Vol. XX No. 2 CECIL CLUTTON ON GEAR RATIOS February, 1944

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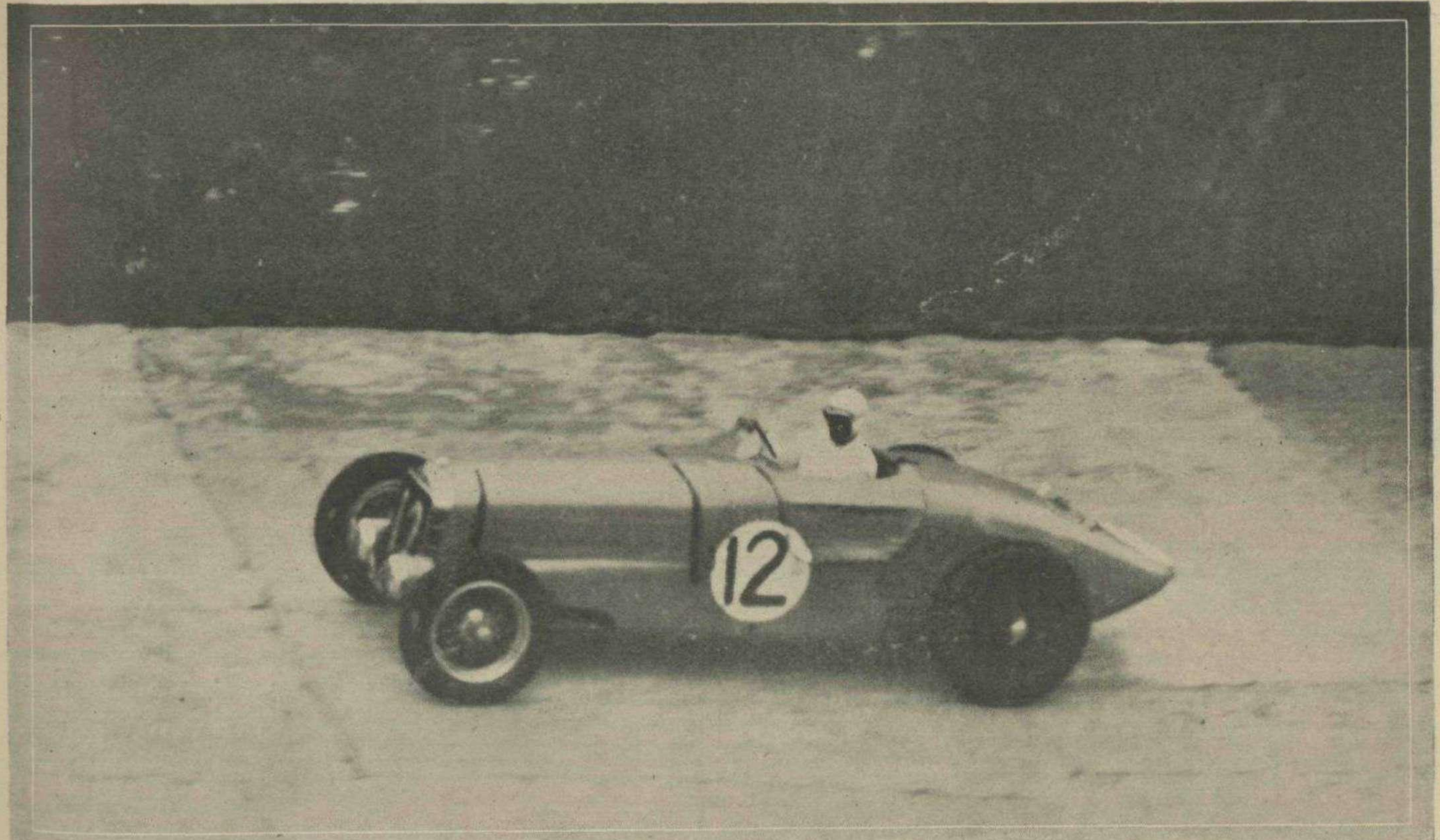

CONTENTS

The Significance of Gear Ratios... 23
Alvicacity 26
Fun and Games in the Midlands 27
From Start to Finish 28
The Outer Circuit "200s" 29
Some Notes on the 2-litre Lagonda 31
Cars and the Gradual Inflation Thereof 32
Rumblings... 33
New Zealand Notes 36
The 6-Cylinder Scott Two-Stroke 36
Club News 37
Letters from Readers 39

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THE SIGNIFICANCE OF GEAR RATIOS

By Cecil Clutton

THIS article is to begin with some fairly elementary remarks about gear ratios, and will end with some thoughts which may not, I hope, be quite so commonplace. It is with considerable diffidence that I embark on the first part, but I have met so many really knowledgeable people who find the topic of gear ratios rather confusing, that I believe there may be some justification for tackling the subject from the beginning. This looks rather like pretending to special knowledge, which I hasten to disclaim, except to the extent that sums in simple proportion have a peculiar appeal to my otherwise quite unmathematical mind ; and sums of simple proportion are what gear ratios mainly amount to.

To begin with, everyone knows that the effective gear ratios of a car are the product of the gearbox reduction and the back-axle reduction. Top gear generally being direct, the overall top gear ratio is also the back-axle ratio—say 4 to 1, for example. If third in the gearbox is 1.25 to 1, the overall third is then $1.25 \times 4 = 5$ to 1.

One is apt to think of 4 to 1 as a fairly high top gear and 5 to 1 as rather low, but 4 to 1, in conjunction with a 26″ diameter road-wheel is actually lower geared than 5 to 1 with a 33″ wheel ; even the mightiest among the scribes sometimes overlook this, and it is very easy, too, to get one's sums wrong. I did so myself, in MOTOR SPORT, quite recently, in connection with the streamlined 1,100-c.c. Fiat. The discovery of this led me to worry out the following simple formula for ascertaining m.p.h. per 1,000 r.p.m. for a given overall ratio and tyre size which, after all, is the only really accurate way of stating gear ratios. There is, of course, a slight difficulty in finding out the true wheel diameter, but the rim size plus twice the tyre width, minus one, is a good rough-and-ready figure (*e.g.*, a 16″ rim and 5″ tyre gives $16+5+5-1=25$″). The formula, which I have not seen stated anywhere else, is for the exact effective diameter. It is :

$$\frac{\text{Wheel diameter in inches}}{\text{overall gear ratio}} \times 3 = \text{m.p.h.}$$

per 1,000 r.p.m. of engine. For example, with a 27″ wheel and 4.05 to 1 ratio, $\frac{27'' \times 3}{4.05} = 20$ m.p.h. per 1,000 r.p.m.

The gearbox serves different purposes on different cars. On an overbodied, under-engined family saloon, it helps the thing to drag itself up hills. On a sports car, which is not unduly worried about hills, it is mainly an aid to acceleration. In racing cars designed for a specific course, the ratios may be plotted to the particular requirements of the circuit. This is a very important aspect of racing up Shelsley Walsh, and accounts for the long run of successes by cars with Frazer-Nash-type transmission, which could be ratioed specially for the event.

Clutton once again presents an absorbing article, and one containing very valuable data, which should be much used, both after the war and by way of an exercise by those now in exile. His views cannot fail to add new weight in favour of the vintage sports car—or is it vice versa ?—Ed.

Twice I have seen really knowledgeable people, in print, say, " We will have nice, close, evenly-spaced ratios of 4, 8, 12, and 16 to 1." That is to say, they make a gap of 4 between each ratio. What is the result of this ? Supposing the 4 to 1 top gives us a maximum of 80 m.p.h. ; on the 8 to 1 third, the engine will be turning just twice as fast at any given road speed ; and assuming the engine can attain peak revs. in top, the maximum in third will therefore be just half that in top, namely, 40 m.p.h. Put as a sum in simple proportion, $\frac{4}{8} = \frac{40}{80}$.

Looking now at third and second, we know that we can reach 40 in third, so we have $\frac{8}{12} = \frac{26.5}{40}$, *i.e.*, the maximum in second is 26.5 m.p.h. And $\frac{12}{16} = \frac{19.5}{26.5}$ in bottom.

So our maxima are the remarkably stupid ones of 19½, 26½, 40 and 80 m.p.h., and what looked, from a very superficial standpoint, a nice even spacing is, in fact, a very wide spacing between the higher ratios and a very close spacing among the lower ones—just the opposite of what is required.

Another (rather less superficial) apparently attractive arrangement of the ratios is that whereby one always speeds up the engine by the same amount between each pair of gears. That is to say, if one goes up to 4,500 r.p.m. in each gear, the corresponding engine speed in the next higher ratio is always, say, 3,000 r.p.m. This would mean that the gap between any pair of ratios is as 3 to 2, and it has been followed out in quite a number of famous cars, including the " 30/98 " Vauxhall, in which case the overall ratios of the E type were roughly 3, 4½, 6¾ and 10 to 1. The reason why this sounds attractive is that the engine can always be kept running within a selected range of revs. But what is the effect on the respective maxima ?

Let us again suppose that peak revs. can be attained in top and that this gives a maximum of 80 m.p.h. As a change to third produces a step up in revs. of $\frac{3}{2}$ so the maximum in third will be ⅔ of top—namely, 53 m.p.h., and so on, giving us maxima of 80, 53, 35 and 23 m.p.h. Thus,

although the *ratios* are evenly spaced, the maximum *road speeds* are noticeably bunched together in the lower gears. The result of this is that, in acceleration from rest, you have a terrific step off, rowing away at the gear-lever with tremendous application, till at only 53 m.p.h. you have run out of ratios and are left pinking impotently in top, while that vulgar Frazer-Nash car is just changing up from second to third. Clearly then, this won't do, either. It has, however, a justification on the family car, where the gearbox is to be thought of in terms of hill-climbing rather than acceleration. For this purpose it is quite good, and gives a nice wide gap between top and bottom.

Incidentally, it is a useful rule of thumb that the number of seconds taken to accelerate on the level from 10–30 m.p.h. in any one gear is also the gradient which the car will climb on that ratio. I know no reason for this ; it just appears to be a convenient fact.

Reverting to sports cars, which are our principal consideration, it is beginning to look as though we have got to space our ratios unevenly so that the *road maxima* are more or less equally spaced. To take a case in point, if the E type "30/98" had had ratios of 3, 4, 6 and 10 to 1, the road speeds at the peak of 3,000 r.p.m. would have been the nice ones of about 95, 71, 47 and 28 m.p.h., instead of the tiresome ones of 95, 63, 42 and 28 m.p.h., as they are. This is achieved by an uneven spacing of the ratios. Thus, to drop from top to third calls for only a 33⅓ per cent. increase in revs. From second to third calls for a 50 per cent. increase, and from second to bottom a 66⅔ per cent. increase.

But beware of thinking that these figures apply going up ! From bottom to second the revs. drop by 40 per cent. ; from second to third by 33⅓ per cent., and from third to top by 25 per cent. Quite simple, really, but an easy point on which to slip up. In an ideal five-speed box arranged on these lines, to get the almost equally spaced speeds of 100, 80, 60, 40 and 24 m.p.h., with a direct drive top, the gearbox ratios would be 1, 1.25, 1.68, 2.5 and 4.15 to 1 and, for example, with a 27½" wheel, 5,000 r.p.m., and a 4 to 1 axle ratio, overall ratios of 4, 5, 6.7, 10 and 16.6 to 1. A properly proportioned four-speed box may use either the lowest four or the highest four of this series of five.

Among other things, there are two factors which largely decide how close the designer can afford to make his ratios, assuming he is going to have the conventional number of four. At the top end, he has to decide the maximum road speed of which the car is capable or, putting it another way, the highest ratio upon which the engine will attain peak revs. Alternatively, he may decide that he will put the highest ratio so high that nothing like peak revs. *can* be attained when it is engaged. The overdrive model Rolls-Bentley and the Frazer-Nash are cases in point. At the bottom end, he has to decide how steep a gradient the car shall be able to surmount in bottom gear, and upon how steep a gradient it shall be able to restart from rest.

The pernicious habit, in latter pre-war reliability trials, of holding restart tests on ridiculously steep hills led designers, who looked to these events for cheap publicity, to supply their cars with fantastically low bottom gears. They sometimes achieved this by three fairly close ratios and a bottom which was literally 100 per cent. lower than second ; or by a more even spacing which meant very wide ratios all through. Either plan is equally undesirable for all ordinary road use, and it is very doubtful if it is any noticeable disadvantage to be unable to start from rest on even a 1-in-4 gradient. By these "trials bottoms" several quite nice little cars were spoilt from the point of view of the ordinary owner, and one hopes that the error will not be repeated.

We now come to the much more interesting problem of fitting gear ratios to different shaped power curves, and observation leads one to think that this aspect of the case is little appreciated by most designers. Notable exceptions have been Frazer-Nashes, W. O. Bentley and Rolls-Royces (especially in the overdrive Rolls-Bentley).

The finer refinements of choosing gear ratios turn upon a combination of two factors :—

(*a*) Does the power curve flatten noticeably at the top end or does it go up in a fairly straight line to peak ?

(*b*) What is the piston speed at peak revs. ?

While not necessarily the case, it is generally true that the short-stroke engine has a fairly straight power curve, and a fairly low maximum piston speed. A very close and extremely interesting comparison can be drawn between the V.12 Lagonda and the 4¼-litre Rolls-Bentley. The Lagonda (75×85) has a remarkably straight power curve, and a maximum piston speed of only 3,100 f.p.m. at 5,500 r.p.m. The Bentley (89×114) has a very flat-topped curve, and a maximum piston speed of over 3,400 f.p.m. at 4,500 r.p.m.

The power curves of both engines have been published in various places at different times, and what makes the comparison so particularly interesting is that, on the normal Lagonda axle ratio the road speed per 1,000 r.p.m. is the same as on direct drive on the Mark V Bentley. Furthermore, it is possible to calculate that the total resistance of the Mark V Bentley and V.12 Lagonda which were road-tested in the *Motor* during the early part of the war by Pomeroy, Heal, Clark and myself (reports also appeared in MOTOR SPORT) was almost identical in each case.

By stepping up the Bentley engine to a hypothetical 91×115, 4½ litres, we are able to compare two diametrically opposed types of engine, of identical cubic capacity, and drawing cars of identical total resistance. This I have done in the appended graph in which horse-power (on the vertical axis) is plotted against road-speed (on the horizontal axis), and also the relevant part of the total resistance curve. As is well known, in a road vehicle the maximum speed varies as the cube root of the power output. In this case, the 4½-litre 6-cylinder is assumed to develop 129 b.h.p. and the 4½-litre 12-cylinder is assumed to develop 165 b.p.h. In otherwise equal circumstances this gives maximum speeds of 97 and 105 m.p.h. The curves, as depicted, are believed to bear a close relationship to those of the Bentley and Lagonda.

We now have to find out what ratios to apply to these power curves so as to use them to the best advantage ; a 30" wheel is assumed in each case, and the 6-cylinder car can be considered first.

What is to be the top-gear ratio ?

Now, if the engine is going to be capable of reaching its terminal velocity of 4,500 r.p.m. and piston speed of 3,450 f.p.m., two difficulties confront us. One is that, as the power actually falls off after its peak at 3,900 r.p.m., the best power will not be available at the greatest road speed, which will suffer to the admittedly negligible extent of 1 m.p.h. ; but acceleration over the last 4–5 m.p.h. will also be affected. A worse snag is that the maximum safe cruising speed will be as low as 70 m.p.h. (3,250 r.p.m. and 2,500 f.p.m.).

As against these two defects we have excellent all-round top-gear performance and flexibility. Is it not, therefore, worth our while to use a top gear of this kind, and have a separate ratio just to look after the extreme top end of the scale, and to provide high-speed cruising ? Clearly, it would be worth while. The normal top-gear ratio on the lines just mentioned would be 4.2 to 1.

On our overdrive, we want to put our cruising speed as high as possible and to arrange for the peak power output to occur where the power curve crosses the total resistance line. This seems to suggest a ratio of 3.5 to 1. Actually, these two ratios conform very closely to the Mark V Bentley ratios of 3.6 and 4.3 to 1.

A word, in passing, about this vexed question of cruising speed, which really is vital to our argument. In the first place, one should try to frame a definition of the term, and this is very difficult. Hoping for better suggestions from readers, I propound the following :—

"Cruising speed is the maximum road speed which the engine can sustain for long periods, and at a sufficiently reduced throttle opening to ensure silent and smooth operation. It must coincide with crankshaft and piston speeds compatible with reliable and economical operation."

The partial throttle opening is, I think, an essential characteristic. It leaves a margin of power to tackle minor gradients without a gear change, while an engine operating at full throttle is always relatively rough and noisy. This applies less to inefficient engines, with small, low-lift valves, which are therefore able to cruise comfortably on a greater throttle opening than in the case of a high-efficiency engine.

One hears a lot about cruising at a maximum of 2,500 f.p.m. piston speed, and one is apt to wonder what special merit lies behind this apparently arbitrary figure.

