 140 mm. as the respective bore and stroke measurements. One, that in the mass, displays no more originality of type than any other Teutonic engineering creation ; and withal is as expensively built, as thoroughly uncommercial as to production, as any motor ever designed, albeit no worse in this regard than many others produced west of the Rhine. Yet one, that in detail, shows to a fair degree the thoroughness of treatment, if not wholly the clear conception of purpose, that have placed Germans where they are." The writer certainly linked the racing car with the aero engine, as witness this from *The Aeroplane* of November 1st, 1915 : "Certainly it [the aero engine] has been tried high enough, for not only were its original Grand Prix editions subjected to the most heart-breaking stresses both before and during the race itself, but on at least one occasion it had remained aloft for 25 hours." We believe that the "Hawk" had not happened when Holden Stone was writing, but of the British 125-h.p. Hall-Scott A5 aero engine he said : "Differing from all [European designs] in detail treatment, it is perhaps nearest akin to the Mercédès because of its inclined valves in slightly widened cylinder heads, and its o.h. camshaft." That the famous Benz aero engines were based on racing car designs, however, is quickly dispelled by Holden Stone who, writing of the 100-h.p. and 150-h.p. Benz, says : "One sees the marine idea demonstrated throughout the Benz design. Once accept that prevision, you will hardly escape it in any detail. But for the deepened crank chamber—permissibly so, as it not only remains accessible, and disposes accessory parts conveniently, but must balance the upper structure as much as possible—one sees nothing else than a marine engine lightened for racing, fashioned according to the German ideal of single function, trustworthiness and, for the rest, Germanised with all faithfulness of imitation." So, interesting as all this is, the "Mercédès mystery" remains unsolved, in part at any rate, after nearly 30 years. Incidentally, we have suggested in these pages that motor-racing gave a pointer to what was coming before both world wars. Holden Stone had another theory, observing that the Benz was an excellent design and that had our politicians realised that after the 1913 Aero Show they could not be bought from Germany, they would have known what to expect ! Well, whatever is the truth about the aero engines of 1914–18, the Rolls-Royce, Napier and Bristol aero motors which are winning the present war for us were not copied from any German source. Nor (alas) did we have a 1939 Grand Prix Mercédès to study when this war broke out.

* * *

Our "Elder(?) Statesmen"

Gently chiding us for describing the Competitions Committee of the R.A.C. as composed of aged gentlemen, Capt. A. W. Phillips reminds us that some quite active persons used to sit on it and that undoubtedly when the war is over there will be additions. We refrain from attempting to average the ages of these committeemen, and we have pleasure in publishing the present constitution of this Committee, which governed motoring sport in this country, yet whose composition was probably not very generally known. It comprises : L. A. Baddeley, G. H. Baillie, O.B.E., Dr. J. D. Benjafield, Capt. W. Bemrose, O. Bertram, A. Percy Bradley, Lt.-Col. T. B. Browne, O.B.E., E. Giles, Sir Algernon Guinness, Bart., the Rt. Hon. the Earl Howe, P.C., C.B.E., V.D., Lionel Martin, J. A. Masters, H. J. Morgan, Mervyn O'Gorman, C.B., A. K. Stevenson, Leslie Wilson.

* * *

Books

"Dick Seaman—Racing Motorist" (*Foulis*) has proved so popular that it appears as a second edition, more compact than the first and containing some new matter. The Motor Sport Instruction Book Library grows apace and a full list will be found on page 193, while we hope to arrange public access to these books after the war. Recent additions include 1,100-c.c. Fiat "Balilla" and Lancia "Augusta" from Stuart Wilton.

Club News

750 CLUB

The 750 Club held its monthly meeting for members and non-members at the "Chez August," in Compton Street, on August 7th. There was a smaller attendance than usual, only 16 persons sitting down to lunch, and for the first time no members of the fair sex were present. Private owners just predominated over the Trade, both amateur and professional. Everyone talked with gusto, and many lines were shot. Unblown 750 c.c. racing, new cars for after the war, suspension problems and motor-cycle fork design were amongst the topics of debate. Incidentally, the pit work on the part of the waitresses and the quality of the lunch have considerably improved. It would be a thousand pities, and a shame on Southern enthusiasts, if these regular meetings had to be abandoned due to lack of support. So we would urge all who can to go along on Sunday, September 5th. There is no need to be a member, but please notify the secretary beforehand. Hon. Secretary, S. H. Capon, 159, Upper Tulse Hill, London, S.W.2.

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J.C.C.

The always go-ahead Junior Car Club's *Gazette* came of age with the publication of the April–June issue, and this was a considerably enlarged number by way of celebration. The advertisers, who temporarily overlooked the war to help H. J. Morgan's effort along, deserve every credit. They comprised Joseph Lucas, Ltd., the Ford Motor Co., Ltd., Ferodo, Ltd., Rootes Securities, Ltd., Riley, Ltd., the Dunlop Rubber Co., Ltd., the Austin Motor Co., Ltd., Alvis, Ltd., the M.G. Car Co., Ltd., the Standard Motor Co., Ltd., Girling, Ltd., S.S. Cars, Ltd., Singer Motors, Ltd., Vokes, Ltd., and Charles Follett. Amongst the interesting contents were views on the future of the Sport by Sir Malcolm Campbell, M.B.E., Fred Craner, Percy Bradley, and Leslie Wilson. Also, of course, many reminiscences, news items about members, and birthday greetings. The monthly council luncheons are still held, and last month the principal guest was Mr. R. C. Rootes, while H. F. S. Morgan, Basil Cardew, Wing Comdr. T. H. Wisdom, Capt. Morris Goodall, and Capt. Frazer-Nash were also present. We would remind readers that membership is still available at £1 for those owning cars up to 10 h.p., and 25s. for those with larger cars, per annum. Non-car running members come in at 5s. Hon. General Secretary, H. J. Morgan, 14, Lime Grove, Eastcote, Ruislip, Middlesex. (Pinner 3693.)

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M.M.E.C.

The Midland Motoring Enthusiasts Club held its extraordinary general meeting on July 7th, and the following officers were elected: *President*, G. F. Bale; *Chairman*, Stewart Forrest; *Hon. Secretary*, D. F. Mallalieu; *Hon. Treasurer*, J. H. Nield. *Committee:* Messrs. Couzens, Dix, Ford, Coombes and Wharton. Graham C. Dix agreed to look after "political" matters, Coombes technical happenings, Wharton racing, Couzens trials, and Southall veteran concerns. The Club obviously means business after the war. A meeting was held on August 18th, and another is scheduled for September 1st, at the "Bull's Head," Bishopsgate Street, Birmingham. And a dance is being held on October 8th, from 6 to 10 p.m., at the Botanical Gardens, Edgbaston, Birmingham. Dress is to be informal, and tickets will not cost more than 6s. 6d. Chairman, Stewart Forrest, 7, St. Martin's Lane, Birmingham, 5.

