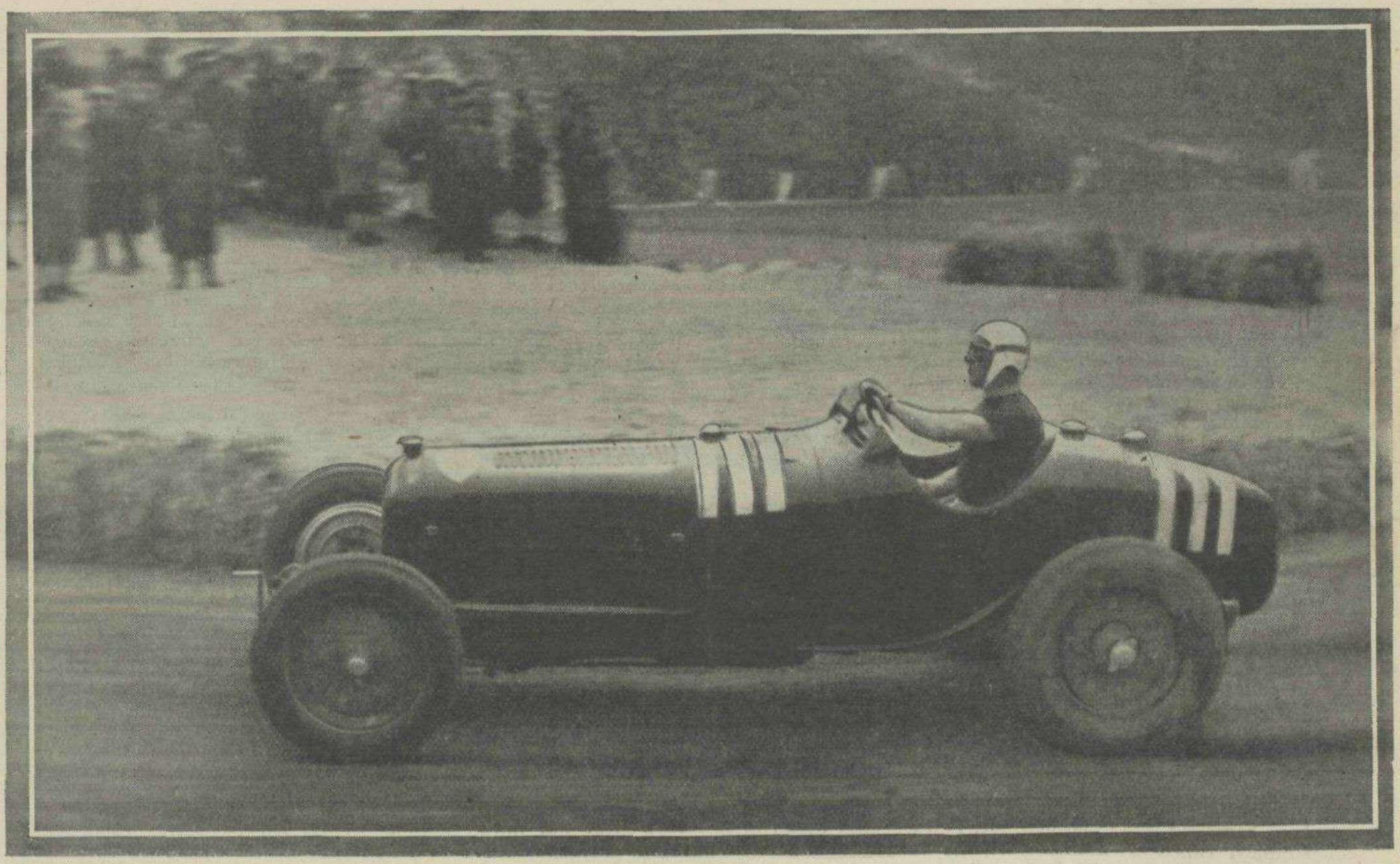
Vol. XVIII No. 11. **ROAD TEST OF SUPERCHARGED ROLLS ROYCE** *November, 1942*

MOTOR SPORT

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THE "REMBRANDT" MEETING

As the Editor of "Motor Sport" was unable, at the last moment, to attend, this report was written for him by J. Lowrey

SUNDAY, September 27th, was the occasion of the second war-time gathering of enthusiasts at the Rembrandt Rooms, Kensington.

Proceedings commenced around the hour of noon, as the enthusiasts began to arrive, and it was cheering to see that quite a few managed to travel by road. Basic rations presumably brought one sidecar outfit, two two-wheelers and a trio of tricars ; the four cars present were apparently shared between the Press, the Trade and the Disabled.

The main interest in these functions really lies in the opportunity they offer for enthusiasts to meet and talk, and certainly there was no lack of talk on this occasion. In fact, the mural decorations loaned by the *Motor*, *Autocar*, Klemantaski, Eric Sidney and others, seemed to be almost overlooked, interesting though they were. There should really be some award for the person making the longest journey to attend these functions ; I don't know who would have claimed it, but quite large numbers of enthusiasts had journeyed (by rail) from such places as Derby, Bristol and Leicester.

The lunch, around which the occasion was built, is scarcely relevant to this journal ; suffice it to say that it did not show signs of having been cut by Lord Woolton's austerity campaign.

After the toast of "The King" had been honoured, the Chairman, Mr. Percy Bradley, called on Gordon Wilkins to propose a toast to "The Forces."

After some initial diversions, in the course of which he endeavoured to instruct Mr. Pomeroy in the correct method of plotting b.m.e.p. against the time of high tide at Barking Creek, Gordon Wilkins settled down to his main theme, this being the importance of civilians planning a post-war world that heroes will be glad to live in.

His description of the be-whiskered and be-tricycled Herbert Stancer bullying the Government into dropping all ideas of anti-cyclist legislation with the slogan "There are ten million others like me" caused great merriment, but there was general appreciation of his emphatic declaration that, if we are to enjoy any rights or privileges as motorists after the war, we must fight for them, now and in the future.

Replying on behalf of the Forces, and especially on behalf of those enthusiasts who are overseas, Major Alan Hess (dissociating himself from his more air-minded namesake) looked forward to brighter days ahead. Typical of the attitude of many Forces' enthusiasts was his remark that, when things were at their worst during the Battle of France, the one thing that really worried him was whether he would ever get to Brooklands again.

Proposing the toast to "The Press," and particularly to the absentee Editor of MOTOR SPORT, Mr. Boddy, Peter Clark scattered bouquets almost as widely as he scattered his neatly-typed notes ! *The Autocar* was, strangely, unrepresented at the gathering, but tribute was paid to H. S. Linfield's great war work on behalf of the Sport—a subject which was frankly rather outside his normal line of business. Tribute was also paid to *The Light Car*, and to *The Motor*, which appeared to be represented by the complete staff, save only the assistant office boy ! In particular, the remarkable co-operation which had led to the Technical Editor of *The Motor* being permitted to contribute to MOTOR SPORT was held up as a shining example of a spirit all too rare in the motoring world.

Since the Editor of MOTOR SPORT had departed on some entirely fictitious business to a very distant place, the task of replying to this toast fell to Mr. F. J. (Vox) Findon of *The Light Car*. It would perhaps be tactless to repeat his tales of the goings on of Messrs. A. P. Bradley and A. C. Armstrong when they were editors of that journal, since their respective disclaimers were so violent as to suggest that these narratives were not altogether untrue.