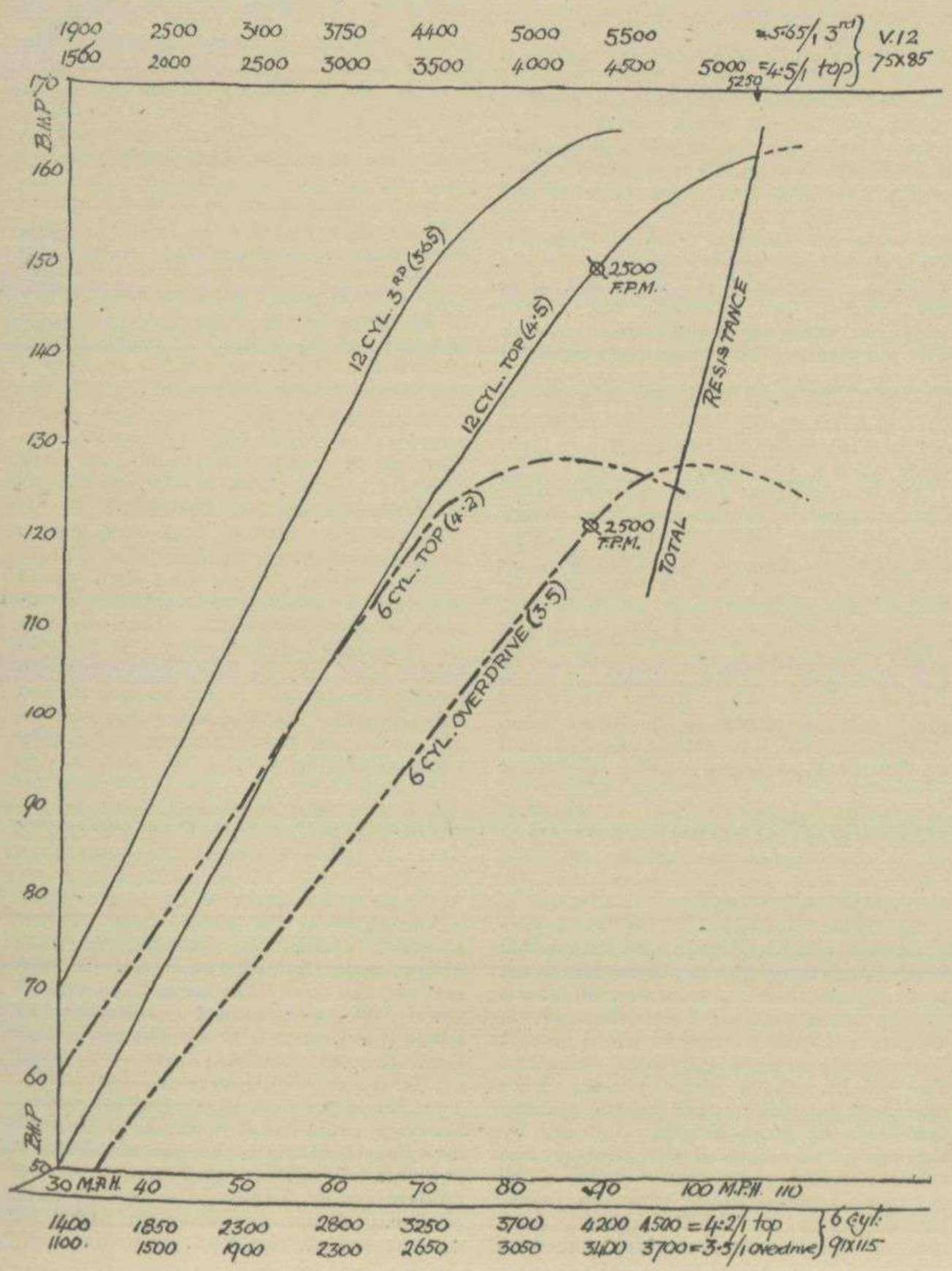
The answer is easily shown in a graph to illustrate the power losses in an engine at varying speeds. The loads in an engine go up as the square of the speed, and the losses go up accordingly. At very high speeds the engine is therefore having to devote a relatively large amount of its energy to pushing itself around. This naturally means uneconomical operation ; and it happens that a piston speed of 2,500 f.p.m. is just about the point above which the loads and losses begin to become excessive. The actual speed at which the piston rubs along the cylinder walls is

in itself of little importance ; but it *is* an exact measure of the rate of increased loading in the engine. This is *not* true of crankshaft speeds, which leave the length of stroke out of account. If and when the weight of reciprocating parts can be considerably reduced, the 2,500 figure may become out of date, but at the present state of development it must be regarded as pretty well an outside figure for touring machinery.

On our 3.5 gear, then, the cruising speed occurs at 87–88 m.p.h., and the graph suggests that this is very nicely placed to meet the various requirements.

Some American cars have at last been forced to adopt an overdrive gear (the average American power curve is remarkably flat-topped), but they frequently make much too wide a gap, involving a 33⅓ per cent. drop in revs. from top to overdrive. As has been shown, this defeats the object of the thing to a large extent. In our example it would have meant a 2.8 to 1 overdrive, which would have put the theoretical cruising speed much higher than the engine could conveniently cope with. It is, I think, the essence of an overdrive ratio that it should be fairly close to the normal direct drive. The Mark V is a splendid example of how the thing should be done, and the Frazer-Nash was another (a typical set of ratios was 3.8, 4.8, 7 and 11.75 to 1).

Now, how about the short-stroke, 12-cylinder engine ? The problems at once become much easier of solution. In the first place, the straightness of the curve raises no difficulty in attaining maximum revs. at maximum speed. In this particular instance, the Lagonda maximum of 5,500 r.p.m. has been assumed, which gives a piston speed of only 3,100 f.p.m. The resistance curve and power curve cross at 105 m.p.h. and 5,250 r.p.m., which gives a slight margin against over-revving in top. Owing to the low piston speed, the maximum cruising speed is 88 m.p.h., which is the same as on the overdrive of the 6-cylinder car. It will therefore be seen what a tremendous advantage in performance is gained by a short-stroke (not more than 85 mm.) engine and a straight power curve. It achieves on one ratio what the long-stroke, 6-cylinder engine requires two gears to do—and then still falls short. This does not necessarily imply that the Bentley type of curve is a bad thing ; it does, in fact, provide an exceedingly pleasant sort of performance, especially in conjunction with such an exquisite gearbox as the Bentley's ; but it does follow that for an engine of the Bentley type to equal the Lagonda performance, without resort to special tuning, a capacity of nearly 6 litres would be required. Alternatively, a mild supercharge is remarkably effective at stiffening up a power curve which tends to droop at the top end. The 2-litre V.12 Grand Prix Delage affords a remarkable illustration of this. In its unblown, 1923 form, it developed its maximum power of 115 b.h.p. at 6,000 r.p.m. and fell off to 106 b.h.p. at 7,000 r.p.m. In its 1924 supercharged form the curve went straight up to 190 b.h.p. at 7,000 r.p.m., at which point it was still rising steeply.



It is not necessarily the case that the long-stroke engine has a flat-topped curve, and *vice versa* ; factors such as valve timing and breathing efficiency are also of prime importance ; but it is generally the case. It is also generally true that an engine like our 6-cylinder example gives excellent power at low revs., and this is evident from the graph. Even with its smaller engine, the standard 4¼-litre Bentley engine has a greater power output than the V.12 Lagonda up to about 3,000 r.p.m. It is, therefore, only above 60 m.p.h. in top that the Lagonda has the advantage. It is, indeed, a remarkable feature of the Lagonda performance that the low-speed performance, although quite good in itself, compares so unfavourably with the really electrifying top-end acceleration as to appear definitely inferior. To make the most of the potentialities it is therefore necessary to do a lot of gear shifting to keep the revs. in the top half of the range. So although the short-stroke engine can do without an overdrive, thus saving some gear-changing, it probably calls for more gear-changing on balance.

The remaining two gear ratios on the 6-cylinder car are not so tremendously important (the Mark V ratios of 3.6, 4.3, 6.15 and 10 to 1 are beautifully chosen), but they have to be very carefully selected on the 12-cylinder type. The Lagonda ratios (on the middle of the three available axle ratios) are 4.45, 5.56, 7.43 and 14.46 to 1, which means that second and third are fairly close ratios, ensuring a vivid performance from 35 m.p.h. upwards. Bottom is largely an emergency ratio, on which 35 m.p.h. can just be reached ; it is very nearly twice the second gear ratio. This implies that unless by running up to peak revs. in bottom there is rather a blank space around 30 m.p.h., and this was also true of 3- and 4½-litre old-school Bentleys fitted with "A" or "D" type gearboxes. Probably a rather higher bottom gear would be the best all-round solution. But however one looks at it, the short-stroke engine needs a lot of gear-changing, and some effortless gear-shift, such as the Cotal, seems definitely to be called for. In this connection it seems a dreadful pity that the Cotal box

has such painfully wide ratios. As generally supplied a 50 per cent. increase in revs. is called for between top and third, and between third and second, like the old "30/98." One is informed that this is inherent, but I should very much like to see a convincing explanation of the reason, because it is not the case on the Wilson-type box which is basically similar. On the Squire, the change from top to third only called for a 25 per cent. rise in revs., and on the Alta, 33⅓ per cent., the Alta box conforming very closely to the 3, 4, 6, 10 series mentioned earlier. It is therefore very much to be hoped that a close-ratio Cotal box will be put into production after the war.

An interesting gear-ratio variant was that applied by Burgess to the 1914 T.T. Humber, in which he evidently considered *both* third and second in relationship to top, and very little in relationship to each other. And for racing purposes there is much to be said for it. Assuming a 3 to 1 top, then the ratios of top, third and second would be 3, 4 and 5 to 1. Bottom would be largely a getting-away ratio of about 9 to 1. This is also very much the spacing on the "A" and "D" type Bentley boxes, and W. O. Bentley has not entirely deserted it, even on the V.12 Lagonda.

The underlying idea apparently was that if one had to slow down into the middle speed-range, say, 30 to 45 m.p.h., a drop into the close-ratio third would not be very effective. Burgess therefore made second a sort of wide-ratio third, and the two could be treated as alternative rather than supplementary. On the Humber this was carried to its logical conclusion by placing both second and third at the front end of the gate. The change from top into either was therefore very easy, but from second to third called for a U-shaped movement of the lever. It is a delightful arrangement in practice, except for the lack of ratios around 25–35 m.p.h.

I hope enough has been said to open up this interesting subject for any readers who may have previously regarded it as rather formidable. One could go on amplifying and refining *ad nauseam*—or has the *nauseam* stage already been reached?

ALVICACITY

John Haining adds to our information on this popular marque

I POSSESS two "12/50" Alvis cars as well as several incomplete editions of the make. The first car, and my favourite, is a 1924 "12/50," engine number 3512, actually a 1925 model, with an open 3-door 4-seater body, and originally it had rear-wheel brakes only. I ran this car in peace-time regularly, doing 34 miles a day to my office, and at least another 250 miles each week-end. The car was in superb condition when I bought her, but I was foolish enough to allow a learner-driver to attempt a difficult turn into my yard with her, to the detriment of the lovely slim mudguards. Then I had a smash in 1941 with an old Ford lorry, with no left lock and a very drunken driver.

On examination I found the chassis to be undamaged, except for a bent dumb-iron, and decided to rebuild the car. My building programme was interrupted by a quite unwanted journey to the "Dark Continent," but has just been completed, at last, in my workshops. The chassis has been braced and strengthened—on the early Alvis the engine is carried in a sub-frame, which is apt to loosen and cause engine judder and harsh transmission.

A great deal of work was put in on the engine, although the single Zenith carburetter has been retained. Considerable modifications have been made to the induction and exhaust manifold; on the original engine the exhaust pipe is led from the rear of the manifold, and roasts the feet in warm weather. The compression ratio is stepped up slightly and the spark department is by Scintilla. Slight alteration has been made to the timing wheel housing, in an effort to eradicate the familiar "12/50" clatter. The original gearbox is retained, with the addition of a clutch-stop, not fitted on the original early model. The rather wide gear ratios are a slight disadvantage. The old steering wheel has been replaced by a spring-spoked "Brooklands" wheel, and the hand-brake is outside—the off side has no front door. The outside lever is partly a personal fad and partly to give more room to my knee.

The Hardy-Spicer fabric couplings have been retained in the transmission, although I could have used the more modern cardan shaft with metal universals. A "12/60" front axle is fitted, and the brakes are coupled and compensated. The high-pressure tyres and split-rim wheels are replaced by 20"×5.50" tyres and the more modern "12/60" wheels. Different axles with Rudge-Whitworth knock-offs are going to be fitted when time permits. The rather bloated and swollen back has been cut off—how those old body-builders could build!—and a more seemly back built on, embodying a large rear tank, and trailer tow-bar coupling. A folding screen is now being fitted, and the dashboard has always been fitted up fairly lavishly. The Smith clock has just been replaced after having had a lively year in my Army Humber in various parts of the world. I have had the car on the road recently, and hope to run it during this year. I ran out of petrol in Kirkby Lonsdale recently, and poured my last 2½ gallons into the bone-dry tank. I drove home, expecting to run out of petrol any moment, and arrived at my workshops near Chester with enough petrol to do a journey of 4½ miles before running out—a total distance of 94 miles. I could hardly believe this m.p.g. myself, so perhaps I should not expect others to!

The old "12/50" was truly nicknamed "the poor man's Bentley." I know of few other cars which give such pleasure to drive and handle, as well as possessing superb workmanship.

My second "12/50" is a 1927 saloon, bought, complete with built-in jacks, new Dunlops, twin wipers and two spare wheels, and in quite good condition generally, in 1941, for £7 10s. This car is at the moment being done up and overhauled, and may be fitted with a modern 2-seater body later. I also possess an experimental "12/50" engine, on which I am trying an overhead camshaft, very experimental as yet.

FUN and GAMES in the MIDLANDS—continued from next page

mechanic assured me that it was a 90-h.p. car which had been used in a Gordon-Bennett race. As previously mentioned, my knowledge of veterans is small, particularly of this type of car, but my own opinion is that it is 1907 or 1908, probably the latter, and that its power is about 60–70 h.p. Perhaps the following brief details will enable a reader to identify it more closely. It was painted a light colour, probably once white, and has been fitted with flared wings. Old brass headlamps are fitted, together with modern side lights of the type used by Ford. The radiator is V-shape and has a half-compression tap below. The four separately-cast cylinders have non-detachable heads, and there are two sparking plugs per cylinder, set horizontally at about 45° to each other. The crankcase is aluminium, with a drive to the camshaft between the second and third cylinders. The three valves per cylinder were operated by rockers and rather spidery push-rods of great length. Judging by the size of the exposed valve-spring, the single exhaust valve was a giant. The exhaust manifolds paired off the cylinders, two huge pipes coming through the near side of the bonnet, becoming one just before entering the water-cooled silencer situated under the passenger's seat. There were four forward speeds and reverse, the final drive being by enclosed chains. A rev.-counter calibrated to 2,000 r.p.m. graced the dash, the petrol tank was at the rear, and the large artillery-type wheels were not detachable. The car was in really excellent order, bearing in mind that it has been uncared for since 1939, but the casual observer is bound to express regret at some of the modernisations which the owner has evidently found necessary in order to use the car on the road.

★ FUN and GAMES in the MIDLANDS

In these petrol-less days enthusiasts in this country still contrive to meet and talk or inspect cars. Graham C. Dix here describes some expeditions of this kind, undertaken by himself and by members of the Midland Motoring Enthusiasts' Club.—Ed.

AN absorbing day was recently spent at Birmingham with Mr. Chris. Southall, who invited members of the M.M.E.C. to examine the collection of veteran cars which belongs to Garry Adams and himself. One can gather the calibre of Mr. Southall's enthusiasm when I say that he met us at his gate in a 1902 Baker electric car, which was operating for the occasion on batteries robbed from more modern vehicles. After sounding the warning bell (which was ominously like that of an ambulance !) the Baker preceded us up the drive, considerable wheelspin in starting testifying to its good power-to-weight ratio. It has the non-sprung tubular chassis reminiscent of the Locomobile steam car, the body being of dogcart type with leather mudguards and cape hood (to be fitted later), the whole connected to the chassis by four full-elliptic springs. It is powered by a 3½-h.p. electric motor with a reverse gear and current lock, and there is also provision for electric lighting, wires being carried through to the lamp brackets. Petrol being in short supply, the remaining vehicles were not started, but a most interesting afternoon was spent in examining them. The oldest member of the stable was an 1899 Benz—large wire-spoked wheels, solid tyres, rear engine, obviously evolved from gas-engine practice, and the usual horizontal-spoked flywheel. In the same garage was a 1903 Darracq tonneau, with single-cylinder engine, gilled-tube radiator, and steering asking only one-fifth of a turn lock to lock. Needless to say, the turning circle was not very good ! In another corner was a 1912 A.C. Sociable, which Mr. Southall used for 700 miles in Birmingham when the extension of the basic ration was granted to three-wheelers. Not being a veteran expert, I had always regarded this as one of the worst cars ever made, taking into account its date of manufacture, with its bathchair seating, tiller controls, inverted village-church-bell layout of double-spoked flywheels and single cylinder, and clutch-cum-epicyclic two-speed box in the single rear wheel. But Mr. Southall assures me that while the A.C. was in everyday use he found it perfectly reliable. I still suspect this to be due more to his careful rebuilding and driving than to any inherent qualities of the design, and this would appear to be confirmed by the fact that on a previous occasion the car took 18 hours to cover 25 miles. Close by was a tri-car with two sloping single-cylinder engines side by side, driving the two rear wheels by chains. Bodywork was almost non-existent, the two seats being mounted on an otherwise unadorned chassis, the passenger sitting in front of the driver. Also examined was an Allday-and-Onions, which surely must have been one of the most minute conventional cars ever made, steered by a delightful wheel of some 9 in. diameter, with a very thick rim. Then there was a wonderfully preserved 1904 Talbot 2-seater, with windscreen in a wide mahogany frame and plenty of brasswork.