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COVENTRY CLUB ?

A group of enthusiasts hopes to form a club in Coventry, and may have done so by the time these words appear. Messrs. R. Robinson, W. J. Rheese, A. E. Maver and T. R. Costello are the folk concerned, and a club-room in the centre of Coventry is in view—rather a nice answer to the Luftwaffe. Anyone interested is invited to write to T. R. Costello, 149, Baginton Road, Coventry.

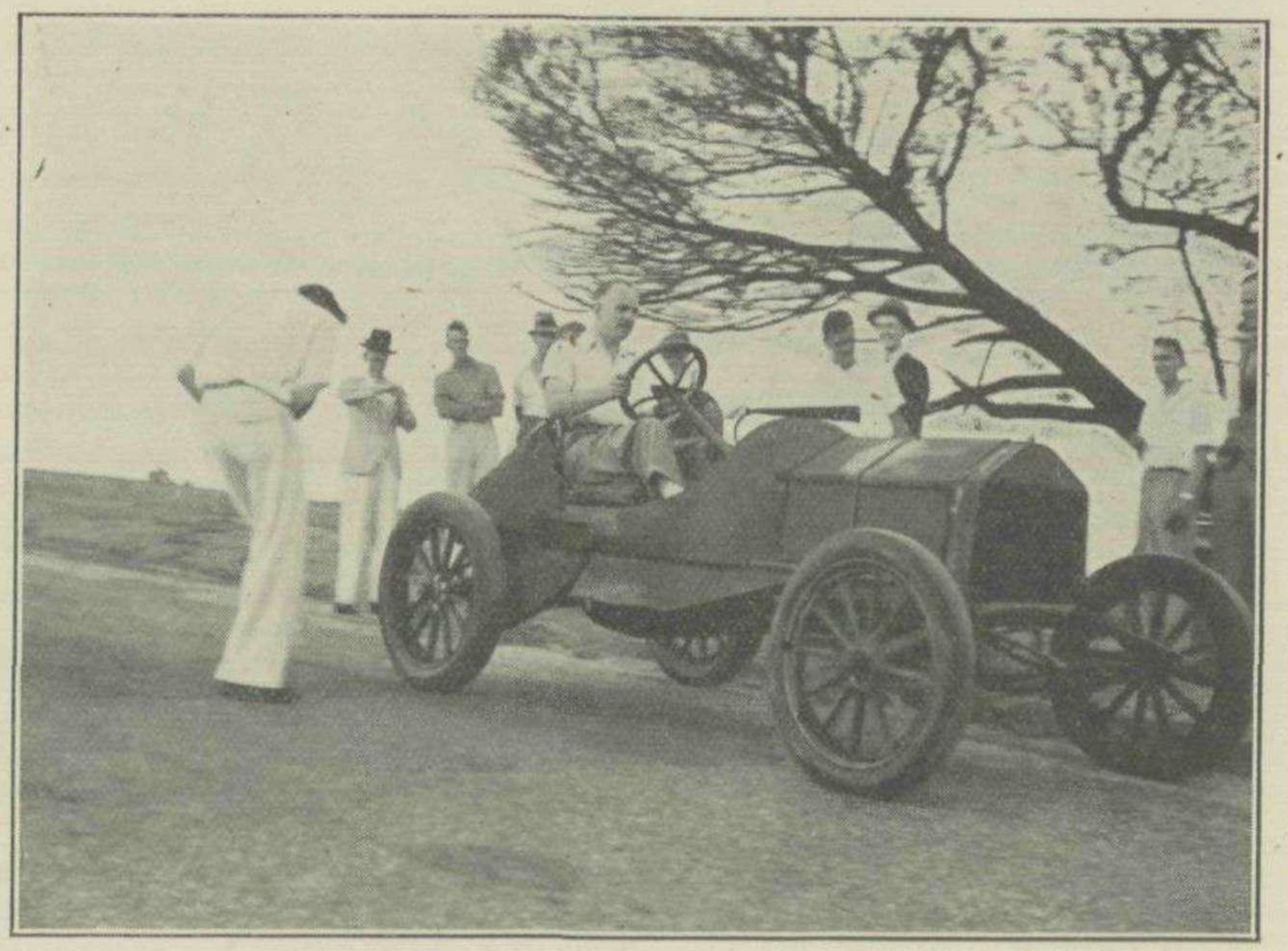
AN UNFORTUNATE ERROR

In the sub-title of Heal's article in last month's issue on Segrave's victory with a 2-litre Sunbeam at Tours in 1923 the car was described as supercharged. Actually this was an unfortunate typographical error, the car, as Mr. Heal accurately stated, being *non*-supercharged. It was not until 1924 that the Sunbeam Motor Car Company, Ltd., used superchargers.

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WE HEAR

Stewart Forrest has acquired a 1932 Riley "Gamecock" and would appreciate an instruction book and any tuning notes available on this and "Special Series" engines. D. F. Mallalieu, secretary of the M.M.E.C., is building a "special" composed to a Wolseley Hornet special engine in a Riley front-axled S.S. II which, as Stewart Forrest remarks, should puzzle the cognoscenti, as it will have the Hornet special radiator. Then there is a beautiful story about the annual holiday of Sydney Allard, Alan May and S. H. Canham. They went off to stay at a farm 16 miles from Minehead, taking bicycles with them, and naturally plotted a contest as to who would get farthest up Porlock, which led to Canham purchasing a Utility Raleigh a few days before he was due to leave, and fitting it with a 3-speed hub, to which Allard replied at the very last minute by buying



J. Watson's account of his collection of veteran cars in S. Africa appeared in the July issue. Here is his 1913 *Metz—the first photograph we have seen of this make. They succeeded the Orient and were made in Walton, Mass., from* 1909 *to* 1921.

a very large rear-wheel sprocket in order to get his gear down. We have not yet learnt the result! Hindes has the ex-Darbishire Type 35A G.P. Bugatti and the ex-Staniland Type 51 twin-cam Bugatti in safe keeping at Windsor. The former car is for sale and is slightly non-standard, having a radiator headed tank and torque-members to prevent the front axle from twisting when the anchorage is used. Rivers-Fletcher showed some photographs at a recent meeting which suggest that Peter Monkhouse is the man who bought the Bugatti Owners' Club's Type 51 Bugatti. Interest in the Molsheim motor is certainly rising fast, for J. L. Wyer recently acquired a 3.3 litre built by Arthur Baron in about 1934, which has, apparently, a shortened Type 44 8′ 6″ wheelbase chassis, a Type 49 cylinder block with four carburetters and a 2-seater body. The car has climbed Shelsley in 45 secs. Then Birkett hopes to have his Type 40 running soon and has acquired almost a complete spare car from Bear, of the same type, and Allan Arnold is another of those very fortunate persons who have Type 51s. Cooper would dispose of his 1930 ex-Faulkner Type 38, which requires assembling, for around £40.