Rising to propose a toast to the organisers, A. F. Rivers-Fletcher and S. H. Capon, Laurence Pomeroy fully lived up to his reputation as an orator. The fact that the only parts of his speech which I recall are quite unprintable is a reflection on me, not Pomeroy !

In a brief reply, Capon said that all the thanks the organisers wanted they already had, in the presence of about 150 enthusiasts at the meeting. He hoped future gatherings would be equally well supported.

"Top of the Bill," Raymond Mays spoke next. He paid tribute to the helpfulness and absolute fairness of Percy Bradley, as Brooklands Clerk of the Course, and looked forward to meeting him again "on business" in the future.

Finally, as Chairman, Mr. Bradley gave some interesting information concerning Brooklands, present and future, though he emphasised that he is no longer in any way associated with the Track authorities. He is convinced that, although the outer circuit is not serviceable at present, it will be restored after the war ; also, recent road-building will make possible limitless variations on the still-intact Campbell Circuit. It was particularly interesting to hear that certain unspecified work had been done, rendering noise at the Track even more audible to the super-sensitive residents on St. George's Hill, but that the Government had agreed to be responsible for the consequences !

So the luncheon came to an end and the audience departed into the ballroom air raid shelter for a very varied film display. A welcome diversion, even though Raymond Mays (in glorious technicolour) did burst into unpremeditated flames (on the screen), and the Champion film persisted in tying itself into a true Gordian knot. Perhaps the projector lacked i.f.s. ?

All good things must come to an end, and with a series of informal tea parties the gathering gradually broke up. We look forward to another such meeting in the not too distant future, and, meanwhile, perhaps Capon will be able to hold some smaller gatherings to keep alive the 750 Club's "first Sunday in the month, open to all" tradition.

A SUPERCHARGED "PHANTOM I" ROLLS ROYCE ON TEST



Cecil Clutton tries FitzPatrick's famous car

★★★★★★★★★★★★★★★★★

WHEN I penned my recent report of a Type 57SC Bugatti for MOTOR SPORT I thought I had certainly carried out the last road test of the war; but almost at once came an invitation from Douglas FitzPatrick to ride out with him in his famous supercharged Rolls Royce car when next the Navy granted him a spell of leave. Whatever other restrictions may be imposed on motoring, one cannot express too strong a hope that the present system of active service leave licences and petrol, and of making a recreational allowance to R.A.F. aircrew personnel, will be continued. The amount of petrol so accounted for must be infinitesimal, but the richly deserved pleasure that it affords can hardly be expressed.

Before going on to consider this altogether remarkable motor-car it might perhaps be worth glancing back along the years and seeing the steps by which the more recent Rolls Royce designs have been arrived at.

The earliest Rolls Royce of all was first tested on April 1st, 1904. It had a two-cylinder motor of 95×127 mm., three-speed quadrant-change gear, cone clutch and live axle. The complete outfit weighed 14½ cwt. In designing it, Frederick Royce had three principal aims in mind. Foremost was silence, but hardly less important were reliability and the avoidance of unnecessary weight. Even in this maiden effort all three were fully achieved. Reliability largely followed upon the meticulous workmanship for which the name is ever famous, but it is interesting that Royce was at particular pains to obviate the valve failures, which were then so common, by providing ample water passages round the seatings—a feature quite unusual in those times. Doubtless with this in view, he adopted the arrangement of inlet valve over exhaust, which, of course, gives unrivalled facilities for ample cooling.

Working on the basis of this model, a series of two-cylinder 10 h.p., three-cylinder 15 h.p., four-cylinder 20 h.p. and six-cylinder 30 h.p. was put into production already, in 1905, bearing the combined names of Rolls and Royce. Of this series it was the 20 h.p. which so distinguished itself in the T.T. races of 1905 and 1906. It is curious to find a man of Royce's talent building such an inherently unbalanced engine as a three-cylinder, but doubtless, with the low crankshaft speeds then employed, this was not a serious objection. Also in 1905 came the quaint "Legalimit," designed to compete with the electric brougham. Its 3½-litre V8 engine (83×83 mm.) must have been a most interesting harbinger of the small multi-cylinder engine of 30 years later, but the model was not popular and was soon dropped.

In 1906 came the first of the great "40/50" series which has dominated the automobile world until the present day, and many of its features have carried on as long. It was known as the "Silver Ghost" and its six-cylinder engine was square, the cylinder dimensions being 4½" each way. It had a three-point engine mounting, side valves, dual ignition by coil and magneto, and developed 48 h.p. at 1,700 r.p.m. The radiator was flexibly mounted. The four-speed gearbox was laid out with direct drive on third gear, but in later models the overdrive was discontinued, since people would use it as top gear, and after a time it became noisy. Three gears are quite adequate for an engine of this type and size, but public prejudice later demanded a quite senseless return to four speeds.

It was this first "Silver Ghost" which carried out the famous 15,000 mile, R.A.C. observed, non-stop trial, after which it was found that the only replacements which could possibly be considered necessary cost no more than £2 2s. 7d. The same car went on in private ownership and covered over 400,000 miles; but even more remarkable, I venture to think, is the 1912 "40/50" belonging to a neighbour of my father's, Sir Walter Carlile, which has covered 710,000 miles with only one involuntary stop, due to a cracked back axle casing when crossing an extra deep French "cassis" at high speed. The last time this wonderful machine went to Derby the firm sent it back carrying a silver plate commemorating its proud record.

The "Silver Ghost" was such a tremendous success that all other models were discontinued from that time until 1922, when the "20" came on the scene.

The year 1911 saw an improved edition of the "Silver Ghost," known as the "Continental Model." The engine had a longer stroke, and the famous rear cantilever springing appeared for the first time. Ever gradually improving, the side-valve engine continued in production until 1925, when it was replaced by the overhead-valve "Phantom I," but, in the meantime, the little "20" was produced, in 1922, which later grew into the "20-25," "25-30" and, finally, the "Wraith."

The "Phantom II" came in 1929, incorporating a more powerful edition of the "Phantom I" engine, unit construction gearbox and semi-elliptic rear springs instead of the cantilevers. The short chassis, "Continental Phantom II" was surely one of the most handsome and aristocratic-looking cars ever forged, especially when carrying a close-coupled coupé body with a big luggage box behind. But the "Phantom II" saw the ultimate development of the large six-cylinder engine consistent with Rolls Royce standards of refinement, and in 1935 the series gave way to the V12 "Phantom III," a car which, whatever its excellences, can certainly not compare with the "Phantom II" so far as appearances are concerned.

Turning now to FitzPatrick's machine, in particular. It is basically a 1926 long chassis "Phantom I." To all outward appearances it might easily be taken for a "Phantom II" of the kind I have just been extolling, for it has exactly that body, while the radiator has been chromed and deepened and the cantilever springs enclosed. This body (by Cooper) was fitted in 1933. The general chassis layout is well known; the wheelbase is 12′ 6″, and the track 57″ in front and 56″ behind. The three-point engine mounting does not seem to leave any very great amount of bracing at the front end, though experience shows that the results are satisfactory. The front springs have very short shackles at the forward end. The rear end of the chassis, leading up to the long cantilever springs, is well stiffened and the propeller shaft is enclosed. Braking is by the famous system of mechanical servo.