The cycling world was represented by a bone-shaker built for Mr. Southall's grandfather by George Tangye in 1869, after seeing a somewhat similar French machine in a Birmingham street. This is not the place to describe such a bicycle in detail, but it is worth recording that the first owner once covered 80 miles in one day's riding. There was also an early Humber motorcycle, comprising a standard cycle frame with motor added, and a four-in-line F.N. machine, rare, though of much later date. Among modern vehicles were Singer Nine sports 4-seater, Morgan 4/4, Standard 10/12 sports 2-seater (of dashing appearance but, we learned, poor performance and badly balanced), and a B.M.W. Type 45, which the owner praised very highly. Now disused was a 350-c.c. Lloyd car, interesting in view of its all-round independent suspension and rear engine, although one gathers that it proved something of a handful on tramlines in wet weather. A Rolls Royce "Silver Ghost" 2-seater coupé, formerly the property of Fred Karno, is used for pulling a field mower, and does so with a remarkably low petrol consumption and no apparent loss of performance. Lastly, due respect was paid to a 1929 Type 40 Bugatti. When this car was pushed out into the sunlight it was seen to be possessed of several special features, not least, in the writer's estimation, being the use of two bicycle pedal-cranks as levers on the front brake back plates.

Stored in the country are other veterans, including a 1904 Lagonda tri-car, a Serpollet steam car and a 1902 De Dion with its classic rear suspension. This last had done some 1,500 miles just prior to the war in veteran trials, rallies, etc. It is on record that when the crew went to collect it from an unheated hotel garage one winter morning they found the owner of a modern popular car in difficulties over starting. Before going, they attempted to help him by resorting to the handle, but without avail. His amazement was a joy to watch when, having primed the engine, the De Dion fired on the first pull-up, and, with lowered goggles and caps reversed, they chugged on their way. Mr. Southall merits the thanks of the whole motoring community for the amount of time, skill and money he has devoted to the honourable task, not only of preserving so many veterans, but also in using them as a practical means of transport. My brief acquaintance with his stable does not enable me to do it justice in this report, and I hope that one day the owner may be persuaded to relate his experiences personally.

Another afternoon the writer arranged to visit Mr. P. M. Bull, who recently claimed, in *The Autocar*, to have owned over 60 cars in eight years. Most of these have been Continentals, and there was a long discussion upon our mutual interest in D.K.W.s. The real purpose of my visit, however, was to inspect his Zbriojevska (?), which I believe is pronounced "Zebrofska." This is a Czech car, of unknown bore and stroke, rated at 13 h.p., and is a 4-cylinder 2-stroke. Having regard to the size of engine, the chassis is of liberal dimensions, independently sprung at the front by a wishbone at the bottom and transverse spring at the top. The engine has an aluminium head, and the drive is to the front wheels via a 3-speed box. The pistons have no deflectors in the accepted sense of the word, but are domed, shallow recesses in the crown guiding the gases. There is a large gravity feed tank under the bonnet, the filler being surrounded by a permanent tundish which would be invaluable if recourse had to be made frequently to tins as a source of supply. The radiator header tank is simply enormous, and the car should be capable of climbing the Tatra, or any other mountains, without overheating. The body is a large two-door cabriolet reminiscent of Mercédès, with red leather upholstery on the wide bench seats. The stiff gear-lever, rising from a ball-joint in the footboards in the centre of the compartment like that in the early B.S.A. three-wheelers, is obtrusive for a front-wheel-drive car, and the linkage is complex. There are two spare wheels, hydraulic brakes, and a luggage boot large enough to store a cabin trunk. Altogether a car to stand up to much tough going and very heavy loads. As the starter was temporarily out of action I did not hear the engine running. I am assured, however, that it is very smooth and gives low-speed acceleration above the average. Maximum is about 70 m.p.h., and there is little noticeable snatch on the overrun, although no free-wheel is provided. There are twin Zenith carburetters, and an individual ignition system which has two coils and contact-breakers and which makes the plugs spark at the bottom, as well as at the top, of every stroke. The greatest thanks are due to Mr. Bull for his kindness in devoting so much time to enable me to examine the car, and still more so for his enthusiasm in collecting examples of current continental practice.

The last of this series of expeditions was a 20-mile cycle ride in a biting wind, to examine an early Mercédès. It was stored at a garage, the owner being somewhere in the Middle East. The

Continued on preceding page

From START *to* FINISH

A foolish episode in which Peter Clark, who records it, was assisted by Julian Fall

IT all started with looking out an old empty Chianti bottle to make a practice "sticky" bomb. This involved rummaging about under the garage bench, and among other debris there unearthed was a one-gallon pressure petrol tank used for sprint events. For some strange reason this tank was found to contain about half a gallon of pre-war Discol. "Let's start the Alfa" was the natural reaction, oblivious to the fact that it was already nearly four o'clock on Sunday afternoon, and the real purpose of Fall's presence was to prepare a Type 22 Bugatti for towing away elsewhere.

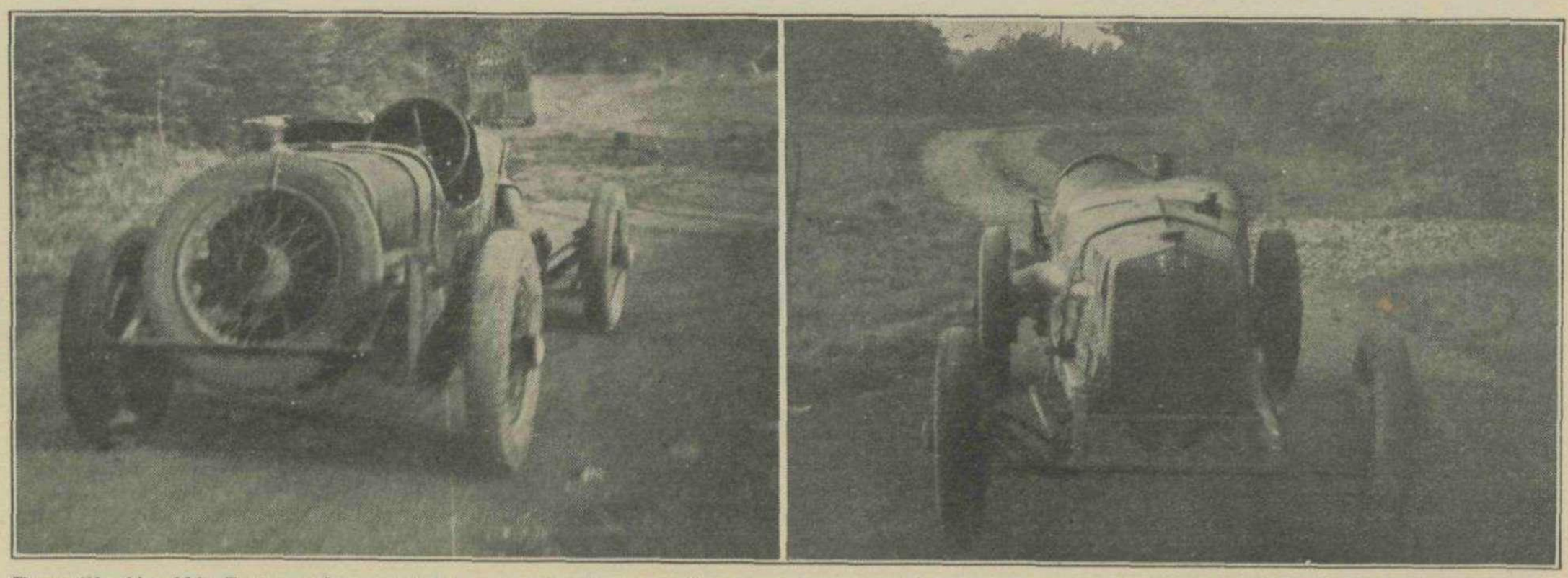
Starting the Alfa meant stripping two 5.25" × 19.0" covers from my gas-producing trailer and fitting them to the Alfa's wheels : blowing up two 7.00" × 21.0" rear tyres ; finding and fitting the Brooklands exhaust system ; improvising a floor and driving seat ; connecting up the sprint petrol tank ; putting a gallon of dirty Castrol "R" into the main oil tank, and finding a metric set-screw to fit the radiator drain plug.

All this was duly done, the standard of pit-work being quite surprising, and after a very brief tow the Alfa burst into unhesitating song. Enthusiasts will have recognised the car as one of the few surviving 6-cylinder 3-litre push-rod o.h.v. cars, but whether mine now has the special racing engine or an ordinary "22/90," I am afraid I really cannot say. Some parts say "Tipo RLS" and others "RLSS," so perhaps there are bits of both. It is in the most disreputable condition, and I have not yet been able to take any steps towards its restoration. The engine seems sound enough, but the gearbox is very strange indeed, chassis distortion enabling the selector arrangements to become most involved.

Anyway, off went the tow-rope, Fall jumped on board, and Clark almost at once changed smartly into two gears at once, bringing matters equally smartly to an abrupt standstill. This trifling *contre-temps* being rectified with the aid of a long tyre lever, we proceeded to call upon my neighbour, Jack Pearks, who was entertaining to tea an eminent (and scandalised) Harley Street physician. We made a beautiful noise and smell. . . . The strange thing about the noise is that, although the engine has a longish stroke and is relatively low-revving, it makes a noise "just like an Alfa." I suppose this perfectly logical phenomenon seems strange because, in a general way, the car feels like a Bentley or "30/98" Vauxhall, and one is therefore inclined to forget that, unlike the typical British vintage car, it has six cylinders.

Taking leave of the Pearks *menage*, and having some difficulty after engaging reverse in disengaging it again, we rumbled home and proceeded violently (if not exactly rapidly) to circumnavigate my house until the precious fluid was exhausted. Fall took some tricky action photographs of this, but such was his excitement (or panic) that I think he must have omitted to "cock the action," for nothing came out. On the other hand, there may be something peculiar about my camera, for on a subsequent occasion, when I was endeavouring to take a close-up of a glamorous female, nothing happened until I turned the thing round to see what it was a-doing of, whereupon it promptly performed and rewarded me with an out-of-focus close-up of my own ugly visage. I suppose this is what the experts mean by panning the camera.

The circuit, as I was saying, started where you see the car's rear view, and after dropping (9-in. sheer) on to the grass swept right-handed in front of the grandstand (or house). Thence it continued in a fast right-hand sweep past the goose pen, under the clothes-line and behind the apple orchard. The latter can be seen in full luxuriant frondage on the left of the picture showing the car's front view, and in the background is the tricky right-hand hairpin where the circuit is completed on regaining the hard highway. Needless to say, the petrol ran out at the point furthest from the garage, leading to a laborious push over very soggy grass. *Such is life !*



Peter Clark's Alfa-Romeo, about which he recounts the accompanying episode. This car is, we believe, the one raced at Brooklands about 20 years ago by Lanfranchi. Another, which Major Coe used to drive, is now in the Whincop's stable.

THIS ENGLAND !

We take the following from *Flight* of December 23rd, 1943 : "Two 20-year-old Canadian Halifax pilots, both of whom have flown in at least one big Berlin attack, besides a fair number of lesser raids, recently applied for third-party motor-cycle insurance. But they were told that as they were under 21 they would have to get a letter from 'a responsible party' before they could be allowed to ride their own motorcycles. Fortunately, the Dominion lads regard this sort of treatment as a joke." We are glad, for the sake of our national reputation, that the pilots regard this red tape as a joke. But, personally, we do NOT.

THE OUTER CIRCUIT "200s"

THE Junior Car Club certainly intrigued the motoring world when it announced, for 1921, a 200-mile contest at Brooklands for cars not exceeding 1,500 c.c. We who have seen 500-mile races won at the Weybridge course, at over 120 m.p.h. in one instance, may assume a blasé attitude, but we hardly need to be reminded of the state of light-car development in 1921, and of what a scratch race over 74 laps of Brooklands' none to smooth concrete implied. This was not the first British long-distance race, for the I.O.M. T.T.s had preceded it, but it *was* the first long-distance race held in this country, for Brooklands, in spite of its fourteen summers, had seen nothing like it before. Speculation on divers scores was rife, but, largely thanks to the late Hugh McConnell, details were gradually settled and the rules published. The actual distance was to be 201 miles 189 yards, and there were to be two classes, up to 1,100 c.c. and 1,101–1,500 c.c., with cups for the winners and a great gold cup presented by T. B. André for the entrant of the car making fastest time of all. The starters were to be drawn up at the Fork in four lines, the first row leaving at mid-day, the remaining rows being flagged off at 30-sec. intervals. Cars allocated to the first row were to sport at least two feet of yellow paint on their bonnets, those in the second row red, those in the third green, and those unfortunates in the last row white. Mechanics had to be carried and they, alone, could assist the driver at the pits.

It only awaited a good entry list, and the first 200-Mile Race of the J.C.C., scheduled for October 22nd, seemed an assured success. That list wasn't long in forming. It closed with Talbot-Darracq, A.C., Aston-Martin, Bugatti, G.N., Deemster, A.V., Marlborough, Eric Campbell, B.A.C., Hillman, A.B.C., Enfield-Allday, Douglas, Charron-Laycock, Lagonda, Bleriot-Whippet, Alvis, Soriano-Pedroso, Silent Snow, Gregoire, Singer, Coventry-Premier, Crouch, Horstman, Temperino, Baby Peugeot, and Morgan—positive proof that this contest was to have the support of both the leading makes of light car and those dark horses striving to establish themselves in a new industry. Speculation as to the results continued unabated. The Talbot-Darracqs were known to be very fast and had beautiful little bodies built at the last minute by the Hawker Aeroplane works at Kingston, while Segrave, Guinness and Campbell were the drivers. They had proved invincible at Le Mans and could exceed 90 m.p.h. if pressed. But Aston-Martins had taken the hour record in the 1½-litre class at over 86 m.p.h. in spite of a s.v. engine, and the A.C. team had lapped at over 90. The Bugattis ha l won at Brescia. These speeds may seem pathetic to-day to some people, mindful of Major Gardner's 200-m.p.h. M.G., but to the writer they appear quite staggering, remembering the state of small car development in the early nineteen-twenties.

Admittedly, in a race of this length and without corners, very high gear-ratios could be used, coupled with narrow, well-streamlined bodies, to enable high speeds to be achieved without tuning engines to an unreliable pitch. There were no acceleration and roadholding problems to face, it is true, which doubtless caused several little-known makers to mildly tune and extensively cowl quite normal light cars and try their luck. Against this, 200 miles round Brooklands was, in 1921, a very long way indeed for small engines, and the surface imposed severe strains on light chassis running on tiny section tyres. Gradually information trickled through concerning technicalities and form. The Talbots had 16-valve engines with the timing gear for the twin o.h.c. at the front, twin Solex carburetters, Delco coil ignition and pump cooling.

Since the war commenced a contemporary has devoted considerable space to Outer-Circuit racing at Brooklands Track, a subject taboo with many people, but deservedly having a fascination all its own. However, these articles have, in the main, concerned the larger cars which raced at Brooklands in the early days, and less emphasis has been placed on the rather remarkable achievements of the small cars of the early nineteen-twenties. They were doing outstanding things in B.A.R.C. short handicaps and in the field of record-breaking, but perhaps they achieved their greatest allure in the J.C.C. 200-Mile Races, run over the Outer Circuit in 1921-4; the original race of this famous series being the first long-distance race held in England. In view of the foregoing I have a clear conscience in inflicting this detailed account on even my anti-vintage readers, for there is some history which should never grow stale.—Ed.

The dynamos were used to charge the batteries on which they relied for ignition, and these 65×112 mm. engines gave 51 b.h.p. at 4,000 r.p.m. The bodies had seat backs of unpadded aluminium moulded to the occupants' backs, and the mechanics had hand grips behind the driver's seat, beloved of writers of schoolboy racing yarns. There were neat half foot-ramps, also of aluminium, with recesses for the driver's heels. Everyone wanted to know what axle ratio these cars used and no one ever discovered, a popular guess being 3.25 to 1. Many of the cars were hastily stripped and rebuilt following the G.P. des Voiturettes, and Bedford's Hillman was found in good fettle after finishing 4th, behind the Talbots, averaging 62½ m.p.h. for the 279 gruelling miles of that race. Five A.C.s were entered, two being virtually standard 3-speed sporting cars, specially streamlined and faired, and three genuine racing cars, designed by the ingenious J. Weller. Originally 8-valve engines with single chain-driven o.h.c., 16-valve heads were tried later, and ignition was by coil, pump cooling being used. The 4-speed gearboxes were in unit with a remarkable solid rear axle, which had exposed driving shafts, the ¼-elliptic springs being linked to the central casings, close against which the brake drums ran. Front suspension was located by a ball-jointed radius arm, consisting of ¼-elliptic springs to a tubular axle, while the new-shape radiators had stone guards, the bodies were well streamlined, and the cars were geared to do 25 m.p.h. per 1,000 r.p.m. The drivers were Munday, Davis and Davy, the last-named having a beautiful streamljned head-rest, while the s.v. cars were handled by Brownsort and Stead. Lionel Martin put in three Aston-Martins, Kensington-Moir's, with streamline body, winning at 81 m.p.h. at the preceding B.A.R.C. meeting, while Zborowski had the 16-valve, Ballot-head engine, completed about three weeks beforehand, Victor Bruce and B. S. Marshall handling side-valve cars. An ingenious lap-scorer was used (the A.C.s had r.p.m./m.p.h. tables adjacent to the tachometers) and big wire-gauze screens for driver and mechanic were fitted. As time went on the later cars gained speed, but A.C. had various pothers, and on the eve of the race the sixth car was withdrawn and Steal took over Noble's entry.