A reader has a Clyno chassis to give away if anyone wants it. Stafford-East, in collaboration with E. G. M. Wilkes, is building up with great care a replica of a touring V-twin G.N., which is a labour of which we very much approve; a reader, 2nd Lieut. Grice, wishes to do likewise if the required parts will come to hand. Mavrogordato is now back in this country from Canada, with the rank of Squadron Leader. He tells us that long before he bought the 1914 G.P. Opel he regularly ran a 1912 racing S.A.V.A., which was extremely comfortable, had all the characteristics of a very smooth engine, but no acceleration, due to the enormous flywheel. This was long before the Vintage S.C.C. held events for such cars, so that mostly Mavro's friends thought him quite mad—but the car would do about 75 m.p.h. The car had a sad accident, and the very day afterwards the Opel was found and rather stole its thunder. The chassis, gearbox and body have, as in the case of Clark-Kennedy's sister car, gone as war salvage, but Mavrogordato intends to keep the engine as "a memento of a very charming old car." Cecil Clutton, they say, has been having lessons in a flying machine, and is reputed to have reported the steering as the highest-geared of any he has ever previously tried. John Bolster is now amongst the enthusiastic cycling fraternity—but only from no-choice, we suspect. John Cooper was hoping, when he last wrote, to meet Sir Anthony Stamer and see his 2.3-litre Alfa-Romeo, and he was also hoping to take under his wing a 1929 Aston-Martin, formerly owned by Hornby, another reader. We hear of a 1932 Riley Nine with, curiously, a van-body, which could possibly be bought for £15, while those who seek to run 3-litre twin o.h.c. Sunbeams after the war are reminded that Metcalfe has one for sale at £45, and Marshall one priced at £150, both with classic 4-seater body of unbelievable length. Down in Sussex R. G. C. Lillywhite is reported to have two "Red Label" 3-litre Bentleys, a blower 4½-litre Bentley, a 3-litre saloon Bentley, a Rolls-Royce and an M.G. laid up. We believe that he would welcome genuine Bentley enthusiasts and that some, or all, of the 3-litre cars are for sale. We also know of two other 3-litre Bentleys in the market. We believe that the much-discussed streamline 1,100 c.c. Fiat saloon is now used by Lt.-Col. Moore-Brabazon, M.P.

K. C. Jarvis, who used an Austin Seven, is a captain with the Middle East Forces and has found trials-driving experience of inestimable value in handling war vehicles under sticky conditions. L. C. Christensen is slowly recovering from the effects of a bad accident and looks forward to driving his Darracq-engined Pansy Special in trials after the war. Aston-Martin, Ltd., offer for sale a single-seater version of the 2-litre, which is an outer-circuit type car with cowled radiator, square, rather high bonnet and streamlined headrest. The normal steering wheel and l.h. gear gate are used and we believe very high speeds were realised with this car at Brooklands before the war. Interesting fast cars on official duties include a trials-modified T-type M.G., an open 2-litre "Speed Model" Aston-Martin, a very fine 1½-litre Aston-Martin open 2/4-seater, and Quilter's (of G.Q. Parachutes) 2.9-litre Alfa-Romeo coupé. Now the Fascist Party has fallen, Nuvolari is said to have been let out of prison, whither he went for smuggling British and American cigarettes into Italy—and, believe it or not, he was driven home by Varzi.

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VETERAN CAR CLUB

The Veteran Car Club is carefully investigating any cars which seem worth buying under its new scheme, and it is holding another social at the Waldorf Hotel on September 18th. Hon. Secretary, J. H. Wylie, 38, West Cromwell Road, London, S.W.

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RECORD LINE-SHOOT

A contemporary has commenced a weekly motoring line-shoot, but we think the record in this connection must belong to the person who was recently heard to explain how he blew up an elderly 1½-litre Bugatti at Brooklands by saying that he gave two E.R.A.s a seven seconds start and, deciding there was no hope of catching them, motored carefully with his attention on the rev.-counter, until, looking up after three laps, he was surprised to see the E.R.A.s just ahead and naturally opened out beyond his safe rev. limit. Being interested we looked up the race in question, to find that the Bugatti started 24 seconds before one E.R.A. and 37 seconds before the other. In the first lap three cars passed it, and it was passed by both E.R.A.s on lap two, after which it certainly burst.

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THIS MONTH'S COVER PICTURE

This month's cover picture is of interest as emphasising the change that has occurred in world politics in the last six years. It shows Rudolf Caracciola driving a 5½-litre Mercédès-Benz round Red Gate corner in the 1937 Donington Grand Prix. It was in this race that "Caratch" mysteriously dropped back towards the close of the race for no apparent reason, finally finishing third behind Rosemeyer's winning Auto-Union and Brauchitsch's Mercédès.

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THE EDITOR'S ADDRESS

As the Editor is returning to London on September 18th, letters to him should not be sent to his country address after the middle of this month.

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★ *Instruction Book Library*

The following is a list of Instruction Books sent in by readers to the MOTOR SPORT Instruction Book Library, from which source we will willingly supply information to genuine enquirers. We hope after the war to place this little library at readers' own disposal and shall be glad of any additions. Apart from valuable assembly and maintenance hints, these books offer excellent, conveniently-presented data about cars which are now historic.