The cylinder dimensions are 4¼"×5½" (roughly 108×133 mm., giving a capacity of 7,668 c.c. and a treasury rating of 43.3 h.p.). The crankshaft is suspended among seven main bearings and the camshaft is gear driven from the front end. There are two cylinder blocks, but the detachable head is in one piece. Dual ignition is by coil and magneto, arranged on the well-known Rolls Royce principle of staggered timing at low speeds, gradually synchronising at higher r.p.m. The cam contour is very "woolly" and the followers are of roller pattern. The complete chassis weight is some 36 cwt. and the overall weight of FitzPatrick's car is about 2½ tons.

The main mechanical modifications which FitzPatrick has carried out are the substitution of hydraulic shock absorbers for the existing friction ones; the replacement of the old silencing system by a no less muting, but far less obstructive, Burgess silencer of superb dimensions; and, of course, the supercharger. This is an enormous Centric, with an outside diameter of no less than 10″. It is fixed on to the off side of the engine, being driven from a pulley, fitted on to the crankshaft damper *via* a double-row belt, at 1.8 times engine speed. The mixture is drawn through two large S.U. carburetters and delivered across the top of the block to the induction manifold on the near side of the block. The pressure of the supercharger makes the middle sparking plugs rather inaccessible, but not hopelessly so. In addition, the initial compression ratio has been raised quite considerably and the head copperised.

The addition of the supercharger brought quite a host of troubles in its wake, but these were gradually dealt with, mostly by "Bentley" Mackenzie, until the car once more became completely reliable, and has been constantly

A SUPERCHARGED ROLLS ROYCE
—continued

motored all over Europe at high speed with no trouble whatever. It is interesting that the petrol consumption has not been affected, remaining at exactly 10 m.p.g. The story of how the bothers were overcome was the subject of a recent article in *The Autocar*, so there is no need to go over that ground again in detail, but most persistent was boiling and exhaust valve failure, while the pistons were not equal to the strain and had to be replaced by a set of Mackenzie specials. [The car was also described in MOTOR SPORT of July, 1939.—Ed.]

I must confess that I anticipated my trial of the car with certain misgivings. Would the Rolls Royce refinement have been sacrificed to a point that it ceased to be a Rolls Royce, and would the road-holding be good enough to stand up to the improved performance? I need not have worried, for the entire experiment has more than justified FitzPatrick's boldness in conceiving it and carrying it out.

The exact output of the engine is not known, but in standard form it was accredited with 120 b.h.p. at some 2,750 r.p.m. Assuming the compression ratio has been raised by 1½ atmospheres, this would put the power up to some 133 h.p. The maximum boost is about 9 lb./sq. in. at 3,000 r.p.m., which would indicate a further 60% increase, bringing the total output up to some 213 b.h.p.

My first taste of the car was with FitzPatrick at the wheel, and he really does handle it a treat. His driving has that indefinable rhythmic quality which all first-rate drivers possess, coupled with polish, excellent judgment and very considerable *elan*. It is a real joy to motor with him, and I smiled to think of some little wise-acre who recently suggested in one of the motoring papers that Forrest Lycett should try his hand at a "small car which really did need handling." It is, of course, true that a small car calls for more strenuous gear changing, but surely any fool can row away at a gear lever. But to drive a large car quickly over English roads calls for a degree of finesse and judgment which is seldom required of the small-car driver.

Presently Douglas turned the controls over to me for a considerable stretch of miles, so that I was able to form a very thorough opinion of the car. I thought this particularly generous of him, because his allowance of leave petrol was not so terrific and cast away in the Orkneys, as he is, he gets no motoring at all when on duty. At this juncture it should be explained that the magneto was away being cleaned up. It should have been back, but as so often happens nowadays there had been the inevitable delay and we therefore had to rely on the coil alone. Superlative as the slow running still was, it would undoubtedly have been better still with both sets in action, and the high speed performance probably suffered in some measure as well. Also, a car which has only had some three weeks' use in as many years is not likely to be giving its best. The figures taken can therefore be regarded as no more than an indication of the genuine potentialities.

Driving along the narrow, twisty Norfolk lanes around FitzPatrick's home one's first impression was the rather obvious one that there was a lot of motor-car, and memories of the swaying and rolling "Phantom I" of tradition made one rather chary of the whole undertaking. But so superlative is the handling of this particular car, with its weight well inside the wheelbase and its overall height of only 5′ 6″ that one is forced to wonder whether the "Phantom I's" reputation for rather inferior road-holding is not to be laid almost entirely at the door of the grotesque bodies it was generally asked to trundle about. No doubt, however, the additional damping is also contributory to the success of this machine.

Anyway, it was only a very few miles before I was slinging the 2½ tons of metal round the corners like a Frazer-Nash, and with every bit as much confidence and pleasure. Added to the narrowness of the roads was the fact that most of them are asphalt and it was raining; the only redeeming feature lay in a general lack of hedges and consequent good visibility. When taken round a corner at skidding speeds the whole car slides absolutely in one piece, with neither over- nor under-steer. Only once, by sheer brutality, did I manage—and then only for a second—to lose the front wheels. Once I breasted a little, almost donkey-backed, hill at 75 m.p.h. and the car practically "took off." On such a wet, slippery surface I expected a nasty moment when we came down again, but nothing at all happened. All this, of course, is coupled with true Rolls Royce standards of comfort, which really *is* comfort and not the seasick-making parody of it which passes for comfort in many cars of American modelling.

Normally, of course, one would not want to dice a large car about in this rather objectionable manner, but Douglas and the Rolls Royce and I were all out to enjoy perhaps the last bit of pleasure motoring we were likely to get for some long time, and probably the last for the duration so far as I was concerned. Also, it is impossible to form a genuine opinion of a car until one has driven it at the edge of control.

The wide-diameter, thin-rimmed, "Phantom II" type steering wheel is a joy to finger. Two turns from lock to lock—and a wide lock at that—do not make for exceptionally light operation, but who cares for that when such superlative sensitiveness and accuracy are there instead? There is no trace of play in the movement, and while there is nothing resembling kick-back, there is sufficient reaction to keep the driver fully informed of what the road-wheels are doing.

The brakes are even, sensitive and reassuring, but not exceptionally powerful when it comes to a real emergency stop. They are, nevertheless, fully adequate for all normal requirements and are doubtless better still when in proper adjustment.

Turning to the mechanical side of driving, it is customary to get away in second gear and change straight into top gear at some 20 m.p.h. The single-plate clutch is silky smooth, but there is no stop and the change is slow. On the "Phantom I" the gate retained the notches into which the lever is pressed by the centering spring, and until one is used to this it makes one clatter about in the gate a good bit, and gear-changing seems to demand rather more physical effort than is desirable. One would doubtless get used to this notch arrangement quite soon, and, anyway, it was dropped in the "Phantom II." In moments of stress it is possible to force upward changes through as fast as the lever can be moved, but again, as John Bolster would say, "It's not in keeping!"

The standard top gear ratio was 3.41 to 1, but this has been raised to 3.2 to 1, which, with the smaller wheels now fitted (7″×19″), keeps the engine speed about what it was before. The overall ratios are 3.2, 4.8, 7.16 and 11 to 1. Engine speed is limited by valve bounce to a maximum of 3,000 r.p.m., which gives maxima of 90, 60 and 40 m.p.h on the upper three ratios. Bottom may have some purpose, but I wouldn't know just what. On decent petrol, 90 m.p.h. can be reached quite quickly, whereas, in unblown form, the car was very sluggish above 70 m.p.h. and had an absolute maximum of 85 m.p.h. under favourable circumstances. A higher ratio still, therefore, seems desirable, probably around 2.8 to 1. If the constant mesh gearing was then raised by 20% we should arrive at the perfect ratios of 2.8, 3.4, 5.05 and 7.8 to 1, with maxima at 3,000 r.p.m. of 103, 88, 59 and 38 m.p.h. This is one of the things which FitzPatrick intends to carry out after the war. The indirect ratios are not dead quiet, but have that faint, altogether delightful and refined hum which characterises Rolls Royce gears of the pre-synchromesh era.