France sent over two bolster-tanked Bugattis, but they did not appear until nearly race day, so that there was no time to fit streamline bodies, and Monez-Maury and Pierre de Viscaya came over later still, with no opportunity of learning Brooklands. Ignition was by two magnetos and the contact-breakers were coupled by a link in the cockpit, held by a wing nut to obtain advance and retard. Of the Horstmans, three had Coventry-Simplex 62×100 mm. engines, altered to take an external inlet manifold fed by a Solex carburetter and outside exhaust pipes, and long streamline bodies with conventional radiator cowls and outside gear and brake levers, the dashboards carrying a radiator thermometer. They were not fast, but seemed likely to be reliable, so Temple and Edwards, backed by Douglas Hawkes's Anzani-engined car, were considered to have a good chance. The two Lagondas were based on the standard 11.9-h.p. model, being driven by Major Oates and Hammond, the former's a sister car to that which had recently broken the 1,500 c.c. hour record. The engine had rockers in line with the crankshaft, operating the o.h. inlet valves, and the bodies, while quite well-faired, were noticeably comfortable and roomy, with well-upholstered seats. Gear and brake levers were central, a spare wheel was accommodated in the tail, and with a very large fuel tank behind it, the radiator was cowled.

Alvis put in two cars, presumably s.v. " 12/40 " models, although there was at

one time some worry as to whether the second car would be ready, as the G.P. car suffered a smashed sump in that race and had to be repaired. Harvey's car had a cowled radiator, and extensively drilled frame and full undershield, and was fast. Joceland drove the other. Milward and Pradier teamed up for Charron-Laycock, which had 65×110 mm. engines, Pradier's having a 3.5 to 1 top gear, ¼-elliptic rear springs in place of ½-elliptics being hastily substituted on both cars. The A.B.C. entered by Gordon England only just came within the 1,500 c.c. class, with its o.h.v. "square," air-cooled flat-twin engine of 1,198 c.c. It had been fitted with a much lighter, square-aspect body for the "200," the whole chassis being visible from the skeleton seats. The fan was removed, the foot-brake and its connections taken off, the cast-iron pistons replaced by aluminium ones giving a compression-ratio of 5½ to 1, two huge Solex carburetters fitted, and the breather led to the exhaust valves, while return springs were fitted to the valve rockers. During the first week in October the rear axle ratio was changed for one of 3.25 to 1 and the speed went up to nearly 80 m.p.h.; unfortunately a gudgeon-pin then broke near the eve of the race.

The fast scarlet Enfield-Allday, a newcomer to Brooklands, went out, experienced steering trouble, and was rushed back to the works, to Bertelli's concern; but the Marlboroughs, one of which had a rotary valve engine, were ready in good time, although in the end only two started. They, like so many of the other cars, had the later well-known coiled piece of tubing from the radiator cap to act as a steam vent should boiling occur. These cars had spare wheels carried in a locker beneath the fuel tank in the circular tail, while the rear springs ran directly beneath the side members of the frame, passing through slots in the upper flanges at the rear, to meet the shackles. One had a screen of ordinary fine wire mesh. As practice progressed it was seen that many cars would go through without refuelling, consumption appearing to vary from 18 to about 25 m.p.g., but the need for fresh oil presented a grave problem; plug troubles were infrequent. The Bugattis used a huge funnel with lid, set before the mechanic, into which could be fed the contents of a quart tin of oil to humour the roller-bearing engine, while the A.C.s had two hand-pumps, one to feed in fresh oil and the other to scavenge. The Enfield-Allday and some other cars had a small oil radiator. Good shock-absorption proved very essential, and one Aston-Martin had both Houdaille hydraulic and Hartford friction shock-absorbers, the latter left loose, to be tightened up if needed.

Before dealing with the actual race, let us consider the 1,100 c.c. class competitors. Archie Nash relied on a standard G.N. with special engine and ratios. The engine was the one used at Boulogne a few weeks before the "200," with 84×98 mm. air-cooled cylinders at 90°. Each cylinder had four o.h.v. operated by an o.h.c. Finding chain drive for the camshafts unsatisfactory in several respects, Nash hastily designed a new system, in which a vertical shaft from the centre of the crankcase drove, by bevel, a cross-shaft connecting both camshafts—in later days, of course, o.h.c. G.N. engines had either a shaft running up the barrel to each camshaft or a single chain drive. Aluminium pistons were used, the internals were undrilled, and there was a dummy radiator frame before the engine. Four-speed chain transmission gave two high top speeds, top being 3.03 to 1, but a 3.3 to 1 ratio being provided in case a head wind blew up the Fork on the day of the race. The tyres were 700×75 Palmers, and the instruments included Smith speedometer and tachometer. The engine asked for a pumpful of Castrol "R" three times per lap, to keep the passenger busy.

Salmson, who had won the Cyclecar Grand Prix that year, sent over Lombard, regarded as Nash's only rival. His car had a 4-cylinder engine and G.N.-type ¼-elliptic front springs. The Deemster, new to Weybridge, was developed from a standard chassis, but had steel pistons, lightened con.-rods, single, stronger valve springs, a special camshaft, and a racing Claudel Hobson carburetter for its bench tests. To improve stability the wheelbase was increased to 8′ 4″, and Hartfords were used all round; the top gear was 3.5 to 1. The transmission bearings ran dry, being specially fitted, and a continual drip feed to engine and front universal joint was used, with a spare oil supply in a tank, fed by hand pump, in addition. The normal Deemster radiator sat on rubber buffers, and had a pigtail vent pipe and mesh shield, the 10-gallon fuel tank was well protected, both occupants had screens, and the body was well faired, with the brake-lever outside and the gear-lever inside, just below the driver's knees. Before the race the artillery wheels were replaced by Rudge wire wheels, and the number disc on the tail was braced by wire stays. The engine had additional water connections from around the valve pockets to the radiator.

The A.V. had a V-fronted dummy bonnet, and Ackermann steering replaced the centre-pivot front axle of the production cars. The big V-twin air-cooled engine sat in the tail behind the rear axle, notwithstanding which the wire wheels carried tyres of a size that would seriously upset present-day scrutineers, even of Class I cars. The Eric-Campbell, quite an unknown quantity, was one of the few unstreamlined cars running, although it made up for this to some extent by having a very slim radiator; it had a specially-tuned Coventry-Simplex engine with outside exhaust system and raised axle ratio, but was otherwise practically standard. The B.A.C. had a rather similar radiator, set well back over its ½-elliptic front springs, and much pother arose when the engines for these cars were lost in transit to the maker's works! The Soriano-Pedroso carried a great continental speed reputation, but was totally unknown over here; the 2-stroke Silent Snow was equally unknown and never appeared to fulfil the kind comment of a current contemporary to the effect that "the 2-stroke cycle should give a theoretical advantage as regards power," while yet another dark horse was the Gregoire entry. The Coventry-Premier was another newcomer, rather standard-looking, even to disc wheels, but it, and Bicknell's artillery-wheeled Singer Ten, were consistent lappers in practice, and Lionel Martin was said to have got 80 m.p.h. from such a Singer in pre-1914 times. The Coventry-Premier was eventually given a bigger Claudel-Hobson carburetter to help it along, while Ware's Morgan 3-wheeler was really quick, lapping at 80 m.p.h. The Crouch had many Brooklands' successes to its credit, but Topping's tiny yellow Baby Peugeot was virtually standard and naturally not very brisk.

The practice period was hectic in the extreme. The Horstmans and one Marlborough were ready in good time, the Deemster lapped at 82 m.p.h., the Charron-Laycock had run quite a distance at 82, and the Alvis was very fast, reaching 87 m.p.h., but, not unexpectedly, trouble was rife. Two days before the race Davis's A.C. was rushed back to the works with the water-pump leaking into the base chamber, a suspicion that the contact breaker cam was slipping, and clutch slip, worries that persisted even as the cars lined up for the start. Indeed, the night before the race saw lights burning in most of the sheds at the Track, as frantic last-minute work proceeded—but over at the Byfleet side peace and contentment reigned where the Talbot-Darracqs were stationed.

It is interesting to observe how estimates of the winner's probable speed changed as practice times came in. The original estimate of 75 m.p.h. was up to 80 m.p.h. by the end of September, and on the eve of the race the victor was expected by the knowledgeable to average 86 m.p.h. In actual fact, the winning car averaged nearly 89 m.p.h., seven finishers averaged over 80 m.p.h., and the fastest lap was at nearly 98 m.p.h. Thus this first long-distance race to be run in England appealed not only on account of its originality and the importance which a varied field of manufacturers attributed to success (competition was keen in the new motoring sphere), but also because ordinary motorists were going to be given the opportunity of seeing racing light cars lapping Brooklands at nearly twice the speed that their own small cars attained flat-out—and attempting to do so for a distance greater than most people covered in a full day's drive. Little wonder that, in spite of clouds which gathered about 10 o'clock, 6,630 spectators, in 1,462 cars (many of them small cars of makes soon to be contesting the first English long-distance classic) and 198 motorcycles, made their way to Weybridge on Saturday morning, October 22nd, 1921. When the four rows of cars lined up before the Vickers' Sheds and people ticked them off in their programmes (which contained a lap-scoring chart of over 4,000 minute squares!), it was seen that the Eric-Campbell, B.A.C., Douglas, Soriano-Pedroso, Silent Snow, Gregoire, and Crouch had failed to materialise. That did not materially distract the interest and anticipation. All was set for an epic race to commence at noon, and the *Autocar* had arranged for telegrams of the competitors' progress to be posted at 36 different towns throughout the British Isles.

(To be continued.)

Some Notes on the 2-litre Lagonda

E. J. L. Griffith, M.I.E.I., enthuses over a respected vintage car that is still in considerable demand.

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I HAVE read MOTOR SPORT, *The Motor* and the *Autocar* since the war began, and although I am only one of many enthusiasts who wish to see the good work carry on, I feel I must congratulate those people who have made these motoring articles so interesting to read. My one regret, however, is that very little has been written about the 14/60-h.p. 2-litre Lagonda ; unfortunately they are rather rare cars, which may be the reason for so little being heard about them. In this article I have tried to demonstrate the excellent qualities of the 2-litre, because, to my mind, having owned and driven a fairly wide variety of vintage motors, it is a car which must not be allowed to be exterminated by the breaker's ten-pounder. The 2-litre Lagonda can be placed high on the merit list of vintage motors which were performing before this miserable conflict.

The first 2-litre was manufactured in March, 1926 ; this was the O.H. model of 12.9 rated h.p., developing 78 b.h.p. The engine has four cylinders of 72 mm. by 120 mm. (capacity 1,954 c.c.).

The inlet and exhaust valves, set at an angle of 45°, are operated by two camshafts, chain driven off the crankshaft, through rockers working on fulcrum pins which are hollow, and eccentric for tappet clearance adjustment. The oil pump and dynamo are also driven by chains. Seven sprockets are situated inside the timing cover, the crankshaft driving chain passing over the intermediate sprocket, underneath the central sprocket and over the oil pump and water-pump sprocket. Attached to the central sprocket, which runs on the lower spindle, is another sprocket, from which another chain drives the two camshafts, an idler sprocket running on the upper central spindle. The magneto is driven off the exhaust camshaft and is mounted across the top of the front of the engine, at an angle.

The sump, chain case and cover, fly-wheel-guard and engine bearers (4-point mounting) are aluminium.

The crankshaft runs in five pressure-fed die-cast bearings, of which only Nos. 2 and 4 are interchangeable. Crankshaft thrust is taken on the front bearing by a hardened steel floating washer.

Oil is delivered to the bearings through an internal gallery pipe, a pump mounted on the front of the engine drawing oil from a 2½-gallon sump through an external pipe, and an oil cleaner, the handle of which turns at throttle openings, and delivering to the gallery. Oil passes through a filter and a tunnel in the sump before entering the inlet side of the pump ; the relief valve should be set to give a gauge reading of 30 lb. per sq. in. at 30 m.p.h. when the engine is hot.

The dome-topped pistons are made of a special aluminium alloy, and have three compression rings and one scraper ring. The gudgeon pins, with bronze rubbing pads, are a push fit in the con.-rod and a running fit in the piston.

The camshafts each run in three white-metal bearings carried in tunnels, the ear of the exhaust camshaft being screwed for a rev.-counter drive.

The connecting rods are high tensile alloy steel forgings. The cylinder head incorporates eight valves and the rocker gear, and it is retained by 21 nuts and has cork sealing washers between the head and the camshaft tunnels.

Firing order : 1, 2, 4, 3 ; magneto firing : 36° before t.d.c., fully advanced ; valve timing : i.o. 5° after t.d.c. (225° opening) ; e.c., 8° after t.d.c. (236° opening) ; tappet clearance (inlet and exhaust) : 0.004″ hot, 0.006″ cold.

One tooth on the starting ring equals 3° on the crankshaft. The gearbox is driven by a short shaft with two couplings and a clutch stop. The propeller shaft is of the Hardy-Spicer type. Front and rear axles are underslung, with triple Hartford shock-absorbers, mounted across the frame at the rear. At the rear of the chassis is a 17-gallon petrol tank, with a further three gallons reserve supply, petrol being fed to the carburetter, which has a water-heated jacket, by an A.C. pump.

The chassis frame is of Vickers' steel, which can be "tied in a knot" and straightened out successfully. Marles steering gear is fitted. The front brakes are operated by rods and the rear brakes by cables through a compensator box and two pulleys on each side of the frame. There are four shoes in the rear drums, one set for the foot brake and the other set for the hand brake, which is of the "pull back" quick-release type. Adjustment of the rear brakes is by the stop screws ; the adjusting nut on the end of the cable is only to take up any slackness in the cable after adjusting the stop screws. The blocks on the compensator-box end of the cable should run in the guides of the compensator-box. Running adjustments can be made by the hand wheels on the foot-brake pedal and the hand brake.

The clutch consists of five main components : the flywheel, the floating plate, the driving plate, which is attached to the clutch shaft, the clutch cover plate, and the clutch pressure plate. The cover plate is bolted to the flywheel, making the two components one unit. The clearance between the tappets and fingers should be 0.020″, and the adjustment of both tappets should be identical. If these clearances are adjusted the stop screw must be readjusted, and clearance between the stop screw and pin should be 3/64″. The clutch stop can be adjusted to suit the driver's requirements.

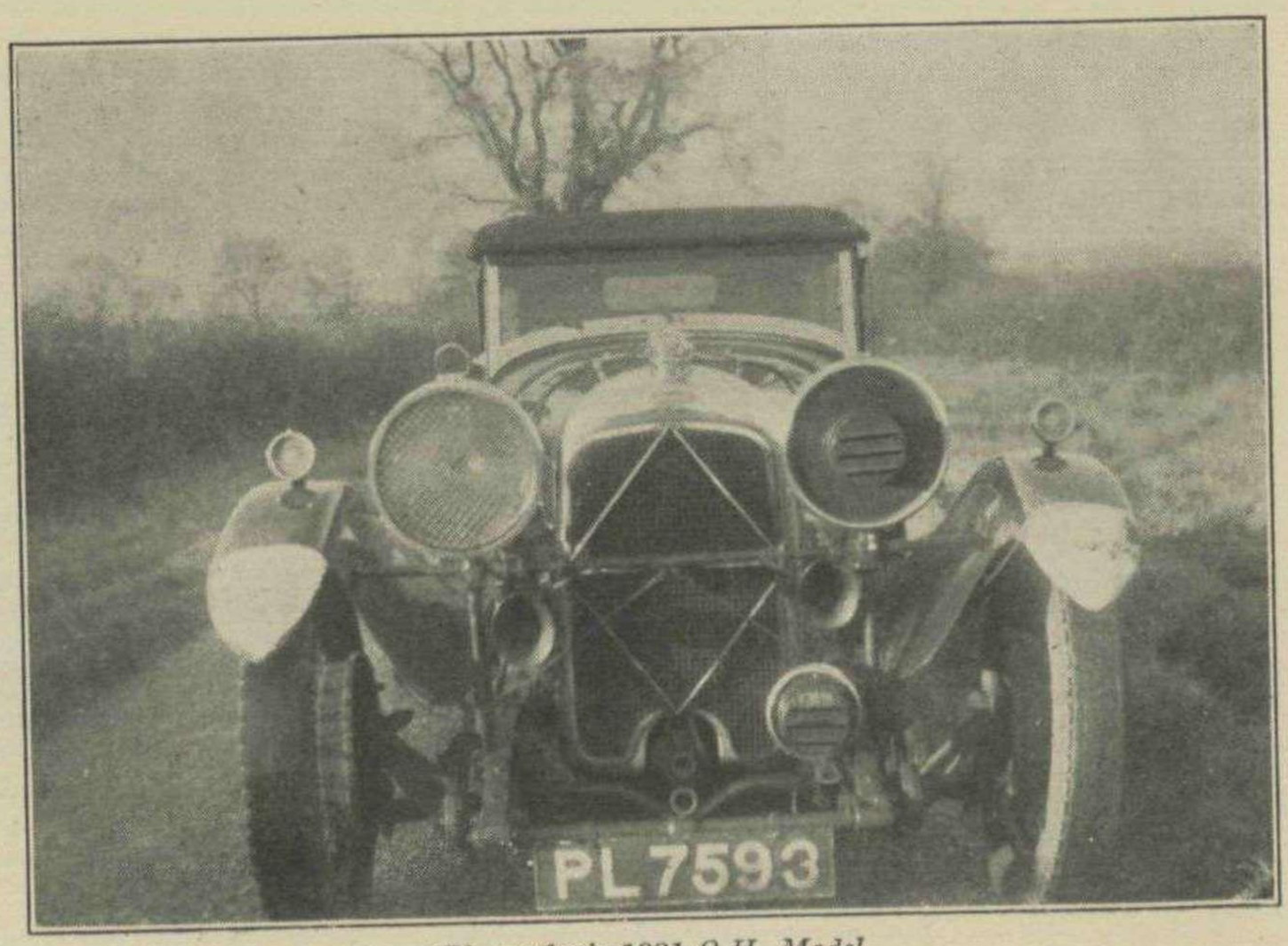
In 1927 the "Speed" model was introduced. The main difference from the standard chassis was a higher gear ratio and raised compression ratio ; fabric bodies were introduced about this time. Some data follow :—

Tappet clearance : 0.004″ ; valve timing : i.o., 3° after t.d.c. (236° opening), e.c., 12° after t.d.c. (236° opening) ; firing point : 36° before t.d.c., fully advanced.