A.C. Six (gearbox-in-rear axle model).
Austin Twelve, 4-cylinder.
Armstrong-Siddeley Long and Short Fifteen.
Alfa-Romeo, supercharged, 1,750 c.c., "17/95"
Alfa-Romeo, 1,500 c.c., unsupercharged.
Alvis "12/50."
Alvis "Firefly" Twelve.
A.B.C. "11/27" and "12/40."
Arrol-Aster, s.v., "23/70."
B.S.A. Motor-cycles.
Ballot Straight Eight, R.H.2 and R.H.3.
Bentley, 4½-litre, pre-overdrive.
Delage Light Six, 15.7 and 18.2.
Douglas Motor-cycles.
Fiat Balilla, Type 508C.
Fiat "10/15," Type 501.
Ford, Model T, Book of.
G.N., 1922-24.
H.E. "14/40."
Hillman Fourteen.
Hotchkiss Six, Type A.M.80.
Invicta, 1½-litre, "12/45" and "12/90."
Invicta, 3-litre.
Jowett "7/17."
Lancia "Lambda," 1923–4, "14/60."
Lancia "Augusta."
Lea-Francis, 1930 (including supercharger).
Lea-Francis Six, Type T, "Ace of Spades."
Lea-Francis, 9.8-h.p.
Lagonda, 2-litre, "14/60."
Lagonda 3-litre Six.
Lagonda "16/65" Six.
Lagonda "Rapier."
Lanchester Six, 21-h.p.
Lorraine-Dietrich, 15-h.p., Six.
Lucas Electrical Equipment, etc.
M.G. "Midget," M-type.
M.G. Six, Mark II.
M.G. "14/40," 1925–1928.
Morris "10/4" and "12/4."
Minerva Straight Eight, 40-h.p.
Morgan Runabout.
Matchless Motor-cycles.
Norton Motor-cycles.
Rover Flat-Twin, 8 h.p.
Rover Fourteen "Pilot" and "16/50."
Rolls-Royce "40/50" "Silver Ghost" and "Phantom I."
Railton Straight Eight.
Rapier.
Riley Fourteen Six and Twelve Six.
Rhode, 9.5-h.p.
Sunbeam 3-litre Twin o.h.c.
Sunbeam, 25-h.p.
S.S. 2½- and 3½-litre Jaguar and 100.
Singer Senior Twelve, 1929.
Triumph "Gloria," 1936.
Triumph, 8, 9, 12/6, and "Southern Cross."
Talbot, all 6-cylinder pre-selectors.
Talbot "14/45."
Wolseley Hornet Special.
Villiers 2-stroke Engines.

Letters from Readers

Sir,

Herewith the answer to the great Lory crankpin mystery. Referring to the original text of Lory's paper I see that he suggests rollers 6.5 mm. diameter by 12.7 mm. He then goes on to say that he likes a " bielle " of 18 mm. " largeur," and having tested this word out on a French technical acquaintance, he says that Lory meant this to refer to the width of the crankpin.

I think there can be absolutely no doubt at all that this is so, particularly as the word " bielle " means " connecting rod," whilst the crankshaft is a " vilebrequin," which word does not come into the sentence containing 18 mm. at all.

I am, Yours, etc.,
LAURENCE POMEROY.

* * *

Sir,

A recent letter from a fellow enthusiast still in the old country has prompted me to pen you a few lines. Although I have read MOTOR SPORT monthly since 1932, I am a little out of touch these days with " the Sport." The reason for this is that since going abroad I have expressed a desire for my copies to be delivered to my home address and not sent out to me, as this will spoil these, among other things, for the future binding. And shall I have a spate of sheer joyful reading on my return !

This time of the seemingly far-off peacetime year would see the racing season in full blast. As a follower mainly at Donington, I would be looking forward to the " Nuffield." So far I've seen each race since 1935, and the lesser events back to August, 1933.

High lights in my memory over the period of years at the Leicestershire course are : 1933, the duels between the late Hugh Hamilton with his K.3 M.G., and Lindsay Eccles and the ex-Craig single wipe " 2.3 " G. P. Bugatti. 1934, the Q-type M.G.s and the Riley successes of Paul and Dixon, plus again Eccles with his twin-cam " 2.3 " Bugatti at the July meeting. 1935, Fairfield's victory with the " 1,100 " E.R.A. in the Nuffield Trophy, and earlier, the advent of R. C. Shuttleworth's *monoposto* Alfa and the " 3.3 " Bugatti of A. H. L. Eccles. 1936, the battle royal between Earl Howe and his blue-and-silver E.R.A. and Seaman's Delage in the 200 Mile Race—Howe passing the black Delage on the apex of Starkeys. The Grand Prix " 3.8 " Alfa of Hans Ruesch, victor of the second Donington Grand Prix. 1937, Walker's dirt track methods with the black Whitehead E.R.A. in the rain, British Empire Trophy. Duel between the works E.R.A.s of Mays and Dobson, and the " Bira " Maserati in the 200 Mile Race—no, I didn't see THE G.P. ! 1938, " Bira's" " Hanuman " E.R.A. victory in the " Nuffield." Gerard's Delage *versus* Lace (Darracq) in the T.T.—Nuvolari coming out of the Hairpin in the Auto-Union. 1939, unfortunately short duel between Percy McLure, blown Riley, and the independently-sprung E.R.A. of " Bira." A great pity after such a fine show that Percy was put out with gearbox trouble at nine laps.

Need I add the very best of good wishes to that *pukka* motor sporting magazine, our beloved MOTOR SPORT. Until the day when open exhausts will mean more than aircraft engines, Good luck.

I am, Yours, etc.,
L.A/C. KENNETH N. TEASDALE.
(ex. E.R.A. Club).
R.A.F., M.E.F.

* * *

Sir,

At the age of 13 I drove my father's car for the first time, it being an Oakland Six ; rather a large car but of only 18-h.p. I enjoyed being at the wheel and that started my enthusiasm for motors and motoring, which has increased with the years. At about this time I bought an old F.N. motor-cycle ; it was a single cylinder and was the type with a shaft drive and bevel gears to the rear wheels, and of course the shaft and universal joints were missing. However, I devised a method of making a drive with universal joints by using a short length of water pipe cut at the ends so that a cross pin could slide two ways ; this was done by many hours of hard work with a hacksaw, and all for a ride of about ¼ mile, as the soft metal of the water pipe refused to stand the strain any longer at this stage. After this my father had other cars—Buick, Studebaker, Chevrolet—which I drove for many thousands of miles. Later I acquired a Douglas motor-cycle, 2¾-h.p. belt drive, and improved the performance quite a bit by a rebore and having the piston ring grooves turned out considerably wider and having rings made to fit ; this in addition to attention to and advancing the magneto made this quite the fastest Douglas in the district, and I well remember the many friendly races that I won on the old Doug. I also at this time had a two-stroke Excelsior.

The first car of my own was a Rover 9 h.p. ; it was in rather bad condition when I bought it for £25, and I spent many days of hard work on it, as I pulled down the whole engine and rebuilt it. On completion it went very well, but I then had the usual trouble with the differential and had to renew some parts ; however, the whole job was well worth while, as the car went very well for a long time. A sleeve-valve Falcon Knight was next on the list. I did not keep this car long, but while I had it it was quite satisfactory, and the motor very quiet. At about this time my brother and I had a Frontenac Ford. We had a lot of fun in this bus, minus a body. I next owned a Morris-Cowley and I still have much respect for these little cars for the great deal of hard work that they will stand without protest. I had this car for some years and carried out all the repairs myself, which I must say were very few. It is still performing good service for a farmer in this district ; I often see it in the town on market days.