Most of the time, whether ticking over, cruising or during mild acceleration, the supercharger is *completely* inaudible. Only at full throttle openings is a faint but exhilarating whine discernible. So far as smoothness is concerned, the engine has lost no atom of its traditional refinement. The available roads prevented me from ever exceeding 75 m.p.h., but 70 m.p.h. is an entirely effortless cruising speed, which represents a piston speed of only 2,000 f.p.m., with the blower gauge registering zero. If the throttle be fully opened at 70 m.p.h., the induction pressure rises to 7 lb.

We took some performance figures, but, of course, with a full complement of ignition and real petrol there would be a different story to tell; even so, it is a sufficiently imposing record for a 2½-ton motor-car, coupled with traditional Rolls Royce refinement; 0–50 m.p.h., using second and third gears only, occupied 11½ secs., but as one ordinarily uses nothing but top gear, the figures on that ratio are the most interesting. The 10–30 range undoubtedly suffered most from the ignition shortage, and with practice I might have come to juggle the spark and mixture control to better advantage, but, as it was, 10–30 and 30–50 m.p.h. each occupied 8 secs., and 50–70 m.p.h. took 10½ secs., making a top gear time from 10–70 m.p.h. of 26½ secs. in all.

It is rather interesting to compare these figures with a "Phantom II" and

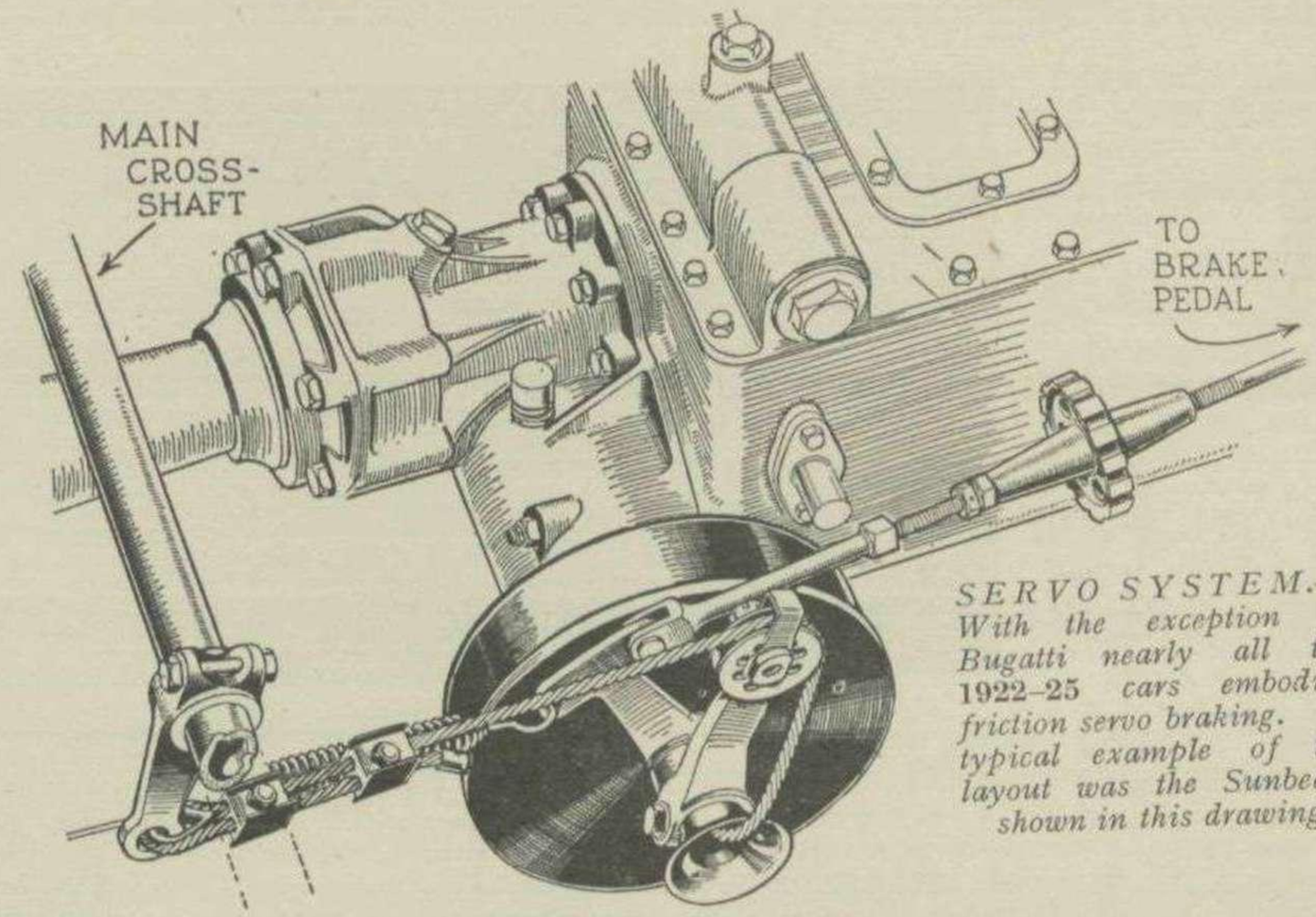
Continued on page 241

RACING CAR EVOLUTION

Part III (*continued*): 1922-1925

By Laurence Pomeroy

We have great pleasure in presenting herewith a continuation of the "Evolution of the Racing Car" series, this time contributed by Laurence Pomeroy, Technical Editor of "The Motor" and author of the "Milestones of Speed" articles now appearing in that journal. The first instalment, covering the period 1919 to 1921, appeared in our October issue. The text and illustrations are published by kind permission of Temple Press, Ltd., and remain their copyright.—Ed.



SERVO SYSTEM.—With the exception of Bugatti nearly all the 1922–25 cars embodied friction servo braking. A typical example of the layout was the Sunbeam shown in this drawing

THE period I am now about to review represents the zenith of motor racing from a viewpoint of the number of companies engaged. It is also a period of intense technical interest, particularly in respect of engine development, so much so that at the end of it Grand Prix engines were developing as much power per litre as they were 10 years subsequently.