The supercharged model followed the "Speed" model ; it developed 110 b.h.p. and had a maximum of approximately 85 m.p.h. at 3,822 r.p.m. Data relating to it are :—

Valve timing : i.o., ½° after t.d.c. (231½° opening), e.c., 18° after t.d.c. (253° opening) ; firing point : 44° before t.d.c., fully advanced.

The 2-litre Lagonda is a motor of very high repute. Roadholding and cornering



The author's 1931 *O.H. Model.*

capabilities are excellent, and the steering is light and responds at the slightest turn of the wheel at all speeds, and has an excellent lock. Springing over all types of surfaces is good, and starting, even in cold weather, likewise. Performance, considering the weight of the car and the engine capacity, is very creditable. I have not taken any times for acceleration, but the car is soon up to 50 m.p.h. from a standing start. At 2,000 r.p.m., which equals 45 m.p.h. with a 4.1 to 1 axle-ratio and 5.25″ by 21″ tyres, the motor is just beginning to get wound up, and it will clock 78 m.p.h. at 3,500 r.p.m.—I had my instruments checked! Oil consumption is very low, and petrol consumption is from 24–27 m.p.g.

Acceleration is quite good; with the clutch stop in use, that 1st to 2nd determined pull back of the gear-lever will leave moderns quite a small picture in the mirror. Another good point is that the 2-litre will motor along in traffic from 8 m.p.h. in top quite happily and, with ignition slightly retarded, will pick up without need to change down. On long journeys it is an untiring motor to drive; from the driving seat everything is easily to hand. The steering wheel is in one's lap, a slight drop of the right hand finds the gear-lever, the rev.-counter, speedometer, oil pressure and radiator thermometer gauges are in front of one on the facia, and magneto and dynamo switches and mixture control are at an arm's length to the left. Five similar push-pull lighting switches adorn the instrument panel, again in front of the driver.

The 2-litre is a very accessible motor to work on. I have recently finished completely rebuilding mine from a bare frame upwards; with the aid of a pit and the ordinary maintenance tool kit, everything went together very kindly. I would like to thank Lagonda, Ltd., for their kind assistance in supplying me with spares and information concerning technical details. A C.A.V. dynamo and starter, and Bosch horns are fitted, and a solenoid switch is incorporated in the starter circuit. The dynamo is mounted on the front of the engine and has the starting handle dog on the end of the armature shaft.

CARS AND THE GRADUAL INFLATION THEREOF:

An Aspect of Evolution

THE mechanical evolution of the car has often been dealt with: in the first year or two of this century design settled down to one basic pattern that has persisted in broad outline ever since, with ostensibly minor internal changes which have, nevertheless, profoundly affected performance. There is another hitherto neglected but equally striking evolutionary phenomenon that we may call inflation.

From 1890–1905 three trends are specially noticeable; cars became lower, longer and plumper. The first vehicles that can legitimately be called cars were frail and spindly. They and their immediate successors have been described as resembling the Holy City, in that their length and their breadth and their height were approximately equal. (This has also been said to be still true of London taxis—unfairly, because much of their height is light superstructure.) Gradually becoming lower for the sake of stability, and acquiring larger engines for the sake of performance, a longer wheelbase and more robust wheels were called for. The lowering and lengthening process was accompanied by the fitting of smaller but fatter tyres and a general rounding of contours, which gave some of the open tourers of 30–35 years ago a good appearance judged even by modern standards. This state of outward development—comprising a very slight rear overhang, radiator (or the front edge of the bonnet if the radiator was behind the engine) roughly over the front axle, and wings that allowed easy access to the axle ends—persisted for a couple of decades.

The last trace of skinniness went when balloon tyres were adopted and front brakes became universal. This was the period that, in the opinion of many, produced our finest cars, the mid-nineteen-twenties vintage. From the point of view of appearance, cars had now fattened out to that pleasant-but-not-too-plumpness that is admired by students of most kinds of form. The worst blemishes were the introduction of imitation fabric bodies that killed the genuine Weymann flexible construction, and the unaccountable popularity of the dummy hood iron.

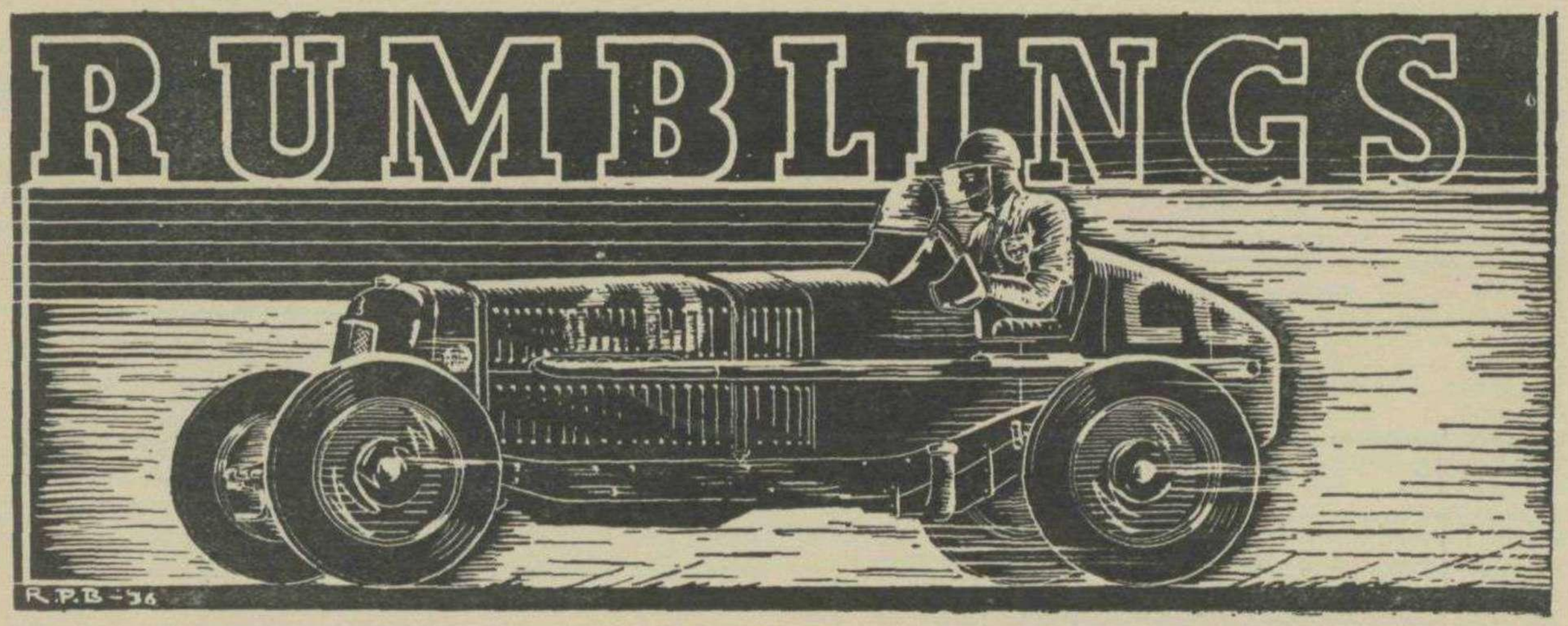
Unfortunately this delectable state was short-lived. First the engine was moved forward, making possible the mounting of roomy bodies on short, unwieldy chassis, but also calling for more rear overhang to restore a balanced appearance. Mechanically, forward engine-mounting was probably a worthy move, but it led quite unnecessarily to some astonishing æsthetic misdemeanours—such as ornate radiator grills where light stone guards would have been equally effective, bulges in unexpected places, euphemised as streamlining; curiously swollen wings and connective fairings that enveloped the wheels and evoked prayers for tin-openers whenever the axle extremities needed routine attention. Even sports cars with no unsightly bent-gaspipery to hide have not been wholly immune from this galloping elephantiasis, though the stage that a normally-staid contemporary has described as the "slug motif" of design—"a large slug in the middle with four smaller half slugs stuck on at the corners"—is mercifully rare. The slugward development, which is neither beautiful nor useful, is the original inflationary process run riot, as if a normal car had been over-distended like a child's indiarubber pig that has been blown up too far. The lost æsthetic appeal will only be regained by deflation to natural proportions.

Happily, inflation cannot go on indefinitely. Beyond a certain stage either the bulges overshadow the car or else the outline becomes so smoothly balloon-like that even the drawing-office is shocked into moderation. I am inclined to agree with W. S. Renwick: "Cutting off the rear overhang drastically, and cutting off the 'false nose,' represent a much closer approximation to the shape of cars to come than has been suggested by other prophets."

Incidentally, I wonder (1) why an appreciably projecting semi-streamline tail looks so awful on anything but an open 2-seater, where it *can* look quite pleasing if unfinned, though its utility is still questionable and its vulnerability nightmarish, and (2) whether it is too much to hope that some day the mere smoothing of contours, desirable though it may be, will cease to be called streamlining?—J. D. E.

Smith or Brown

What initial? Where does he live? Repeatedly you will hear these questions, while valuable time is being wasted because Smith or Brown or somebody else has written in asking "Where are my copies?" Nobody of that name appears in the list of subscribers at that address, and the initials cannot be deciphered. After exchange of correspondence it appears that he changed his address two months ago—"Didn't you know?" The overworked staff are not clairvoyant; if they were they would not be working for MOTOR SPORT. Please notify alteration of address, in writing that can be read, **every time** you change it!



Challenge Accepted

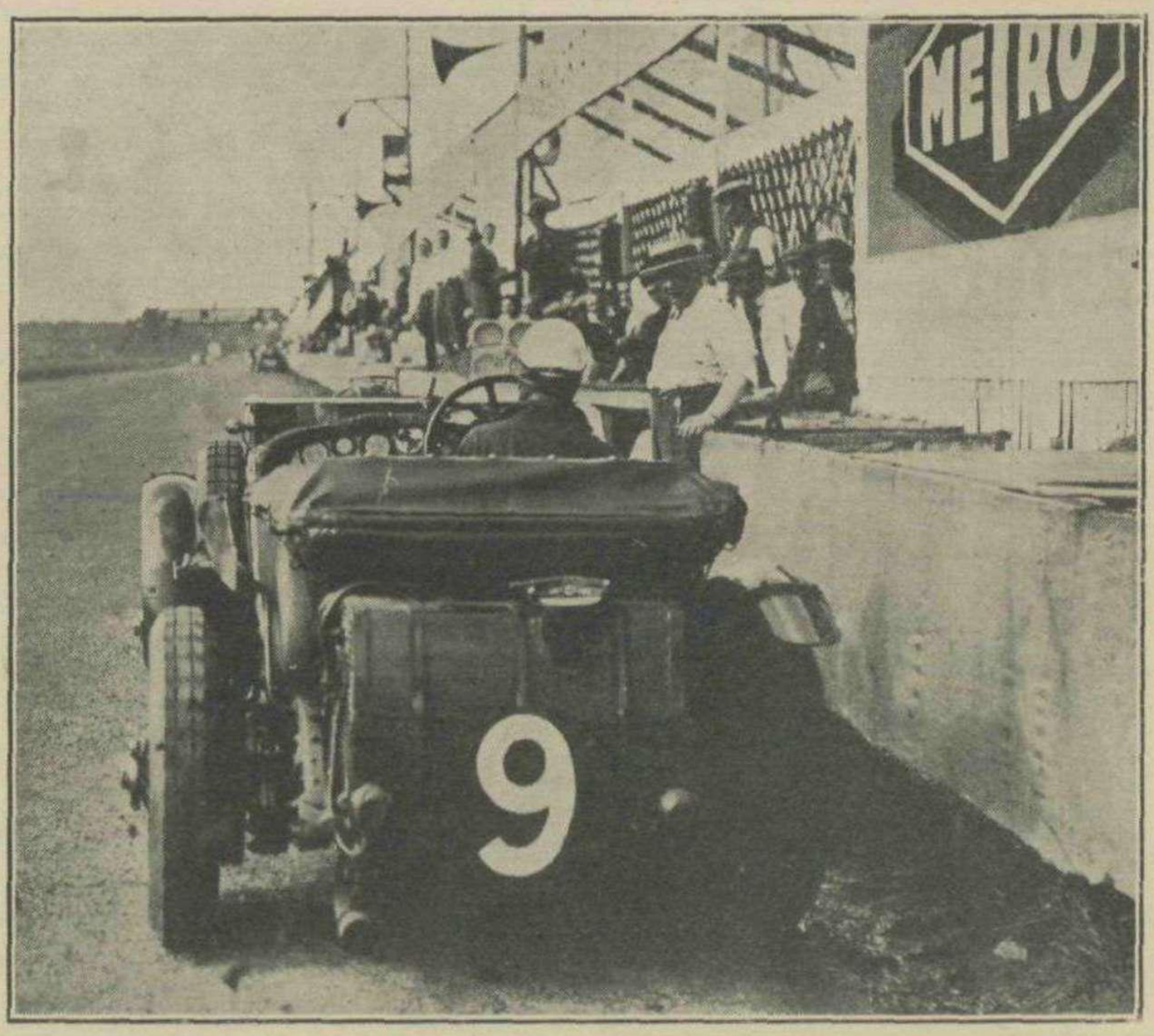
Lt. C. W. P. Hampton has accepted, with certain reservations, the series of challenges put to him by Lt. P. F. Whalley, which arose from the Continental *versus* British discussion in these pages. We published the letter from Peter Whalley in December, and here is Peter Hampton's full reply :—

December 25th, 1943.

Sir,—I was very interested to read the letter from Lt. P. F. Whalley, featured in "Rumblings," in the December issue of MOTOR SPORT. There may well be some truth in what he says about the Delahaye as sold to the public. Though the one driven by Arthur Dobson performed very well in the Brooklands "Fastest Sports Car" race, and elsewhere; as also did Connell's Lago Darracq. I doubt very much if a 4.3 Alvis, Bentley or Lagonda could get even within striking distance. As I have said before, the Alvis is a very fine car—also, of course, the Bentley; but my experience with the 4½-litre Lagonda does not bear retelling here. That part, then, of Whalley's letter is rubbish.

However, the meat of his letter is his challenge. Let me say at once that, all things being equal after the war, I accept both his challenges subject to certain provisos, as follows: I know his ex-Couper Talbot "110" very well, having always admired this car, and met it on several occasions at Brooklands in J.C.C. events. It used to pass my "2.3" Type 55 Bugatti like a train on the Outer Circuit, and I always regretted that I was unable to buy it at the time Couper was offering it for sale. (Incidentally, although I have never met Peter Whalley, I believe he lives not far from my home in Sussex, and that we corresponded earlier in the war when he replied to an advertisement I had in MOTOR SPORT when I contemplated selling my Type 57 Bugatti tourer.)

I claimed 112 m.p.h. maximum for my Type 55, and don't think I have ever claimed more than 112-115, either privately or publicly, for my Type 57S Clearly, therefore, I should be a complete Joe Soap, the Punter's Pal, if I accepted Whalley's challenge as it stands, knowing that Couper's Talbot has a potential 130 maximum. Since, however, the challenge is that the Talbot will beat my Type 57SC, and I hope that if my plans to convert my 57S to a "blown" model materialise satisfactorily, it should increase the maximum to about 125, I am prepared to accept the challenge over three laps of the Crystal Palace road circuit instead of five laps of the Brooklands Outer Circuit. My Bugatti is a very fully equipped fixed head coupé, and in no sense a racing car. Also, all my arguments have been to the effect that the continental cars are superior in *all* respects for road work—not just maximum speed. The Crystal Palace circuit will prove whether or not a standard 3.3-litre Bugatti—in my view the best of all continentals—is superior to a very special, non-standard British sports car of



"The Wearing of the Green." The late Sir Henry Birkin, Bart., gets away from the pits with his blower 4½-litre Bentley in the 1930 Le Mans race, in which he set the pace in order to crack-up Caracciola's Mercedes-Benz. Note the near-side rear wing crumpled by a flung tread—the blower cars suffered incessant tyre trouble and eventually Birkin retired, but not before he had undermined the Mercedes opposition. This photograph is from Rivers-Fletcher's collection; he wrote up the Bentley victories at Le Mans last month.

similar litreage. I am prepared to overlook the fact that my Bugatti will run in this challenge race complete with all touring equipment (radio, screen defrosters, tool box, complete tool kit, spares, spare wheel, silencer, lamps, etc.) whereas the Talbot has a fairly stark, open sports competition body ; provided that this latter carries lamps, wings, normal road silencer, some form of windscreen, spare wheel, tool kit, dynamo and starter and normal seating capacity. I shall probably run on pump fuel, and would not agree to the Talbot using more than 50 per cent. pure Benzole, the remainder being pump fuel.