Next was a Hupmobile Six with a very nice sports body in two colours ; this was a thoroughly reliable car—it had a good turn of speed and always looked well, a good example of the better class of American car of 1932. The car following this was a Riley Nine, and these cars, I think, were the best small cars in the world. My Riley had an amazing performance even though it had an ugly double-seater body ; the enjoyment I derived from driving it I shall never forget. The design and workmanship of the motor is excellent, and it would sing along at 60 m.p.h. or higher all day if necessary. I eventually sold the Riley, but the new owner takes good care of it and often tells me how in third gear it will lose more modern cars on a hill.

I was without a car of any sort for some time, but I now have a car which has good performance and a personality all its own—a " Blue Label " 3-litre Bentley with a nice clover-leaf body. My Bentley is in good order and a real pleasure to drive, although this is not a great deal as the petrol ration at present is only three gallons per month. The whole car has a solid all-one-piece feel, and the note from the through pipe sounds well.

My brother, Flight-Lieutenant B. H. Higgins, D.F.C., of the R.A.A.F., has some interesting motors. A Midget which for two years held the Australian record in its class, a Rudge Four o.h.v. cycle, and a Harley-Davidson Special 13-h.p. job, and not least of all a supercharged Aston-Martin with a clover-leaf body, a great little car. Both my brother and I wish MOTOR SPORT every success and assure you that every copy is looked for eagerly and read from cover to cover, so keep it going.

I am, Yours, etc.,
Wangaratta, Australia. W. F. HIGGINS.

* * *

Sir,

I have been intending to write you *re* the matter of the bit of B. and M. Aston-Martin news from Mr. Pomeroy, because it is definitely not accurate, and a true statement of the facts is this :—

In the beginning three chassis were supplied to give a wheelbase of 8 ft. 6 in., but these proved too weak by reason of their being only 3 in. deep. One was cut down to 8 ft., and this was " Bunny."

The designer of the s.v. engine was one Robb, late of Coventry Simplex, who also designed the vertical 16-valve o.h.c. engine. This was designed to have battery and coil ignition, but this was not fitted, and in place a vertical-driven magneto was fitted.

Through Zborowski, Gallop persuaded Henri to design the 16-valve twin-cam

engine over the Christmas holidays of 1921 for the modest sum you have stated. The dimensions of the various parts in this engine are exclusively Peugeot. The 8-valve twin-camshaft engine was a failure and was definitely NOT used in H. W. Cook's 200 Mile Race car. The snag of the o.h.v. engines was the centre main bearing. All the different heads (that is 16-valve vertical, 16-valve twin-cam and 8-valve twin-cam) were mounted on the same base.

No cars had dry-sump lubrication; those with it were converted afterwards. (This corrects an incorrect statement of mine.)

I am on the track of "Nigger," one of the original racing B. & M. Astons. This was sold by Lambert to the police in Wakefield; since that I have traced it to Stockton-on-Tees. The car was a short wheelbase with artillery wheels, no front brakes and one of the light semi-streamlined bodies. A different body was fitted by its owner in Wakefield.

By the way, 52 or 53 cars were actually made, *not* including the special racing cars.

I am, Yours, etc.,
F. E. ELLIS.

Stockport.

* * *

Sir,

I find Mr. Hampton's reply to my letter very interesting, but I, too, hold my own opinion *re* British and foreign motor-cars. It is surprising to me that Mr. Hampton says, in effect, that the M.G. successes were very seldom obtained abroad. To name a few, M.G.s have scored at the 750 c.c. race, German G.P. twice, 800 c.c. Eiffelrennen twice, Mille Miglia team prize, Acerbo Cup Junior race, American A.C. Grand Prix, Swiss Coupe des Voiturettes, 24-hour Bol d'Or, Circuits di Modena, etc. Then he goes on to praise the qualities of the Lancia "Aprilia." For my own part, I would prefer (*a*) an M.G. 1½-litre, (*b*) an Alvis "12/70," (*c*) an S.S. Jaguar 1½-litre, (*d*) Riley 1½-litre, to any standard Aprilia in existence. Finally, turning to the cheaper cars, Mr. Hampton enthuses over Renault, Fiat, and Citroen. Whilst admitting these to be good cars, I still fail to see why they are superior to Morris, Austin, Standard, Hillman, and other British cars of the same price.

For example, the F.W.D. 12-h.p Citroen has a maximum speed of 63 m.p.h. as against the Series III Morris Twelve's 70 m.p.h. The 8-h.p. Renault, which incidentally is taxed as a nine, has a maximum of 62 m.p.h. against the 8-h.p. Standard's 61 m.p.h. Again, in the 10-h.p. class, what can the continent oppose to Morris, Austin, Hillman, Standard, Ford, Wolseley, Sunbeam-Talbot, Jowett, and others?

I fully recognise, of course, that Mr. Hampton is sincere in his belief, but I think that he is quite mistaken, just the same. Perhaps he will write again in answer to this letter and thus develop the discussion, which I am really enjoying.

I am, Yours. etc.,
A. F. BROOKES.

St. Helens, Lancs.

[We are glad to endorse the M.G. successes. Nevertheless, speed is not everything, and this discussion, depending as it does on the indefinable qualities rather than the concrete, is apt to become pointless if continued. Perhaps Mr. Hampton has driven mostly continentals and Mr. Brookes mostly Britishers, but, having driven many of both, we rather think that to *please the enthusiast* our manufacturers should study Lancia, B.M.W., Fiat, D.K.W., etc. But then, do they want to please enthusiasts?—ED.]

* * *

Sir,

The Sequeville-Hoyau described in your August issue seems, from its body, to be of 1921–22 vintage, as surmised, although the low chassis and engine numbers suggest something earlier—perhaps 1919. The 1919 chassis, however, had a Rhone dynamotor, not separate units, and the Zenith fed through the block. The gear ratios were interesting: 4½, 5½, 11, 15½, giving almost equal speeds (50 and 45) on top and third, but only about 20 on second, which could with advantage have been raised to 8 to 1. I remember the quaint timing gear—a short inclined cross shaft linking the camshaft to the crankshaft by two pairs of skew gears. Very quiet and durable, but a hell of a thing to cope with single-handed. Bore and stroke remained for years at 60×110 (1,244 c.c.). The clutch was a single plate between Ferodo discs, but may have been altered later.

I went in a Van der Plas 2-seater a few times in 1924 or 1925 and found performance decidedly brisk up to the modest maximum. Total weight, of course, was low (about 12 cwt.) and the brake horse-power not far from 20.

An extremely practical but hearse-like saloon body was available. This, and the fully floating axle, created quite an impression in 1919!

Re Jowett's (July issue): (i) one was successfully blown in 1935 and performed phenomenally; (ii) 68 m.p.h. equals 4½ thousand r.p.m. I don't believe stronger valve springs and two carburetters would hold the engine together for long at this speed! I can push mine to 4,300—but only for a few seconds at a time.

I am, Yours, etc.,
J. R. EDISBURY.

Bebington, Cheshire.