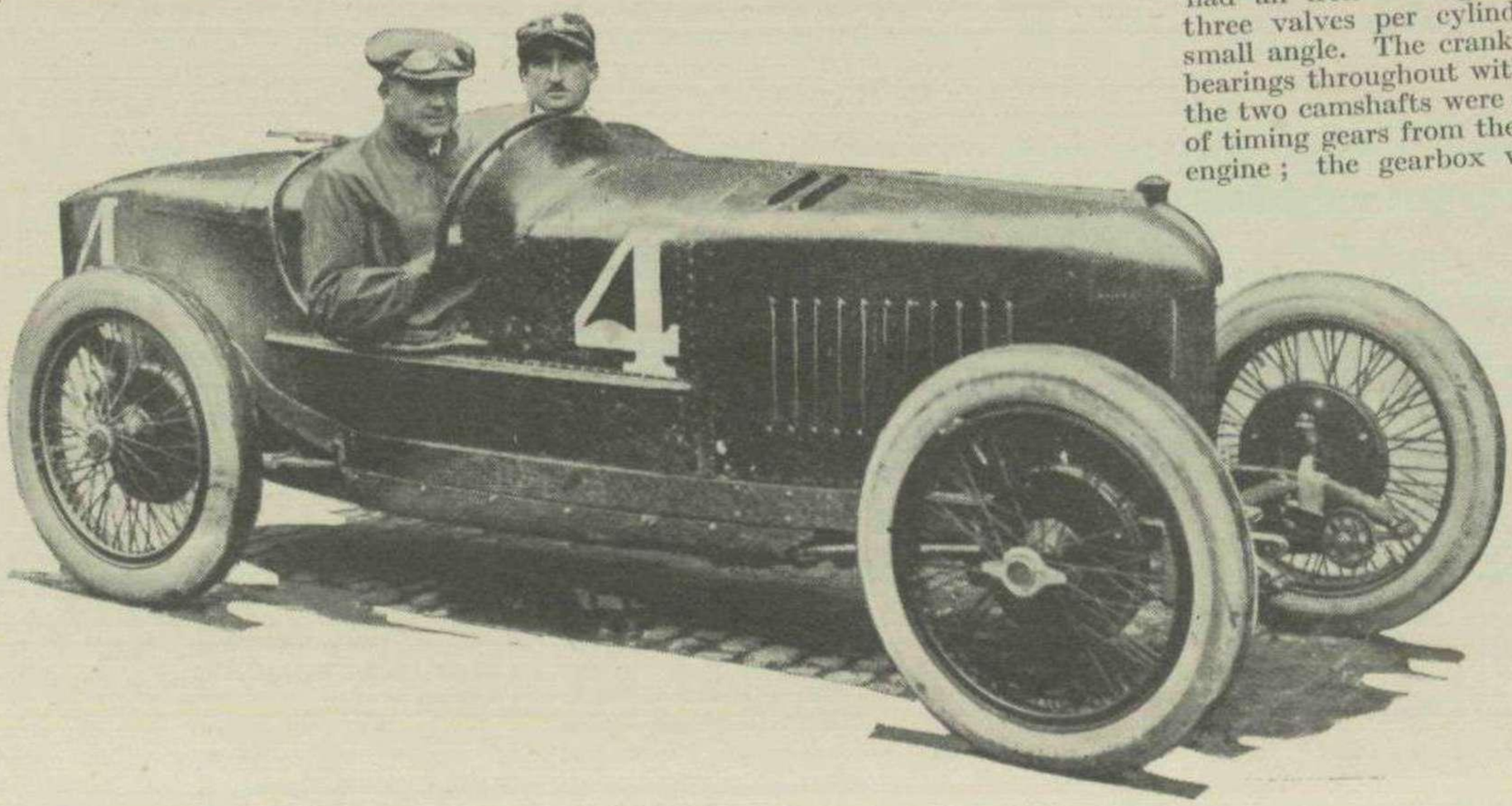
So far as international racing was concerned a 2-litre capacity was enforced throughout, apart from three exceptions, which I think I shall deal with straight away. Early in the year the R.A.C. ran a T.T. race in the Isle of Man open to cars of 3-litre capacity; this attracted the previous year's Grand Prix Sunbeams, a team of Bentleys with tuned-up standard production engines, and three specially built Vauxhall cars with engines designed by Ricardo. In view of the obviously high costs to the last company of building special cars it may seem odd that they should have been chosen to enter a race under the virtually obsolete 3-litre formula and that they did not wait until the French G.P. and run 2-litre models which could have been kept going for some years.

The answer, believe it or not, was pure ignorance. I can vividly remember the astonishment of the Chief Engineer when I, then a very small schoolboy, told him the true facts, for he, up to that time, had been quite confident that the R.A.C. were complying with established international practice. As it happens, the Vauxhalls did not even receive a reward for their enterprise and could do no better than third, first place being secured by Chassagne on a Sunbeam, and the runner-up being a Bentley.

Indianapolis was the second 3-litre event and the straight-eight Ballots were sent over, one of them running third, the race being won by Jimmy Murphy on a Duesenberg chassis with a Miller engine. Another non-formula event was the Targa Florio, which was won by an ex-1914 G.P. Mercédès, which had been fitted with front-wheel brakes. Two Ballots ran second and third, but these were 2-litre sports cars having four cylinders, with two overhead camshafts; design by Henri.

The main race of the year was undoubtedly the French Grand Prix held at Strasbourg. Entries were Fiat, Bugatti, Ballot, Rolland Pialin and Sunbeam, also two Aston-Martins of 2½-litre capacity. This race forms, as it were, the watershed between the pre- and the post-Henri school of design. The Aston-Martins had engines which were virtually half the previous Henri-designed 3-litre Ballots, the 2-litre Ballot was designed by Henri himself, with all the characteristics of his engines, and were of the type run in the 1921 French Grand Prix, gaining third place.

The Sunbeam was a new design by Henri, who had been retained by Louis Coatalen for this purpose. In this model the designer continued on the lines which had hitherto brought him and his copiers so much success, but rather surprisingly he abandoned the straight-eight engine in favour of a four-cylinder unit. This had an iron casting as cylinder block, three valves per cylinder inclined at a small angle. The crankshaft ran on ball bearings throughout with plain big-ends; the two camshafts were driven by a train of timing gears from the front end of the engine; the gearbox was built in one



PROGENITOR—The 1922 French Grand Prix winning Fiat car designed by Bertarione, set the fashion in engine design and general outline for many years