Regarding the second challenge, I have not yet run my Amilcar Six, but I am, nevertheless, prepared to accept this challenge, over the same course as above, provided that Whalley's K3 M.G. runs with lamps, wings, dynamo, starter and silencer, as I propose fitting out my Amilcar as a road car immediately post-war and, obviously, therefore, am not prepared to run it as such against a stripped racing car. I put no restriction on fuel. I stipulate that in all contests we drive our own cars.

Unfortunately, I do not own a Lancia " Aprilia " of any type. If, however, anyone would loan me a standard 1939 " Aprilia " saloon, I would back it to beat Whalley's standard TB M.G. over the same course. The same applies to his Alta, if by then I am able to acquire a Type 37A Bugatti—the car I believe I mentioned in a previous letter that I would back to beat the Alta from A to B.

I should be quite happy if the Editor of MOTOR SPORT judged the contests. I would also like to insert another condition in the Bugatti-Talbot duel, viz., that immediately afterwards, the two cars are driven for not less than five miles in and around Sydenham and Crystal Palace district to prove their roadworthiness. I invite the Editor of MOTOR SPORT to accompany me in the Bugatti, and ask him to nominate an equally responsible third party to accompany Whalley in the Talbot. I would also insist that no other cars are invited to join this race, otherwise the many corners in this circuit might well be cluttered up with 8-litre Bentleys and the like. So much for all that—all I want now is peace and the availability of tyres and petrol for the Bugatti.

The article by Marcus Chambers in the same issue, entitled " Preserve or Perish," struck me as being awful nonsense. His analogies of the Old Master in a chromium frame and the old Berkeley Coach don't fit in at all. Surely a better one would be the case of the genuine Queen Anne, or other period, house. Delightful to own—but not in true period style with no bathroom or sanitary arrangements. These are added because, by blending the old with modern science, the ideal of many is achieved. So with motor cars. If a Birkin Bentley motors better with the single-seater engine, or if Bachelier can make a good road car out of a bad Type 54 G.P. Bugatti, or if a classic car of 1920–30 lives again after being rebuilt and fitted with modern accessories (S.U. pump instead of Autovac, etc., modern, attractive body instead of its old, uncomparable affair), then why in the name of what's reasonable not do it ? Why have a shabby radiator when you can have a clean one, merely because in 1920 chromium-plate wasn't available ? I don't get it. I'm all for vintage cars, but when it is carried to this length for the sake of pseudo he-man stuff and misdirected " good taste," then I agree with certain people who say that the vintage cry is largely affectation. I see nothing wrong with a horn on a Monza Alfa playing " Le Chemin du Paradis," if the owner likes it, or an electric bell on a Mercédès (presumably the one I had on my Targa Florio car as a joke and effective road clearer before the days of " gonging police cops ") any more than having an electric bell circuit in a period house. Like the genuine antique, that is kept in original condition as a show-piece and delight to its owner, I agree that pre-1914 cars should be kept in original condition—but merely because they are rare relics and kept as such.

Finally, replying to Mr. R. W. J Clarke, I should say the reason why continental cars have higher gear ratios is that they make their cars lighter and, as a result, livelier. British cars are far too heavy, and rev. their life away due to the necessity of having low gear ratios. I do not agree with most of his remarks, nor with " Two-Point-Six." who obviously knows very little about breeding.

I am, Yours, etc.,
C. W. P. HAMPTON (Lieut.).

H.M. Forces.

We hear that the Scuderia Chemvamo wish to give a small trophy to the victor, and Boddy is quite willing to judge the contests, so here is one interesting happening to herald the peace.

Correspondence

Much of the compensation of devoting most of one's leisure to running this paper comes from the extremely interesting correspondence received (there is all too little time available to reply to it, alas) and the new year was no exception. Peter Hampton, apart from the matters he mentions above, tells us of Dr. Noel Murdock, of Victoria, Australia, who has owned Bugatti cars since 1928. He has a Type 44 laid up and is seeking spares for a Type 40 which has developed very noisy valve gear and gearbox. He says that with all garages engaged on repairs to essential vehicles it is impossible to get parts made up, and so he hopes someone in this country may be able to find him spares—he would arrange and risk shipping, although he remarks that some recent issues of MOTOR SPORT have gone astray—" and the supply doesn't meet the demand." Very few Bugattis went to Australia and so " knowledge comes by trial and error," so any maintenance hints or literature would be much appreciated. We can forward letters c/o Lt. Hampton. Dr. Murdock says that after 1930 the M.G. killed the Bugatti market in Australia. He has owned Fiats, 4-cylinder Hispano-Suiza, 3-litre Bentley, Rolls-Royce and Ford V8 cars, after learning to drive on his father's 1908 single-cylinder De Dion, now in storage. He concludes : " I liked the Bugattis best ; the Ford is excellent as a family car, and the Fiats were great workers, but the Bentley and Rolls disappointed me—no life, cumbersome, heavy to handle and a poor ride." Another letter has come in from Capt. Alan Southon, now in a nicer bit of the Middle East. The Mercédès he mentioned last month turned out to be a 4-cylinder " 21/90," owned by Major Aurengo-Jones, who has another in the U.K. It was a 1924 car with o.h.c. and single Pallas carburetter. It is rumoured to have been built up from aero-engine spares left over at the close of the Great War and did not appear to be a very good model, so it has been sold, and possibly broken up. It is believed to have run in speed trials at Alexandria years ago and to have attained about 100 m.p.h. The dynamo, gear-driven from the rear of the crankshaft, resulted in a scream easily mistaken for a blower. Southon has also encountered three blown 1¾-litre sports Alfa-Romeos up for sale at prices of £600 to £800, and an earlier car of this sort still in use. He remarks : " All these cars have been the property of Army officers, so it looks as though someone has been more fortunate than I in this matter. " The high prices are difficult to understand, since the Egyptian doesn't like this type of motor car, which leaves the penniless Army officer as the only prospective buyer."

An alloy-wheeled, twin-carburetter 2-litre G.P. Bugatti, said to have run in a Targa Florio, was also for sale, for £250, the owner admitting that another £250 would be needed to get it to run. Southon is surprised that the Type 230 Mercédès-Benz abandoned by German diplomats in this country has been referred to as the only one of its kind in the U.K., as these, and the smaller Type 170 Mercédès, are quite common in the Middle East. He finishes his letter with some details of the air-cooled O.M. light truck chassis, which has a push-rod o.h.v. 4-cylinder engine of 1,616 c.c., cooled by a Franklin-like curved duct, fed from a centrifugal fan driven from the front of the crankshaft

and housed within an alloy casing. The valves are enclosed in rocker boxes and the cylinders appear to be without fins. The chassis steers and drives on all four wheels and has a central 4-speed gearbox. Suspension is independent all round, by transverse leaf springs in pairs. The engine apparently gives 20 h.p. at 2,400 r.p.m., or 23 h.p. in later models, and speeds are governed at 25 k.p.h. to 48 k.p.h. according to type. The appeal for clues as to the whereabouts of certain veteran cars, published in these columns in December last, has so far fallen on barren ground, but Alan Smith, of Orpington, who is rebuilding the 1910 Brasier, weighs in with some data about the Nazzaro. He considers that the car which ran at Lewes in the nineteen-thirties probably wasn't the 1914 Grand Prix car at all, but a car he once borrowed from a Croydon motor company for extended trial. This car proved disappointing, being unable to exceed 65 m.p.h., and to reach that speed only with difficulty, so that an attempt to reach Torquay in a day resulted in turning back at Wimborne. Second and third ratios were very low and there was bad back-lash in the bevel drive to the single o.h.c.; also, the four-wheel brakes were worn out. The body was a 4-seater and there was a full Bosch lighting set. That rather evaporates interest in the Nazzaro, unless anyone comes upon the G.P. car, but can any reader tell us what has become of a 1908 G.P. Germain which Sully, who once raced an H.E., is rumoured to have saved not so fearfully long ago? Apart from old cars which have vanished, C. L. Grace has found at Woodbridge, Suffolk, a big 1912 4-cylinder Cottin-et-Desgouttes believed to have been built for hill-climbs and raced at Brooklands, but the history and origin of which are otherwise wrapt in mystery. This is *not* the car Homsted ran at Brooklands around 1925; the engine number is C534, and any information about it would be most welcome.

* * *

Reprint

G. T. Foulis & Co., Ltd., have reprinted the late Sir Henry Birkin's book, "Full Throttle," in austerity style, which is excellent. It contains all the original text and many of the splendid photographs and drawings, most of the Bentley days at Le Mans and elsewhere, and is good value at 7s. 6d. We notice that the apology by Birkin to the proprietors of Brooklands Motor Course for certain unfortunate references thereto does not appear in this war edition, probably because the old Track has been closed for the last four years, although we would prefer to think that after the war the concrete will be relaid so as to be above reproach. Birkin's plea for a team to uphold the British Green is, in a way, as necessary now as ever it was, and should be digested by all who hope to race other than in an amateur capacity when racing happens again. Incidentally, enthusiasts owe much to the house of Foulis, who have published, also, Chula's books, "Bira's" "Bits and Pieces," Edge's reminiscences, Bradley and Burn's "Wheels Take Wings," Lt.-Comdr. Graham White's book, and "The Magic of a Name," by Harold Nockolds, the last-named nowadays an important soldier man in the Middle East, with several mentions in dispatches.

* * *

Obituary

It is with deep regret that we learn of the death of Lt.-Col. Charles Jarrott. Jarrott was undoubtedly the greatest British driver at the close of the last century, and his great book, "Ten Years of Motors and Motor Racing," published in 1906, and twice reprinted, did much to introduce people to the Sport in the early days. He loved any form of contest and was, of course, in the forefront of all manner of athletics, amongst which, perhaps, his early motor-bicycle and motor-tricycle races should be included. Jarrott won the 1902 Circuit-des-Ardennes race with a 70-h.p. Panhard, averaging 54.3 m.p.h. for the 320 miles with that decidedly tricky car. But some of his greatest drives took place in earlier town-to-town races, such as the Paris–Vienna, which he just finished after galling troubles had beset his "70" Panhard; the fateful Paris–Madrid, when he drove a De Dietrich; and the Paris–Berlin, in which he drove his 40-h.p. Panhard into 8th place. He later handled Napier and Wolseley "Beetle" cars in the Gordon-Bennett races. Many people class Charles Jarrott with Segrave and Seaman of later eras, and his death removes from our midst a very great British racing driver, a fine sportsman and an extremely staunch motorist. He lived long enough to see some of his rather pessimistic forecasts on the future of motoring and motor-racing all but fulfilled.

New Zealand Notes

THE September, 1943, "Bulletin" of the New Zealand Sports and Racing Car Club contains information of more than usual interest. W. J. Farnsworth describes the Sunbeam cars he has had, comprising one of the 1912 "Coupe de l'Auto" 3-litres, afterwards sold to another enthusiast who has rebuilt it, and a 1914 3.3-litre T.T. car and a "20/60" push-rod sports tourer, which he still possesses. The T.T. car, of which Anthony Heal and Brodie Dunwell preserve examples in this country, is credited with 98 to 100 m.p.h. in touring trim, 0-60 m.p.h. in 9.2 secs., s.s. ¼-mile in well under 20 secs., and 21–22 m.p.g. cruising at 2,000–2,500 r.p.m., equivalent to 60–75 m.p.h. A Smith 5-jet carburetter is used. Although not mentioned in the "Bulletin," we believe Farnsworth is now on the scent of one of the 1921 straight-eight 3-litre racing Sunbeams, of which Heal preserves another in this country, and one of which was raced by Daybell at Brooklands as late as 1930, afterwards becoming the Munday-Special (later Bainton-Special), with a "30/98" Vauxhall engine installed. Another is owned by Burnand, with a Rolls-Royce "Falcon" engine in place of the original.

Of Sunbeams in general, Farnsworth sagely observes that the "20/60" will probably prove to be more reliable, when all is said and done, than a twin o.h.c. sports 3-litre, although he also seeks one of these. The push-rod car is at present slower, but he plans to reduce the weight considerably and to fit a higher axle ratio, of about 3.8 to 1 in place of the existing 4.7 to 1 axle, when he expects to get 90 m.p.h. at 4,000 r.p.m. He goes on to say that Sunbeam began to explore the luxury saloon class when Bentley was bringing out the 4½-litre, and had given up interest in sports cars when Bentley was firmly established in that field. But he reminds his readers that no other firm, from Edwardian days to the turn of the quarter-century, did so much to further British racing prestige as Sunbeam, a banner handed on to Bentley and, in turn, to M.G. The result is seen in every Sunbeam ever built, be it tourer, sports or saloon.

With experience of both, and an enormous regard for the Bentley, he admits: "I feel bound to say that, on the whole, I prefer the Sunbeam."

In the same issue of this "Bulletin" is a long article on tuning for sprint events, by John McMillan. He emphasises the need for low head-resistance, even at speeds as low as 20 m.p.h., and prefers a fairly high c.g. for sprint work, to enable the weight of the car to assist adhesion of the outer wheels on corners. A compression ratio of approximately 8 to 1 for cylinder bores up to 72 mm. and 7.5 to 1 for larger engines, is recommended and honed or mirror-finished bores are to be avoided. A suggested valve timing is: inlet opens 20° before t.d.c., closes 70° after b.d.c.; exhaust opens 70° before b.d.c. closes 35° after t.d.c. Valve seats should, the author says, not exceed $\frac{1}{16}$" width for each inch of throat diameter. He finds Ford V8 valves, turned down to the required size, excellent, and believes in copper-plating the combustion spaces. Exhaust pipes should be the same size as the ports and of identical length, merging into a common pipe of slightly greater diameter. S.U. or Amal carburetters are recommended. With the recommended compression ratios, it should be possible to use 80 octane fuel, but better results could be had from 50/50 petrol/benzole—it is remarked that benzole can be "bought quite cheaply from most gasworks"! McMillan concludes by suggesting the following dopes: For b.m.e.p.. of 180–200 lb./sq. in., 60 per cent. methyl alcohol, 30 per cent. benzole, 10 per cent. aviation petrol; for b.e.m.p. up to 335 lb./sq. in., 50 per cent. Methanol, 20 per cent. Ethonol, 15 per cent. benzole, 12.5 per cent. petrol and 2.5 per cent. distilled water.

THE 6-CYLINDER SCOTT TWO-STROKE

VERY considerable interest was aroused by the picture of a 6-cylinder Scott 2-stroke engine installed in a 1928 Aston-Martin, published in the December, 1943, issue of MOTOR SPORT, so we have pleasure in adding further details of the engine, kindly supplied by the owner, Dr. R. Wood. The Scott Company is normally associated with the famous 2-stroke motorcycle which it introduced before the last war, and with the curious 2-track, 3-wheeled Scott "Sociable" of the early nineteen-twenties. Some time before the outbreak of the present war a 1-litre 3-cylinder-in-line 2-stroke engine was announced, and experimentally installed in a popular make of small car. The 6-cylinder 2-litre 73×78 mm. version which Dr. Wood had installed in an Aston-Martin in 1937 was a development of the 3-cylinder engine. Designed by Mr. Cull, it has called forth praise from Cecil Clutton and, indeed, showed a remarkably high output, giving 86 b.h.p. as supplied, while the designer claimed that it could easily be developed to give 126 b.h.p., or 170 b.h.p. unblown, if somewhat modified. The engine was of normal 3-port type, with cast-iron block and aluminium head, crankcase, sump, inlet pipe and transfer port covers. The crankshaft was of built-up 6-throw type with disc webs, running in eight double-row roller bearings. The front three throws were as in a normal 6-cylinder engine, and the rear three were at 120° to each other, No. 4 being at 180° to No. 1, thus giving a power stroke every 60° of rotation. The throws carried double-row roller races, round which were clamped the normal big-ends of the 2-stroke-type con.-rods, which had partially cut-away little-ends. The flywheel was normal Scott and carried a Borg and Beck clutch. The crankshaft carried a thick aluminium disc outside each main bearing and these exactly fitted tunnels, one in each of five crankcase webs.

Thus the crankcase (a single alloy casting) was divided to secure crankcase compression for each cylinder, sealing being by the oil film in the roller races. The transfer passages were formed internally, with a detachable plate for the outer wall, shaped to form a venturi. Separate sleeves in which the ports were accurately machined spigoted at their lower end into the crankcase and at their upper end into the cylinder block. The cylinder head had centrally disposed sparking plugs.

Cooling was by a pump, chain-driven from the front of the crankshaft. It had vanes set at 90° to the rotor and very effectively delivered water via an internal pipe to the area around each exhaust port. The pistons were normal Scott, with small saw cuts on the skirts to distribute oil round the cylinder bores. Lubrication was by a scavenge and a pressure pump in the sump, the former drawing oil from each crankcase chamber and returning it to the 2½-gallon sump. The pressure pump forced oil to two metering pumps, one at each end of the near side of the crankcase. These pumps were driven by swash-plates from an auxiliary shaft and had six plungers. The swash-plates were controlled in conjunction with the carburetter throttle opening so that the pump stroke increased as the opening increased, metering more oil to the bearings, etc.; the pressure pump actually supplied oil pressure, the auxiliary pumps merely controlling the supply. The auxiliary shaft was driven by roller chain from the front of the crankshaft, lubrication being by pressure-release from the main pump. Oil was fed to the junctions of the port sleeves and cylinders and to the cylinder bores as well as to the bearings. The engine had a safe speed of 6,600 r.p.m., limited only by the flywheel safety factor; it weighed about 350 lb. and carburation was by two T.T. Amals.