* * *

Sir,

Naturally, I have been extremely interested in the excellent articles on the old Astons, and have sent Ellis a few additional scraps of information, etc.

May I venture to correct one or two statements in the article in your current issue? The name of the designer of the side valve and vertical 16 valve o.h.v. engine was Robb, who had recently been employed by Coventry Simplex.

The 8 o.h.v. engine shown at Olympia in 1925 was an adaptation designed by the Hon. John Benson, son of Lord Charnwood.

It was never raced at Brooklands, and was not a success—but I must go easy on this, as my connection with the firm ceased in late 1925. The engine used by Cook in the "200" was an example of the Henri design, but the block had been over-bored, and a crankshaft with reduced throw had to be fitted. Yes, there *was* an A.M. during the 1914–18

READERS' SALES AND WANTS

To meet the repeated demands for something on the lines of the old Spare Parts Announcements, we have instituted a system of inexpensive advertisements. Each announcement must be limited to **twelve** words, plus the advertiser's sufficient postal address, and the charge will be 1s. 6d. per announcement, payable at time of posting.

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12/50 Meadows engine and gearbox, pref. dural rods, decent condition. Meek, 167, Carnston Road, London, S.E.23.

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war : s.v. engine with valve caps ground in and held down by a bus-bar. Designed by Robb also, and the engine you know fitted on its base. Transmission by (late) E. G. Wrigley, and largely drawn by Cecil Kimber !

Heartiest congratulations on the very high level of excellence of MOTOR SPORT; how do you do it ?

I am, Yours, etc.,
LIONEL MARTIN.

Surrey.

* * *

Sir,

I was most interested to read about "Team Bentleys" in February's MOTOR SPORT. Your correspondent may be interested to know that I own a 1926 Team Car (No. 8, raced by Glen Kidston), registration No. MK5205. Since purchasing this car in 1936 I have fitted it with a 4½-litre engine. I used it constantly up till the middle of 1941 on my military duties, and it is now stored at my home in London. I also, until recently, owned a 9-ft. wheelbase (pear-shaped rad.) 3-litre, and also a 1925 T.T. 3-litre, which I keep for spare parts—not that I have needed any ! Best wishes to MOTOR SPORT.

I am, Yours, etc.,
F. H. THOMAS (Capt., R.E.).

Airgraph, India.

* * *

Sir,

Mr. B. FitzPatrick in his letter (July, 1943) certainly libels the English motor designers both on their past and present achievements, with his repertoire of popular clichés so unkindly used. Anybody who attempts to ridicule the vintage motor car is rather on Tom Tiddler's ground. People who run these worthy veterans are not fools ; they are well aware of what is available on the market. A standard "12/50" Alvis big-port (not that many are standard) with a maximum of about 72 and doing 26 m.p.g., or a 4½-litre giving 90 m.p.h. with 17 m.p.g., will compare quite favourably with the modern English or continental car in most respects other than, probably, acceleration, silence and lightness of control. But to offset this they have greater longevity and much lower depreciation costs. And what is more important, there is a class of enthusiast, both here and abroad, who find more satisfaction in both owning and maintaining a veteran.

As for our more modern designs I am surprised that an apparently knowledgeable person should refer to them as "absolute abortions." The English motor-car is essentially built for English roads, for which it is eminently suitable. However, I will allow that they may specialise so much on that score that once the average English car comes off the hard made-up highway the suspension may not prove very successful. And I am thinking that in view of the present rubber shortage it is fortunate for us that the majority of our motors carry non-independent suspension.

To capture foreign markets we must build special cars, suitably designed to meet the requirements of the particular countries concerned.

I am, Yours, etc.,
DONALD PARKER (F/O., R.A.F.).

Salop.

* * *

Sir,

It was very refreshing to read the defence of women drivers in your July issue.

I am no feminist in the usual sense, but I must say I heartily agree with most of the points made by your contributor, "P. D. B."

I particularly enjoyed the reference to "rich young nincompoops" and their habits. It reminded me so forcibly of the "twerps" one was compelled to listen to, and drive amongst, at and *en route* to and from meetings before the war.

My motoring before the war was confined to some trials and an occasional rally in such cars as Alvis, M.G. Magnette, Lancia and H.R.G., but the pleasure my brother and I derived from such events as we were able to find time for was almost nullified by what was the (to us) objectionable behaviour of so many others who took part. The intense conversation of both sexes, the noisy drinking habits (we prefer a quiet, steady session in the "men only" bar, when you can find it) and the absurd attempts to impress one another with exaggerated boastings, made us wonder whether motoring Sport was worth while after all. Perhaps things will be different after the war, but I very much doubt it.

Sorry to sound so gloomy, but I just had the urge after reading "P. D. B.'s" article to let her know, through you, that at least one "mere male" agrees with her and at the same time air a grievance I have had for years against so many of the motoring fraternity.

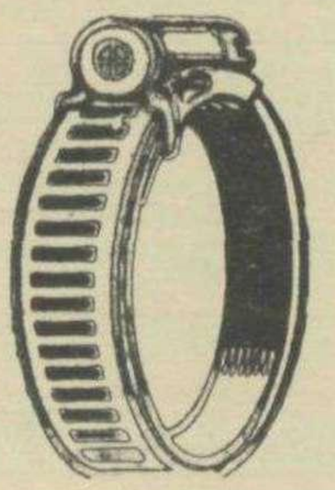
I am, Yours, etc.,
W. S. PERKINS.

Rugby.

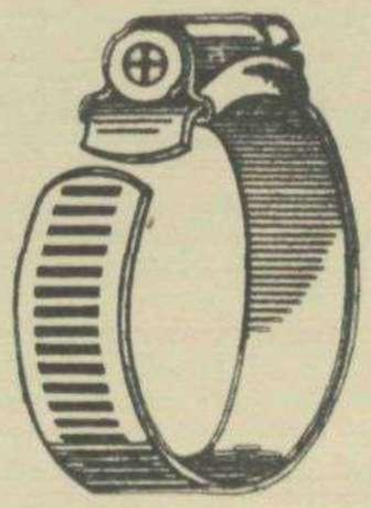
[This seems an unusually black picture, but this letter may do a little good somewhere. Actually, we hope Mr. Perkins

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will not give up motoring sport for the reasons he outlines—it takes all sorts to make a world, and experience has taught us that one may make thousands of acquaintances and a few friends from association with any pastime. It is the few real friendships which outweigh all the shortcomings evident in one's acquaintances.—ED.]

* * *

Sir,

As one who has been exiled from the "old country" for a matter of 2½ years, I should like to congratulate you on keeping up such a high standard in these difficult times.

I receive your paper regularly, I am pleased to say, and it is amazing how much I am cheered up on the arrival of each monthly copy, for out here I'm afraid real enthusiasts are very rarely met. I particularly enjoy the "Cars I Have Owned" series that you are now running.