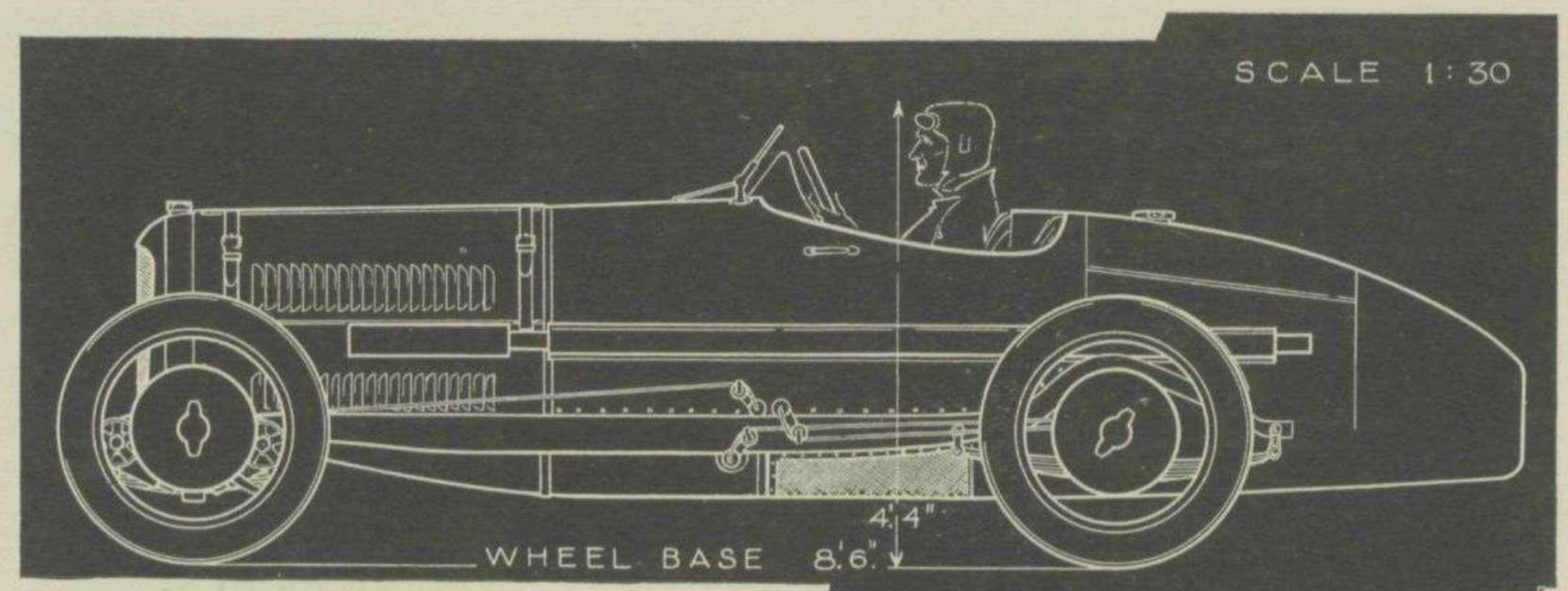
RACING CAR EVOLUTION
—continued

unit and the brakes had mechanical servo action.

In view of the success of the straight-eight principle in the 1919–1920 period, it is strange that only two entries in 1922 had this number of cylinders, viz., the Rolland Pialin and the Bugatti. The former need not long detain us, as it was never a very successful design, although it embodied many ingenious mechanical features. The latter was a forerunner of a long range of successful cars during the decade. The crankshaft ran on three ball bearings, the cylinders were castings of two blocks of four, and single overhead camshafts operated two inlet and one exhaust valve placed vertically in the cylinder head. Two carburetters were used, and it was claimed that the engine would give 90 h.p., although this is probably an exaggeration.

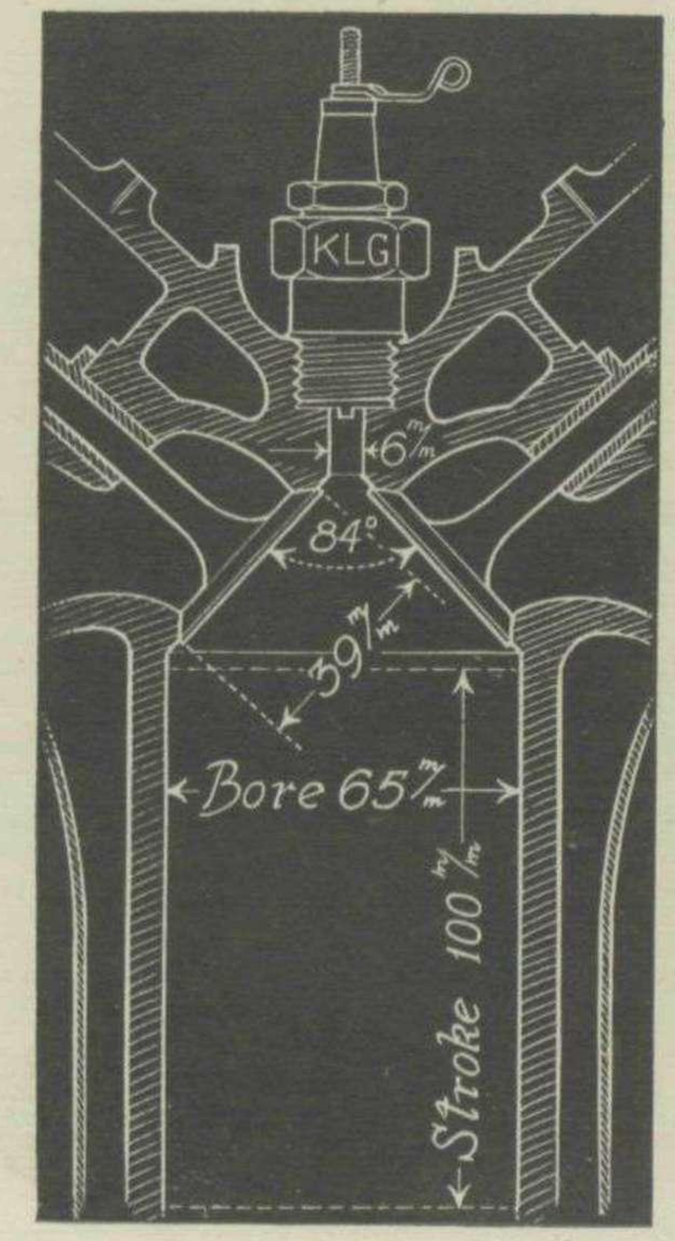
Both the Bugattis and the Ballots were fitted with egg-shaped bodies, and amongst the ingenious features of the latter was a scheme for taking the exhaust out through the centre of the body. It was supposed to favour streamlining, although it made the interior of the car extremely hot. The bore and stroke was 60 × 88 mm.

The Fiats had engines which were scaled down replicas of the 3-litre models I have previously described, the bore remained the same, 65 mm., and the



Above
TYPICAL OUTLINE.—This scale drawing of the Sunbeam 2-litre G.P. car is typical of the racing models of the period. The derivation from the 1922 Fiat is clearly marked

Below
TURIN TECHNIQUE.—The 1922 Fiat engine followed 1914 Mercedes practice in employing cylinders built up from a steel forging with welded-on water jackets. The principal dimensions of the engine are shown in this sketch, which indicates the large diameter of the valves and the wide included angle between them



stroke was reduced from 112 to 100 mm., giving a capacity of just under 2 litres. The general specification of the engine, viz., timing gears at the back, cylinder built from steel forgings with welded-on jackets, wide angle valves, and all-roller-bearing engine, was identical with the previous types, and the choice of six cylinders seems to have been dictated primarily by convenience and not by belief in the superiority of this number as compared to eight cylinders in a line. These Fiats developed 60 h.p. and ran up to 5,000 r.p.m. The piston speed at these revolutions was only 3,300 f.p.m., a direct contrast to the Sunbeam, for Henri's choice of a stroke-bore ratio gave him dimensions of 68 × 136 mm., so that 3,300 f.p.m. piston speed equalled only 3,800 r.p.m.

In a sense, therefore, the Sunbeams were beaten before they started, and, in fact, during the race at Strasbourg they were never in the same street as the Fiats. Their best lap speed was approximately 78 m.p.h., whilst the Bugattis were able to average 80 m.p.h., and the best Fiat speed was 86 m.p.h. Actually, Nazzaro on a Fiat won easily at an average speed of 79.4 m.p.h., although rear axle troubles affected the other two at the last moment and prevented them having a grand slam. In consequence, two of the Bugattis finished second and third.

The superiority of the Fiats was so great that in the sole 2-litre event held during the year only the Bugatti came out to challenge it, and the Fiat had an exceedingly easy win on the Monza Circuit at the excellent average speed of 86 m.p.h. Thus, although Henri had really been represented by three makes in 1922, viz., Aston-Martin, Ballot and Sunbeam, it was apparent that his basic designs were now superseded.