Club News

WE HEAR

Denys Axel-Berg has recently acquired an excellent " Red Label " 3-litre Bentley, which he is having restored by the Imperial Garage, Lyndhurst, where a very early Panhard keeps it company. He has a 1926 " 14/40 " DIS. Delage with a very sound engine, which he would dispose of for about £50, or would exchange for anything of equivalent appeal. He reports a " 19/100 " Austro-Daimler, short-chassis 8th Series Lancia "Lambda," an Anzani Frazer-Nash, a 3-litre Sunbeam, a 7-h.p. Alldays and Onions, and a 2-litre O.M. amongst vintage machinery which he has seen exposed to the elements within the last few years, in fields, barns and breakers' yards in various parts of southern England. John Haining, who has recently returned from the Far East, and has been discharged from the Army on account of ill-health, plans to make something of a speciality of " 12/50 " and " 12/60 " Alvis cars and spares. He has two " 12/50s " at present and will be glad to hear from Alvis owners, and to buy cars and parts. Later, he hopes to save other vintage types from destruction. Meanwhile, his workshops can undertake a limited amount of rebuilding and overhaul jobs for enthusiasts, the drawing office is at any vintagent's disposal, and estimates can be given for any type of casting in brass or cast-iron. The address is Winbolds Trafford, near Chester (Mickle Trafford 41). Haining mentions that at one time his regiment numbered two " 12/50 " Alvis, an 8-litre Bentley, a 4½-litre Bentley, two 3-litre Bentleys, a " 30/98 " Vauxhall and an M-type M.G. Midget amongst 17 officers. These cars are all laid up now and their owners scattered far and wide. However, laid up in his own district are a 1927 3-litre Bentley and a 1925 " 30/98 " Vauxhall, both of whose original owners have just returned from the Middle East, and, in use, a 1924 " duck's back " " 12/50 " Alvis, also with the original owner.

Capt. John Moon is another who has come back safely from the Middle East, and he has been using his Austin Seven " Nippy " on leave petrol. An immaculate red-and-black Lancia " Lambda " baker's van has been seen in a remote village in Scotland. Peter Whitehead and John Gordon are serving in the Middle East. F. R. Dickinson, " Eastwood," Chester Road, Poynton, Cheshire, seeks advice on installing a " K.N. " M.G. Magnette engine in a 1935 L-type M.G. Magna coupé, and also needs Magnette spares. J. Watten closed down his motor business in 1939 to concentrate on war production. He still gets very good service from his hard-used and little-serviced 1934 3-litre Hotchkiss saloon. Ashwood, having disposed of his Lea-Francis and acquired an Alta, has now decided on another change of plan and has purchased, from D. R. Taylor, an open 3-litre Bentley, while Taylor is hoping one day to rebuild his 1924 " Le Mans " 3-litre Bentley, which was for many years Bentley's service lorry. Harold Pratley has at last acquired the immortal 350-h.p. V12 Sunbeam with which Campbell reached a speed of over 150 m.p.h. in 1925. Rowland, of Byfleet, has kindly given a 3-litre Bentley instruction book to the MOTOR SPORT library.

A. F. Ashby is with the Ministry of Supply and is selling his *monoposto* modified Alfa-Romeo. Peacock is rebuilding his Alvis-engined G.N. Special and has recently bought a " 12/50 " Alvis tourer, for which he seeks an engine. H. T. H. Clayton, whose Amilcar Six lapped Brooklands at 123 m.p.h. before the war, is these days concerned with the restoration of worn-out Army vehicles for the battle front. Peter Whalley, still in India, reports meeting only two enthusiasts in eighteen months—one a Scott fan, the other an American midget car driver—and seeing only two real cars, a Van den Plas 3-litre Bentley and a D8.120 Delage on which a potentate had changed into 1st at 90 m.p.h. to the detriment of the Cotal box. L/A.C. Bawden, R.A.F., writing from Canada, says he has met a Mr. Murphy, of Chicago, who recently inspected a French Talbot and who is hot on the trail of a 3.3-litre Bugatti, being " really determined to get hold of a hot-stuff motor." Bawden earnestly seeks a D-type gearbox for the special 4½-litre Bentley owned by his brother and himself. Replies to the former at 23, Greenleaf Road, E.17 (Larkswood 1805).

F/O. Paul Phillips is running a 1929–30 Riley Nine " Brooklands " with four S.U. carburetters, but seeks something more spacious. He remarks that of 16 cars in 124 Squadron the only one resembling a sports car is an Australian sgt./pilot's 1933 Hornet-Special. However, " MOTOR SPORT is avidly read and half the lads want a real car now." 12-h.p. cars under £60 should meet the bill, he says, while a Centric supercharger is wanted by a pilot friend for a 1935 Lagonda " Rapier." R. G. J. Nash, still up in Scotland, has found, and saved, an 1896 4½-h.p. M.M.C. wagonette, which is in original and excellent condition, having had one owner since new. This was actually the car made in Germany by Daimler as the prototype M.M.C., and it has tube ignition. Hugh Palmer, of the Scuderia Chemvamo, has part-exchanged his L-type M.G. Magna with Ian Metcalfe for a " Red Label " 3-litre Bentley, which he then drove up north to his R.A.F. station. This Scuderia continues to issue its private news-letter, an excellent scheme, and its sponsor recently visited Parnell's stable, where he saw the " Bira " 1½-litre Delage, the Wakefield E.R.A., Dobson's T.T. Riley, the Reusch 3.8-litre Alfa-Romeo, a Dixon 1½-litre long-tailed Riley, the old, red 1,100-c.c. Dixon Riley, the ex-Wilson 1,100-c.c. E.R.A., Percy Maclure's i.f.s. Riley, and the Challenge ; also the ex-Seaman black Delage, although we always thought this and the " Bira " i.f.s. car to be one and the same. Surely someone should preserve Dick's car for posterity, racing it until its days of victory are over ?

Anthony Phelps has left A.T.A. and is now a test pilot with the Lockheed Corporation in this country.

★

750 CLUB

The January meeting was unannounced and only Capon, Birkett, F/O. Mallock and Mrs. Mallock attended. The secretary appears to be too busy to issue a " Bulletin " or arrange further meetings, and a committee meeting should be called to decide the club's immediate future. With excellent, regular enthusiasts' meetings in the North, the Midlands and the West, it will be a thousand pities if Southerners are deprived of the 750 Club gatherings, which, since " Osterley " days, have been so well supported and enjoyable. At all events, we hope this live little club for the impecunious, suggested by Boddy and launched by Phil Hunter, will survive the war, and, perhaps, live to sponsor unblown 750-c.c. racing over real road circuits.

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LOOK OUT, MAJOR GARDNER !

A contemporary, reporting an American dirt-track driver now in this country, describes midget car racing as " this highly dangerous pastime," and then goes on to say that normal midgets hit up about 90 m.p.h., and an Offenhauser has topped 150.

★

APRIL " REMBRANDT "

We understand that another motoring gathering is due to take place at the " Rembrandt," London, quite soon—the date selected being April 16th.

★

J.C.C.

In December last the Junior Car Club held its 50th monthly war-time council meeting. Sir William Rootes was the guest of honour, and Major Bale took the chair. Other informal council meetings have been held, and it is hoped to announce a London social event, open to members, this spring. The *Gazette*, still published, has reached its 19th volume. The October-December issue contains news of J. E. Swainson, who, invalided out of the R.A.S.C., is now keenly interested in the plastics business ; P. G. M. Talbot, now a major, R.A., whose 8-litre Bentley is up on blocks ; Leonard Sandford, now a P/O., R.A.F., and many others.

Hon. sec. : H. J. Morgan, 14, Lime Grove, Ruislip, Middlesex.

D.D.M.C.

Those who have suffered the grave misfortune to lose a limb as a result of enemy action should note that the Disabled Drivers' Motor Club exists to help and advise them. It is a long-established club, which once had its own members' day at Brooklands. The hon. secretary's address is 33, Rockingham Road, Uxbridge, Middlesex.

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OUTLET FOR ENTHUSIASM

At Bristol 24 enthusiasts met for a Christmas dinner at the Grand Hotel, and another gathering, at the Full Moon Hotel, was scheduled for January 27th. Up in Yorkshire the Y.S.C.C. have had a dinner and film show in Bradford, and plan a meeting in Leeds, while the Midland Motoring Enthusiasts' Club had a meeting on January 5th at which the officers and committee were re-elected for 1944, although the president, G. F. Cole, resigned on account of ill-health. The club was reported very sound financially, and it is hoped that Shorrocks, of Centric Superchargers, will give a talk at the "Windsor," Birmingham, on February 2nd. Meanwhile, in the south, the 750 Club has ceased to issue its "Bulletin," and appears likely to cancel future meetings. Now *then*, Southerners!

STOP PRESS

In "Rumblings" the Editor comments on some interesting correspondence. The last post opened before closing this issue for press included a note from A. Wynn-Jones seeking help in converting his blower Bentley to Le Mans specification, a request from L/Cpl. Lambert, 14243495, 1, Davenport Road, S.E.6, for photographs for a small motor club run by his unit, and a letter from L/A.C. Bob Burgess, R.A.F., B.N.A.F., who saw two Type 57s at the local Bugatti service depot, where a mechanic produced photos of Wimille, Chiron and Sommer at Albi. He also saw a B.N.C., two M.G.s, and two F.W.D. Georges Irat, apparently with Ruby engines, amongst the modern French stuff. Cars are run on alcohol fuel which "seems to be made from grapes, rotten fruit and vegetables," while a few motorcycles with pneumatic wheel-barrow wheels get around.

Then F/O. Andrew Lloyd, Malta, reports meeting John Lander, whose bedroom ("what a bedroom!") was littered with 2-litre Lagonda pieces; Lander also made a 6″ model of the 4½-litre "Le Mans" Bentley he has stored in England—"the most perfect piece of craftsmanship I ever beheld."

From India Capt. Kenneth Richmond, R.A., who has Capt. B. W. Fursdon, of Rally fame, in his division, sends a long and very Riley-conscious letter, which will form a future "Cars I Have Owned" contribution, while Capt. R. W. Marsden sends two negatives of the "2.6" Alfa-Romeo mentioned in Capt. Green's letter published last October. He bought the car in Asmara and got it to his home in India; it is a 1933 car, said to have been third in the Mille Miglia, and which won the Asmara "round-the-houses" race, Christmas, 1939. Capt. Marsden is sending £2 as an appreciation of MOTOR SPORT, to be paid to "any one of your motoring charity funds"—a nice gesture. Another reader reports a 2-litre Lagonda engine at Grigg's yard, Sheet, near Petersfield, which may help someone with spares, and a reply-paid cable from Australia requested carburetter settings for a Type 43 Bugatti.

★

THANK YOU

The Editor wishes to thank the many well-wishers who sent him Christmas cards and New Year greetings.

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COVER PICTURE

This month's cover picture shows Louis Gerard at speed on the Brooklands banking during the 1938 Dunlop Jubilee Meeting, with the 3-litre Delage with which he won the T.T. that year at 67.61 m.p.h.

Letters from Readers

Sir,

I have studied Capt. J. S. Moon's brilliant article with considerable care and interest. Granted his three fundamental requirements, I am, with one exception, in complete agreement with the details of his proposed design, and I think such a car as he outlines should be extremely attractive and not outrageously expensive.

The detail on which I disagree with him is the practicability of unified body-chassis construction for this style of car. The Citroen and Amilcar roadsters seem to me to present two successful examples of low-built open cars with adequate doors and unified construction.

But where I really diverge from Capt. Moon is over the desirability of trying to make the car suitable for both fast road work and for trials, even of the "not too fearsome" variety.

This compromise lands him in several difficulties. First, he is compelled to specify a rather large and expensive 5-speed gearbox, in order to have a low enough bottom gear. The second difficulty he does not touch on. To get the "good" ground clearance he requires for trials, he will have to increase the height of his centre of gravity, on which he rightly lays great emphasis, and to sacrifice either minimum frontal area or his "kitchen-chair" seating position.

Thirdly, for adhesion in mud, he will have to carry a large proportion of his weight on the rear wheels, a distribution which is undesirable for fast road travel.

Lastly, he is tied to rear-wheel drive and a transmission which obtrudes on the driving compartment. Even though he banishes the gearbox to the rear axle and bends the propeller-shaft under the front seat, if his floor boards are to be the lowest part of the car, his front universal and the front end of the propeller-shaft must stick above floor-level by half the diameter of the clutch housing at exactly the point where the third passenger wants to put his feet. This detracts considerably from one of the most attractive features of the car—reasonable comfort for three.

My solution is to make the car a pure road machine, like the vast majority of classic sports cars, and to adopt front drive and unified construction. (With the disappearance of the propeller-shaft, the backbone chassis becomes an embarrassment.) Then all these awkward compromises vanish and the whole design becomes simpler, lighter and cheaper.

I am, Yours, etc.,
C. W. S. MARRIS (Sqd. Ldr.).
R.A.F.

* * *

Sir,

May I say that although I take in all available motoring journals, I have never before come across one which breathes the spirit of enthusiasm and keenness as does MOTOR SPORT, or keeps interest alive so well in these difficult motorless times. Long may it flourish.

I have a Riley Nine "Kestrel" which, after twelve months' spare time work, I have to my liking. It has a "Special Series" engine, so should be pretty good; it breaks my heart to see it stand there and deteriorate for lack of use. I am now keen to get hold of a 1937 or 1938 M.G. T-Midget, to play around with until the great day.

With regard to the "vintage *versus* modern" argument now raging, although not biased either way, it seems to me, purely from my own experiences with different makes, that modern cars generally are easier to drive, and are definitely "livelier" to the touch, probably due to lighter weight and combined body and chassis construction. But they are not made to last as were good cars of ten or fifteen years ago; anyway, why should they? The average motorist usually desires a change every twelve months or so.

I have owned and driven many popular makes of car since 1929, including Jowett, Morris Eights, Cowleys, Standard Nine and Ten, Austin Sevens, Riley Nines, Singer Bantam, Citroen Twelve and Eighteen, Lloyd, Ford Eights and Tens, Hillman Minx, S.S.1, M.G. L-type, etc., and many motor-cycles.

No car gave me as much pleasure as a 1929 2-seater Riley Nine, with a 1936 Singer Bantam a close second. I always think Singers should get more of the limelight, the performance is really lively even in saloon form, but springing is rather a weak point, rear springs are prone to fracture with four up on a bad road, and the front shockers do not seem up to their job. These cars are economical, too; oil consumption was still 1,000 m.p.g. after 52,000-odd miles, and she would still do 40 m.p.g. petrol.

Like many others, I live only for the day, which we hope is not far distant, when we can join a club and "dice" and scramble to our hearts' content, in good company.

I am, Yours, etc.,
Rednal. W. BEVAN.

* * *

Sir,

Mr. K. W. Campbell queries my statement that it is not necessary to alter the transmission line when fitting flat springs to the rear of a standard Austin Seven.

My reply is contained in the first paragraph of my article, namely, that I have done it, not once, but three times, to 1927, 1931, and 1933 chassis.

Whether this practice is desirable or not is a debatable point, and admittedly all the production Austins with flat springs used a raised transmission line (see para. 7 of my article). My own opinion is that any slight angularity which there may be at the rear universal joint has a negligible effect on performance, and in any case is less than that on, say, a standard "Chummy."

The purist can emulate the designer as Mr. Campbell has done, or can use Austin parts as I have done on my present "special."

My reference to the 1929-'30-31 starter should read 1930-'31-'32.

I am, Yours, etc.,
A. M. R. MALLOCK (F/O.).
R.A.F.

* * *

Sir,

As a sincere admirer of the productions of M. Ettore Bugatti, I must rise in protest against the action of Mr. J. Lawrence in captioning his photograph of a 3.3-litre Grand Prix Bugatti "Orthodox Magnifique."

Consider, sir, the ingenuity which le Patron has lavished on every feature of this machine's design. Recall the superb tapered frame which replaces the usual glorified bedstead, the featherweight radially-spoked wire wheels, and the unique rear suspension by reversed ¼-elliptic springs. Ponder on the torsionally flexible front axle supplanting the independent suspension which other designers, slavishly following the fashion of the day, adopted with unanimity, and other similar features of the design.

Magnificent this car most certainly is, even if it can never hope to win a race. But I would respectfully suggest, sir, that to describe it as orthodox is to cast an unwarrantable slur upon the name of a great Frenchman, Italian, Greater German, or whatever M. Bugatti may be.

I trust you will appreciate, sir, that as owner of mere mundane examples of the Anglo-Saxon sports car builder's craft, I feel presumptuous in even writing of such a masterpiece of Gallic automotive art as the Bugatti, and I beg leave to sign myself,

Yours, etc.,
"BEDSTEAD."

* * *

Sir,

Controversial views held by readers of MOTOR SPORT have been (and are being) expressed in these columns, issue by issue. The results of much thought have been put forward in respect of the design of the fast car best suited to meet the post-war era. Very right, very proper, very interesting. But I am as appalled as I am astonished at the conservatism of the views expounded. Your able (and sometimes highly accomplished) contributors give little indication of original thought, but merely analyse existing sports and racing cars, pluck from each what is thought to be its brightest feature, and combine all the high lights into one glittering ensemble.

If one is disposed to be magnanimous about it, then one must agree that this method conforms to the accepted means of evolving the best, be it motor-car or golf club. What *does* confound me, however, is the realisation that none of your contributors have yet appreciated

the means by which the greatest single advancement can be achieved.