Conquered enemy territory has so far yielded nothing more interesting to my eyes than a few Lancia "Aprilias" and one of the ultra-streamlined 1,100-c.c. Fiat saloons.

But I can pronounce the former G.P. circuit as still in first-class order, and can now well imagine why such high lap speeds were possible on it.

Before the war I was merely an ardent spectator of the Sport, owning a 1½-litre M.G. saloon, but when things start "cracking" again, my brother and I intend to be active participants in sports car events for a beginning. At the moment the car we have in mind is a Type 328 B.M.W., pending, of course, the introduction of newer and better post-war models.

May those enthusiastic days be not far distant!

I am, Yours, etc.,
M.E.F. S. L. WALLACE.

* * *

Sir,

MOTOR SPORT for May has just reached me, and may I add my thanks to you for continuing publication to the many who have already written? It is for me one of the most welcome pieces of mail I receive in this dreadful country. The only pleasant pieces of motor cars I've seen out here are 1½-litre Bugatti and s.s.v. Mercédès in Cairo, and Amilcar, 3-litre Bentley, modern Talbot (Darracq), and Horch in Alexandria. Reference the May issue, page 90, depicts "Green's s.v. Aston-Martin." Surely this is an H.R.G. at Prescott? I've been right with all the cover photographs so far, and though far from any reference, and memory is rusty, I feel I'm right. Also I think I recognise the car on page 103, "Plugs," as a Talbot, French G.P., 1938 (?), Rheims—in for a new valve spring or rocker—if not, why remove valve cover to remove a plug?

I am, Yours, etc.,
A. R. WILSON (Lt.).

Airgraph, M.E.F.

[Yes, A.M. is H.R.G.! And we wondered how long it would be before someone spotted the apparent inaccessibility of those plugs!—ED.]

Sparking Plug Research

LODGE PLUGS, LTD., have recently conducted some valuable experiments at their laboratories at Rugby in connection with the temperatures of sparking-plug insulators and electrodes. Measurement of temperatures was made by incorporating very fine thermocouples in the plugs themselves. Thermocouple plugs enable the correct type of sparking plug for a given engine working under a particular set of conditions to be chosen accurately without further experiment. Lodge Plugs, Ltd. have developed thermocouple plugs which enable temperature measurements of the electrode to be made with an accuracy of ±2° C., and, as the thermocouple, set $\frac{1}{32}$ in. from the end of the electrode, is only 10 thousandths of an inch in diameter, the characteristics of the plug remain unaffected. The hottest part of a standard-type sparking plug proved to be the tip of the central electrode. It was found that when this part of the plug reached approx. 1,100° to 1,150° C. pre-ignition would occur and that after-running or auto-ignition happened at an electrode-tip temperature of approx. 1,000° to 1,050° C. The exact temperature at which these troubles arose was, naturally, dependent on fuel, compression ratio, engine design, etc. The insulator, if made of sintered alumina, as in Lodge plugs, normally remained at a temperature slightly lower than that of the electrode, but deposits on the insulator would become incandescent appreciably before the electrode reached this state.

Tests with a popular 11-h.p. car showed a plug electrode temperature of 545° C. at a steady speed of 30 m.p.h., rising to 775° C. at 70 m.p.h., and 745° C. at maximum speed in third gear. When testing a 6-cylinder car on the road the electrodes of the plugs in cylinders No. 3 and No. 6 remained identical, rising from 480° C. at 30 m.p.h. to 700° C. at 70 m.p.h., but the plug in cylinder No. 1 showed an electrode temperature of 520° C. at 30 m.p.h. and 850° C. at 70 m.p.h. and higher temperatures at intermediate speeds, thus revealing a cooling or distribution malady affecting No. 1 cylinder. Experiments with a Rolls-Royce single-cylinder test engine of "Merlin" type, using Lodge RS5/4 plugs, showed an electrode temperature rise of approx. 250° C. between a variation in b.m.e.p. from approx. 85 to 385. It was found that shortly before a plug reaches pre-ignition point the rate of temperature rise decreases, due to auto-ignition taking place, and that thereafter there is a sudden and appreciable temperature increase to pre-ignition temperature. The thermocouple plug enables plug design to be adjusted to obviate these temperatures from being reached without courting other troubles due to too low an electrode temperature. Its application to racing car engine research after the war is obvious.

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FOLLOWING copies MOTOR SPORT, Dec., 1942, Dec. 1936, January-June 1937, Aug. and Sept. 1937, good condition. Mathieson, Lavershot Court, Windlesham, Surrey.

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RECENT MOTOR SPORT ROAD-TESTS

IN the issue of May, 1937, we published an Index of all the road tests conducted by this paper since it was founded, as *The Brooklands Gazette*, in 1924. From this Index we have been publishing extracts, but these did not embrace the tests published during the last six years. In order to make good this omission, we give below a revised selection, including tests published from May, 1937, to the present issue. Read in conjunction with the Index of May, 1937, it provides a reference to all the MOTOR SPORT tests—251 in all. Readers' accounts of their cars and technical descriptions of new models, moreover, are not included in this Index. Many of the issues concerned can still be supplied, at the prices given below. Please quote date of issue when ordering.