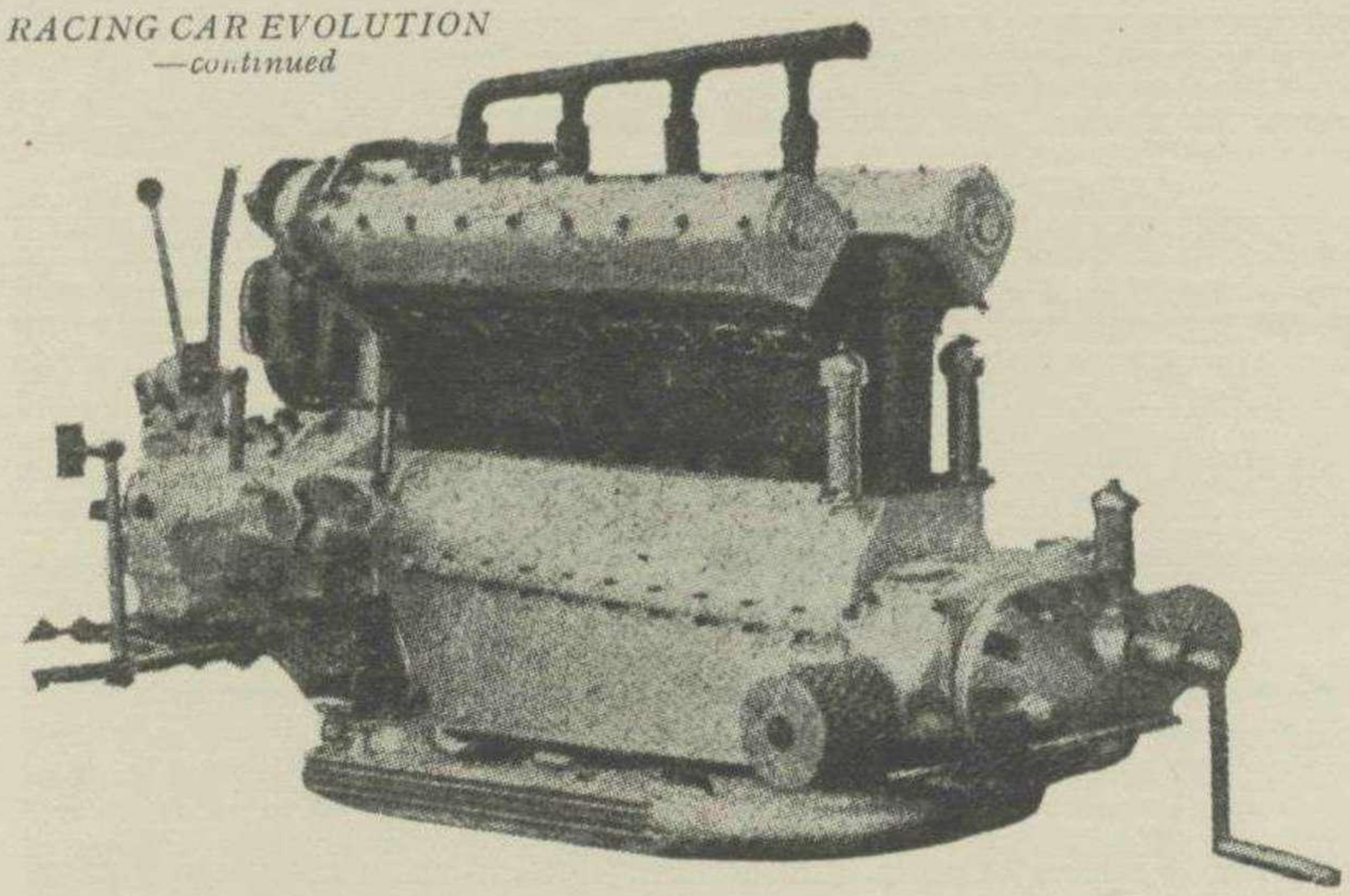
In 1923 the Fiat Bertarione school was in its first flush of success. The Targa Florio was poorly supported at the beginning of the year and was won by Alfa-Romeo with one of their large six-cylinder models, the first Alfa-Romeo victory in a major event.

Indianapolis was interesting because it was the last occasion on which there was strong European representation. Ettore Bugatti sent over a team of cars with Strasbourg type chassis and single-seater bodies, and Mercédès entered some four-cylinder models with bore and stroke of 75 × 129 mm., supercharged. These were successors of a rather unsuccessful blown 1½-litre which had been entered by the Stuttgart firm for the 1922 Targa Florio.

Although the drivers were unfamiliar with Indianapolis they did tolerably well and one came home third despite exhaust valve trouble. They were by no means the first racing cars to be fitted with superchargers. Experiments in this direction had been made as long ago as 1907 and 1908 on an American car called the "Chadwick," whilst the Mercédès Company themselves had been experimenting with blowers since 1917, and made their first supercharged car in 1919. However, despite the winning of the race by an unsupercharged Miller at 90.95 m.p.h. (which was 4 m.p.h. slower than the previous year's record with the 3-litre model), the Mercédès entry focussed public interest on the blown type of engine.

Even more significant was the arrival of some entirely new Fiat models (with superchargers) on the starting line

RACING CAR EVOLUTION
—continued



PRODIGIOUS PERFORMANCE.—The P2 Alfa-Romeo engine, designed by Jano, embodied a Roots blower delivering air under pressure to a carburetter mounted at the back of the engine, through a heavily finned manifold. Following the Fiat in general construction, this engine (designed in 1923) was successfully raced up to 1930, and was capable of propelling the car in its later forms at approximately 140 m.p.h.

of the French Grand Prix held at Tours. It is doubtful whether there has ever been a race with more technical interest and diversity than this one. The Rolland Pialins turned up with the previous year's cars, but the other teams, Voisin, Bugatti, Fiat, Sunbeam and a single Delage were of extreme interest. Bugatti kept the same engine as previously, but had ultra-short wheelbase chassis with tank type streamlined coachwork, whilst the Voisin also had carefully calculated bodies of good aerodynamic form. Delage returned to racing with a car designed by M. Planeton and built in an extremely short space of time, orthodox so far as the chassis was concerned, but with a twelve-cylinder engine potentially capable of a very high r.p.m. and road speed, the stroke being only 80 mm., the bore 51.3 mm.

In the event none of these cars were serious contenders, and the struggle lay all the time between Sunbeam and Fiat. For the former Coatalen followed once again his policy of buying up the best brains from his rivals. During the previous winter he secured the services of Bertarione of the Fiats, and it is, therefore, not surprising the 1923 Sunbeam engines showed a very strong resemblance to the previous Turin products. In point of fact the 1923 Sunbeam engines were almost identical to that of the 1922 Fiat, except that 2 mm. were added to the bore and 6 mm. taken from the stroke, giving dimensions 67 × 94 mm., whilst the exhaust valve was made larger than the inlet valve. A unit construction gearbox giving only three forward speeds was fitted, and the external appearance of the car was again very "Fiat like."

The latter company had a team of cars of entirely new design by Messrs. Fornaca and Cavelli. They followed general principles previously established at Turin and, like the 1921 cars, had eight cylinders in line. The bore and stroke were 60 × 87.5 mm., and by moderate blowing the power was raised to 120 b.h.p., as compared to the 92 b.h.p. of the previous year's six-cylinder model and the 108 b.h.p. claimed for the unblown Sunbeam.