I refer to the "five-in-line" engine. It is nothing other than conventional thought and conservatism which has resulted in the persistence of the even numbers; hence the 4, 6 and 8 in-line, all of which are accepted with complacency.

The five-in-line is excellently suited to all classes from 1½- to 4½-litre capacity, above which volume the seven-in-line offers similar advantage, and will ensure that the weight of the reciprocating parts is kept to a minimum. Consider the benefit obtained by such an arrangement. No two pistons are on t.d.c. at the same time, giving an excellent kinetic constancy. The crankshaft characteristics are of a high order, for reasons other than the fundamental necessity of carrying the shaft in six bearings. Six bearings! I suspect that this peculiarity will be seized upon by the obturately-minded as being sufficient reason for condemnation on the count of manufacturing difficulties and their effect upon cost. Which, to quote Euclid, is absurd. It must be admitted that the cost of manufacture will be more than that of a three-bearing four-cylinder engine, but the additional charge can be kept within reasonable bounds, and the combined effect of smooth torque and excellent balance will result in low maintenance expense.

The proof of the pudding is in the eating. A review of engine design much in vogue amongst purveyors of heavy transport will indicate that they have sampled the recipe, and found it good. The five-in-line heavy duty compression-ignition engine functions very well under severe conditions, whereas the four- or six-in-line of the same capacity is a rough motor of "lumpy" torque. The analogy between such engines and those designed for sports and racing cars is by no means so absurd as might appear. In fact, the faults inherent in the four- and six-in-line manifest themselves in the heavy duty engine when subject to the particular conditions appropriate to their environment; the same faults are latent in the sports or racing engine, but are less evident in consequence of the differences in design and operational usage.

The moderately-priced sports car envisaged as meeting a post-war need is provided with a five-in-line of approximately 2-litre capacity, with wet linered block and single o.h.c. operating two valves per cylinder, with low pressure supercharge. Basically the same engine is intended to satisfy those who require higher performance (and are in a position to pay for it) in which event is included a modified head embracing a twin o.h.c. valve actuation, together with higher boost.

Time does not permit a fuller exposition of the remaining features of the chassis, but let it be said that it is not proposed to fit the engine at one end of the chassis and drive the road wheels most remotely situated, a method which is further proof of our being slaves to convention. When opportunity allows I hope to expound more fully on the contemplated venture, which aims at providing a high-grade sports car at a reasonable price, and fitted with such an engine as described. Anyone interested?

I am, Yours, etc.,

R.A.F. F. A. KAPPEY.

Sir,

I cannot help but enter the lists against "Two-Point-Six" when he states that the 2.6 M.G. and 2½-litre S.S. can exceed 90 miles an hour and are "very, very comfortable." I have owned 37 cars in the last 14 years, including these two, and I give them full credit for offering good value for money in a genuine 80 mile-an-hour motor car. Even at this speed their accuracy of control leaves much to be desired. Why is it that supporters of the British car, like "Two-Point-Six," will spoil their own case by such exaggeration? He and Mr. Thursby-Pelham should become pen-pals.

Mr. Fitzpatrick has gone straight to the point of the "British *v.* Continental" controversy in his excellent article on the 1,100 Fiat. He points out that these strictly utility family cars should be compared with our Austins, Hillmans and Standards, and not our much more expensive sports cars of larger capacity. As a case in point, the likelihood of the Second Front and the need to leave my wife with a car for which spares are readily available, made me sell my three Fiats and buy a very well-known British Twelve of one of the makes mentioned. This car belonged to an aunt and had done 1,400 miles in the hands of an experienced chauffeur. Its finish and accessories are incomparably better than the Continentals and the running between 30 and 45 miles per hour reasonably comfortable and silent on the straight. First gear, however, is frighteningly noisy, the clutch indescribably rough, the gear-change uncertain, the brakes poor and the steering more successful at transmitting road-shock than influencing direction, while the

engine rocks in its mounting like a canoe in a rough sea. I am not prejudiced and wanted to like the car. As it is, I loathe the sight of it. Until our big manufacturers can incorporate that indefinable quality "handling" in their cars, will someone please sell me a Lancia "Aprilia" or Fiat, price quite immaterial?

I am, Yours, etc.,
"CAVALRY OFFICER."

Home Forces.

* * *

Sir,

In reply to your footnote to my letter in the January issue of MOTOR SPORT, the T-type in question was tested at the Aston-Martin works on the invitation of Mr. R. G. Sutherland, of Aston-Martin's, whose kind invitation Mr. Thursby-Pelham accepted.

But even so, the very fact that the M.G. in question "held" a Humber Super Snipe—maximum 90–92 m.p.h.—travelling flat out, should be sufficient proof to any reasonable person that the M.G. was capable of far more than the 75–80 m.p.h. mentioned by the Editor and others.

As regards the tuning of the Midget, it was made perfectly clear by Mr. Thursby-Pelham in his article in the *Autocar* of April 11th, 1941, that his car was "tuned for speed rather than economy," to quote the author. I admit it must be pretty galling to the anti-British, anti-modern, and anti-buzz-box people to have to admit that a 10-h.p. car can top the 90 mark.

Jarvis & Sons, Ltd., from whom the car was purchased, used it as a demonstration model before selling it to Mr. Thursby-Pelham.

I am, Yours, etc.,
"TWO-POINT-SIX."

[Apparently it hasn't occurred to "Two-Point-Six" that the Humber probably also had a magic speedometer. If the M.G. did over 90 m.p.h., Mr. Sutherland, to the best of our knowledge, never confirmed it.—ED.]

* * *

Sir,

May I crave a small amount of space to express my agreement with Mr. E. G. M. Wilkes's extremely sound opinions in his letter in your December issue.

I have never ceased to marvel at the sudden decay in enthusiasm for real sports cars which appeared about the same time as the general introduction of independent springing. Stern men who had scorned to motor in anything less than a 'Nash without a hood, were suddenly seen lurking about in saloon B.M.W.s. Others got married. Still others said they were getting old, and, anyway, these Continentals had something. . . .

In fact, the splendid era of 1924–1932 mentioned by Mr. Wilkes was apparently coming to an end through sheer lack of enthusiasm, a view apparently supported by you, sir, in your own article in the same issue, wherein you express doubt as to whether demand will be sufficient to justify the marketing of certain quite good sports cars.

A pretty pass!

And then we have a gentleman such as "Two-Point-Six," who apparently has never owned a good car in his life, making fun of those of us who, despite the "lure" of the modern car, still prefer to motor in the great cars produced in an era when competition was fiercer and sports cars *had* to be good to appeal.

No, it is an outlook which is very far from bright, and meantime there seems no better policy that any enthusiast could follow than to preserve and make ready for the great day his ancient, unreliable, 25 m.p.h.-in-the-middle-of-the-road, vintage car.

Finally, may I ask Marcus Chambers to cease mourning the British single-seater Bentley and the road car? I nearly had occasion to mourn it myself recently; but that is another story and I don't like dwelling on it.

I am, Yours, etc.,
PETER ROBERTSON RODGER
A.T.A.

[At least the dismal future foreseen by Peter Robertson Rodger may ensure that the diminishing number of worth-while vintage sports cars is shared amongst those who can really appreciate them—even if it is the moderns which live in the middle of the road to impede them.—ED.]

* * *

Sir,

Perhaps you would be interested in my specification of a "special" which I hope to construct "when it's over." I have at home a very fine Anzani-engined 1927 A.J.W. motorcycle and I hope to take the engine out and put it into a light sports chassis—probably an old M.G. Midget. With regard to lightness and the difficulty of fitting a clutch to the existing engine I propose to use a Wilson box without any clutch. This, of course, is only theory and may not work very well in practice, though I believe certain E.R.A.s were so fitted. Unfortunately, I cannot give any details of the engine except that it is a V-twin of 990 c.c. o.h.v. with magneto ignition. Perhaps some of your readers may be able to enlighten me with regard to higher compression ratio and r.p.m., b.h.p., etc. My complete ignorance concerning it arises from the fact that I came abroad two days after rescuing the machine from a breaker's yard! The above "special" should lend itself readily to conversion to a 500-c.c. "Class J," if ever the opportunity for such trials comes along.

I am, Yours, etc.,
A. S. DUNNING (Sigm.).

By Air Mail,
H.M. Forces.

* * *

Sir,

Can you give me any information, as to type, etc., of a Bugatti, chassis No. 2223, engine No. 617, first registered May 6th, 1925, which I owned a few years ago? I was very "green" in those days and left it lying in a field near Prudhoe, Northumberland, whence it was stolen! The performance was such that it beat a Singer "Le Mans" I had, both for acceleration and top speed.

Despite Marcus Chambers's scathing remarks, I think a Ford V8 engine in a Bugatti chassis is an excellent combination, and I intend to mate my twin-supercharged V8 unit to a Bugatti chassis as soon as Hitler permits.

I think Lieut. Whalley's "T.B." M.G. must have been exceptional to beat a

Lancia "Aprilia" easily on acceleration, as my S.S. 100 had a battle to race an "Aprilia" from Anglesey to Birkenhead one summer before the war. Nobody seems to like S.S. 100s, but I think they are exceptional for the money; mine is at present laid up. It's a 2½-litre, was once timed at 102 m.p.h. for one mile, did 36 secs. for the half-mile at Wetherby, 17 secs. for the s.s. quarter at West Hartlepool in 1939, averaged 60 m.p.h. for 100 miles down the Great North Road from Newcastle, and hasn't been rebored in 51,000 miles.

And yet I never read of an S.S. when British sports cars are discussed. Why?

Good luck for 1944.

I am, Yours, etc.,

D. O. PATERSON

Liverpool.

* * *

Sir,

May I ask you to correct a statement in the December issue that I had the Talbot engine installed in the Atalanta chassis, as I feel that coming after Marcus Chambers's article it might cause all enthusiasts to spurn me!

Atalanta themselves installed the engine for a Mr. Watson. I merely bought it a long time after it had become a *fait accompli*.

I am, Yours, etc.,

M. E. NIXON

Harpenden.

* * *

Sir,

I am delighted to see in your last three issues evidence of a campaign against the vandalism which prevails in many parts of the motoring world. The best defence against that of the Trade (who are only following the natural law of supply and demand) is, as the Editor implied, for owners of historic or highly-thoroughbred cars to sell only to approved private individuals, or to those rare traders who can be trusted properly to select their clients for suitability.

Young enthusiasts whom the war has prevented from gaining any practical motoring experience may be well-meaning offenders; they often have no idea at all of the money and knowledge required to run their 4½-litre Bentley satisfactorily, for example, especially immediately post-war. Loftily scorning any small (but practicable) sports machines, they hope to waive their apprenticeship and blossom into mature vintagents overnight. Just picture young so-and-so let loose in his "30/98," simultaneously learning to drive and trying to "do a hundred"! I would implore any owner of a sporting light lorry who has less than 10,000 miles' driving experience, and under £500 a year assured, to commence building himself an Austin Seven Special in which to go motoring. For he will surely be obliged to sell his lorry when peace breaks out, particularly if it is one with a built-in following wind.

In his article last month, "Preserve or Perish!" Marcus Chambers must have caused many of us to do some heart-searching. But the slight sneer attached to his categorisation of the "engine-swapping fraternity" should, I think, be more properly applied to the "engine-dropping fraternity," who confine their activities chiefly to bar rooms and fire-sides. Engine swapping is closely allied to the master craft of special-building, whose devotees may hold up their heads with pride. When there exists in fair numbers a chassis famed for its superlative roadholding and brakes, and for its mediocre performance, who can deny us the artistic and creative joy of fitting to it a good power unit from a car that motors rapidly straight on at corners? The amateur, you see, is untrammelled by production and jig requirements and patent specifications, so is able, as a rule, to improve the manufacturers' products. To do this, however, he must carry out the installation with thoroughness and imagination, and must give full consideration to the attendant problems of final drive ratio and weight distribution. The inclusion of parts from a number of different makes in order to overcome structural problems is a mistake, in view of subsequent servicing and replacement.

I would not, myself, select a Ford V8 engine for a Lancia "Lambda," because the very low b.h.p. per litre scarcely justifies the loss of a reasonable gearbox, and the sense of bathos on opening the bonnet. But what of a "Paris-Nice" Hotchkiss engine, or even (dare I suggest it) a "30/98"?

I am, however, against fitting other makes of engine to Bugattis, because I believe the excellence of their steering is largely due to the immense rigidity of the crankcase and the intimate attachment of the frame thereto. I see that Marcus Chambers will tolerate engine swapping within the confines of one make, so I will confess to the intention of stealthily fitting a "Brescia" Bugatti engine to a Type 40 car, appropriately raising the axle ratio. This is an attempt to eliminate faults inherent in both types, to make a pleasing and reliable touring car, and to be at once Vintage and Molsheim on a small outlay.

Chambers's article concludes with a list of outstanding examples of vandalism. An interesting history of the Vauxhall-Villiers and the Type 54 Bugatti is contained in a letter on page 39 of MOTOR SPORT for February, 1942. The two were mated together and the result was not really better than either of the originals. Active steps are now being taken to restore both cars, not to their former state, as the necessary parts are not available, but they will be rebuilt with components of the same manufacture so that contemplation of them will result in few, if any, cries of "Shame!"

Marcus Chambers also mentions an "Alpine" Talbot. I wonder if this refers to one of which I recently saw the body adorning a Bentley chassis. I was told that it was from the ex-Mike Couper machine, yet this car figures in the challenge to Peter Hampton from P. T. Whalley, published in "Rumblings" last month. Does any reader know what has happened to this Talbot?

I am, Yours, etc.,

H. BIRKETT.

Fleet, Hants.

[All very sensible, and we are in entire agreement with most of Birkett's propoundings. We shudder, however, at the thought of the very excellent Lancia front suspension having to support a "30/98" engine; actually, *if you must be a vandal*, the Ford V8 motor goes in quite easily, and Allard-like performance should then result. However, was the 8th series "Lambda" engine so very far behind, at all events for speed and longevity? The body of the ex-Couper-Talbot is on Metcalfe's 4½-litre Bentley, but the Talbot is, nevertheless, likely to appear again after the war.—ED.]

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Continued in next column

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Continued in next column

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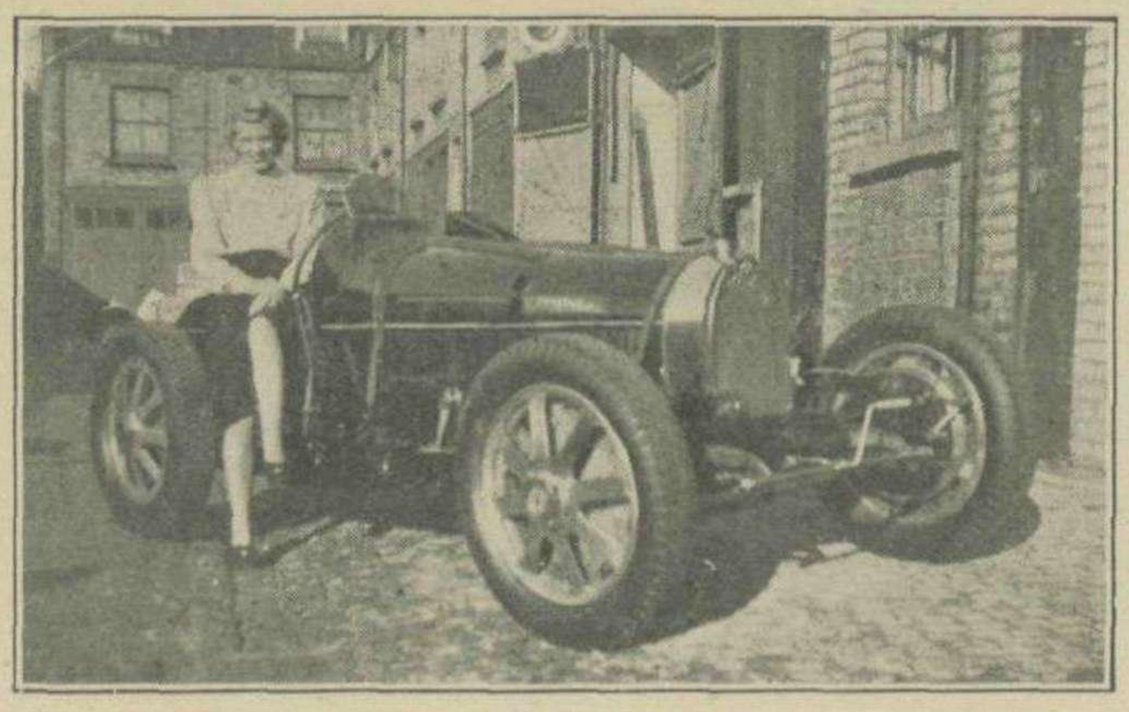

BUGATTI CLASSICS—No. 4

Photograph from the Jack Lawrence Collection

Type 35B. Produced in 1927 as a supercharged, 8-cylinder, single-cam, 2,261-c.c. Grand Prix Bugatti, the model established a reputation for its reliability. Bugattis, including the 35B, secured 806 first places during 1927, and this particular car has enabled its many owners, including the Hon. Jock Lieth, Andrew Leach, D. Mortimer and F. O. Harmer, to achieve success

★ Cars illustrated in this series are not necessarily for sale, but shown for the interest of Bugatti enthusiasts by Jack Lawrence, of 166, Clarendon Road, Holland Park, W.11. Phone : Park 5705

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 4¼-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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