Make of Car	Issue
A.B.C. 11 h.p. 2-cyl. 2-seater	Feb. 1926
A.C. 2-litre, short-chassis, 15.7 h.p. 2-seater	July 1936
A.C. 2-litre, 16/40 h.p. 3-seater	Oct. 1927
A.C. 2-litre, 16/66 h.p. 4-seater	June 1934
A.C. "Ace" 16/80 h.p. 2-seater	July 1937
Alfa-Romeo, 1½-litre supercharged 6-cyl. Charles 2-seater (1929)	March 1934
Alfa-Romeo 1½-litre supercharged 8-cyl. "Zagato" 2-seater (1932)	July 1934
Alfa-Romeo 2.3-litre supercharged 8-cyl. "Zagato" 2-seater (1933)	Aug. 1936
Alfa-Romeo 2900B, Type 8C supercharged 2-seater (1937)	Jan. 1942
Alvis 6-cyl., "Silver Eagle" 4-seater coupé (1929)	Aug. 1931
Alvis 3½-litre saloon	Feb. 1936
Alvis Speed Twenty 4-seater	June 1932
Ansaldo 2-litre, 4-cyl., o.h.c. 4-seater	Sept. 1924
Aston-Martin Mark II, 11.9 h.p. 2-4-seater	Jan. 1935
Aston-Martin Ulster 11.9 h.p., T.T. 2-seater	Oct. 1935
Aston-Martin 11.9 h.p. 2-seater	Jan. 1930
Aston-Martin 1½-litre Ulster racing 2-seater	Aug. 1937
Aston-Martin 2-litre Speed Model 2-seater	May 1938
Aston-Martin 1½-litre Mark II, long-chassis 4-seater (1934)	Aug. 1940
Aston-Martin 2-litre streamline saloon	June 1942
Atalanta V12 saloon	March 1939
Auburn 30 h.p., 8 cyl. supercharged 2-seater	June 1935
Austin Seven Boyd Carpenter 2-str.	Sept. 1930
Austin Seven "65" 2-seater	Jan. 1934
BENTLEY 4½-litre, 6-cyl., Park Ward saloon	June 1936
Bentley 8-litre "Special" 2-seater (1931)	April 1938 & Dec. 1940
Bentley 4½-litre drophead coupé	Aug. 1938
Bentley 4½-litre Mark V saloon	Feb. 1941
Bentley 3-litre "Blue Label" "Special" 2-seater (1928–9)	Feb. 1939
Bentley 4½-litre "Le Mans" 4-seater (1928)	Jan. 1942
Bugatti 2.3-litre 8-cyl., Type 43, supercharged 4-seater	May 1930
Bugatti 3.3-litre 8-cyl., Type 57 saloon	May 1934
Bugatti 3.3-litre Type 57 saloon	May 1939 & June 1939
Bugatti 3.3-litre Type 57C supercharged saloon	June 1939
Bugatti 3.3-litre Type 57 SC supercharged coupé	Aug. 1942
Bugatti 5-litre Type 46 saloon (1929)	April 1942
CROSSLEY 20/70 h.p., 4-cyl., s.v. 4-seater	Nov. 1925
Crossley Ten, 1,122 c.c. 4-seater	April 1932
Crouch Anzani 12/30 h.p. 2-seater	Aug. 1924
DAIMLER 2½-litre 18 h.p. saloon	June 1940 & Nov. 1941
Darracq 12/32 h.p., Weymann saloon	Sept. 1924
Delage 8-cyl., sports saloon	April 1930
Delage D8/180 drophead coupé	May 1938
Delahaye 3.5-litre "Coupé des Alps" drophead coupé	Aug. 1936
D.K.W. "Special" saloon	Feb. 1938
Dodge 25.3 h.p. "Custom Six" saloon	May 1938
EXCELSIOR 5½-litre, 6-cyl., super-sports test chassis	Sept. 1927
FIAT "Balilla" saloon	May 1934
Fiat "Balilla" 10 h.p. 2-seater	Jan. 1935
Fiat 6 h.p., Type 500 coupé	March 1937
Fiat "Balilla" 1,100-c.c. saloon	March 1938
Ford Eight "Anglia" saloon	Aug. 1940
Ford V8 "30" Estate car	Oct. 1938
GEORGES-IRAT 2-litre f.w.d. 2-seater	May 1940
HILLMAN Fourteen saloon (1939)	June 1941
Hotchkiss 3½-litre "Grand Sports" saloon	July 1939
H.R.G. 1½-litre, Meadows engined 2-seater	June 1937
H.R.G. 1½-litre Le Mans racing 2-seater	Dec. 1939
INVICTA 4½-litre saloon	Dec. 1929
Invicta 4½-litre Estate car	June 1941
LAGONDA 4½-litre 4-seater	May 1936
Lagonda 4½-litre 4-seater	Jan. 1934
Lagonda 4½-litre, 6-cyl. saloon	Sept. 1939
Lanchester Eighteen saloon	Feb. 1938
Lancia "Aprilia," Type 238 saloon	June 1938
Lea-Francis 1½-litre supercharged T.T. 2-seater (1929)	June 1934
Lea-Francis Fourteen saloon	Dec. 1938
Leyland Eight 2-seater (1927)	Feb. 1938
MERCEDES-BENZ 12/40 h.p., supercharged 2-seater	June 1925
Mercédès-Benz 33/180 h.p., supercharged 4-seater	Aug. 1927
Mercédès-Benz 2.3-litre saloon	April 1938
Mercédès-Benz 1.7-litre, Type 170V 2-seater	Feb. 1939
M.G. Midget "J1," 850 c.c. 2-seater	Sept. 1932
M.G. Midget "T" 2-seater	Jan. 1937
M.G. 14/40 h.p., 4-cyl., super-sports 2-seater	May 1927
O.M. 6-cyl., 2-litre 4-seater	Oct.-Nov. 1928
PEUGEOT "201" 4-cyl., 1,122 c.c. saloon	Sept. 1931
RAILTON 8-cyl. Cobham saloon	Sept. 1938
Riley Nine 4-seater	June 1931
Riley 16 h.p., 4-cyl., "Kestrel" saloon	June 1938
Rover Ten "Special" 2-seater	Aug. 1939
Rolls Royce Twenty, all-weather (1927)	March 1942
Rolls Royce "Phantom I," supercharged	Nov. 1942
SINGER Nine 4-seater	March 1933
Squire 1½-litre, 4-cyl. 2-seater	Aug. 1935
Steyr Type XII, 14/35 h.p., Weymann saloon	Aug. 1928
Stutz "Black Hawk," supercharged 4-seater	Jan. 1930
Stutz 5-litre, 8-cyl. 4-seater	Dec. 1927
Sunbeam 3-litre, 6-cyl. (twin o.h.c.) fabric saloon	Nov. 1927
TALBOT "90," Brooklands-bodied 2-4-seater	April 1931
Talbot "105" sports saloon	April 1934
Talbot 3½-litre saloon	March 1936
Talbot Ten "Rally" 4-seater	Oct.-Nov. 1936
Talbot "105" Vanden Plas 4-seater	Nov. 1932
Talbot Ten tourer	June 1938
Terraplane 29 h.p., 8-cyl. 4-seater	July 1935
Triumph 2-litre "Vitesse Six" saloon	April 1935
Triumph 10 h.p. "Gloria Southern Cross" 2-seater	June 1935
Triumph 10 h.p. "Gloria" saloon	Jan. 1934
Triumph Nine "Southern Cross" 4-seater	June 1932
Triumph Eight "Gnat" 2-seater	Aug. 1931
Triumph Eight, supercharged 2-seater	Dec. 1929
Triumph "Dolomite" 14/60 h.p. saloon	June 1937
VAUXHALL 20/60 h.p. "Hurlingham" 2-seater	Feb. 1930
Vauxhall 17 h.p., 6-cyl., "Cadet" saloon	Sept. 1931
Vauxhall Twenty-five saloon	Aug. 1937
WINDSOR 4-cyl., 11 h.p., "Special" 2-3-seater	Nov. 1926
Wolseley Hornet Swallow 2-seater (1933)	April 1934
Wolseley Hornet (12.08 h.p.) saloon	Sept. 1930

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