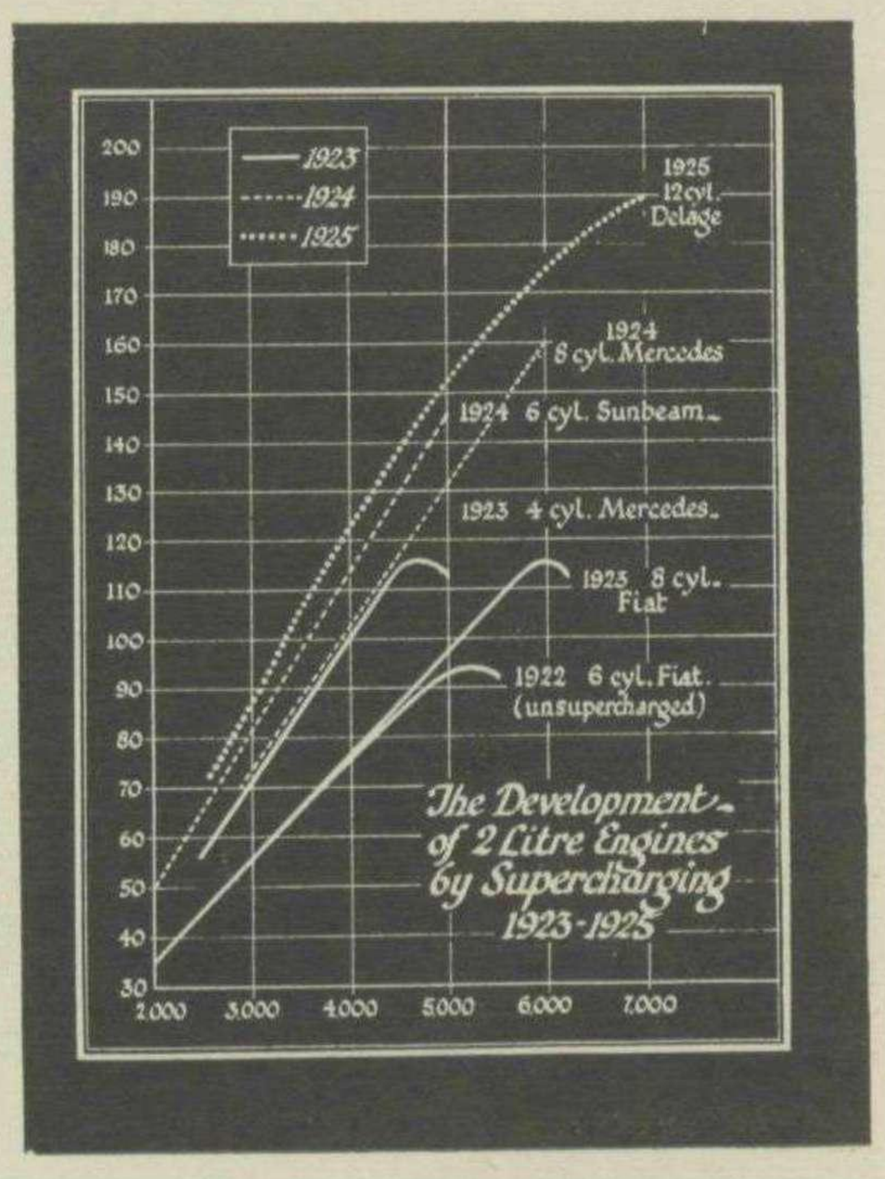
The contest between these two makes was close, for a Sunbeam was second at five laps, first at 10 laps, first at 20 laps, second at 30 laps, and Segrave finally won on the thirty-first lap. Fiats, on the other hand, were first at five laps, second at 10 laps, first at 20 laps and first at 30 laps. No Fiat finished, all of them going out with various mechanical troubles, including break-up of the rather primitive Vane type of blower, which will be described in detail in another part of this article. Sunbeam was second and fourth, Bugatti running third, 25 minutes behind the winner.

The Bugatti drivers were handicapped by the odd proportions of wheelbase and track chosen by their designer, viz., 6 ft. 6 in. and 3 ft. 3 in. respectively, and this made them very hard to hold on the straight, although quick through the corners. At the time Bugatti attributed this characteristic (in my opinion falsely) to the streamlining, but the latter certainly proved its worth in respect of sheer performance. This was shown by some hand timing, which gave the winning Sunbeam a maximum speed of just over 130 m.p.h. and the Bugatti just under 114 m.p.h., although the Bugatti engine developed not more than 80% of the power realised on the Sunbeam.

This race was held in July, and by the time the Italian G.P. was held in September the Fiats had been fitted with Roots type blowers, with which they showed their quality in no mean fashion. Bordino led up to half distance, a staggering effort in view of the fact that he had broken his arm in practice and drove single-handed with a mechanic changing gear. He was forced to retire through physical exhaustion and Salamono won at 91.6 m.p.h., Nazzaro second and an unblown Miller, driven by Jimmy Murphy (the 1921 French G.P. winner), third, five minutes behind the winner. Fourth and fifth were two rear-engined Benz cars, designed under Rumpler patents. These cars had no influence at the time, but are worth mentioning because they led directly to the production in 1934 of rear-engined cars for Auto-Union, a story I must relate at some other time.

Fiats put up a lap record for the Monza track at 99.8 m.p.h., so the eight-cylinder blown cars thus proved themselves 6% faster over the whole distance and 7½% faster over the lap. This was the first race won by a supercharged car, and since that time only one International G.P. has been won by an unsupercharged type, except on occasions where blowing has been proscribed by the regulations.

In 1924 the Targa Florio was won by a blown car, this being a four-cylinder Mercédès similar to the previous year's Indianapolis cars, but very much improved in detail by Dr. Porsche, who had become chief engineer. This was followed by Indianapolis, where Duesenberg appeared with an engine fitted with a centrifugal blower running at about six times engine speed and gave about 10 lb.



POWER OUTPUT DOUBLED.—The above curves show the progressive increase in power output on the engines built under the 1922–25 2-litre formula. It will be seen that power output was more than doubled, partly as a result of using shorter stroke and partly because of supercharging. The result was a gain in maximum speed of 30%

RACING CAR EVOLUTION—continued

boost. This car averaged 98.24 m.p.h. to win the event, and was thus 4 m.p.h. faster than the previous year's car, which had had one carburetter per cylinder.

For the circuit of Cremona, held early in the year, Alfa-Romeo entered some cars which had been designed for the 1923 Italian event, but which were withdrawn after an accident which killed one of their team, Sivocci. Winning easily at 83.9 m.p.h., Ascari was timed over 10 kilometres to do 123 m.p.h. This was clear proof that they would be formidable contenders for the French Grand Prix, which was run at Lyons on August 3rd. For this race the excellent entry of 22 cars was received, teams from Alfa-Romeo, Fiat, Delage, Sunbeam, Bugatti and Schmidt, and a single entry from the Miller. On these cars, Fiat and Delage were substantially the same as the previous year's models. The eight-cylinder Alfas were very "Fiat like" in general design, except that they had cylinder blocks in four pairs, but they were of an all-roller-bearing type, bore and stroke being 61×85 mm. Bugatti had much the same engine as previously, but a new chassis, the first of the famous Type 35 models, which are well known to all racing enthusiasts.

The Schmidt had cut valves and six cylinders and, with Sunbeam, were the only make having fewer than eight cylinders. In other words, after a lapse from favour in 1922 the straight-eight engine had returned to popularity in a big way. Although they were out of fashion in this respect, the Sunbeam cars were acknowledged the fastest on the course. They had the previous year's engines with Roots blowers added and developed 140 b.h.p. A rather longer and improved chassis included torque tube drive and four-speed gearboxes. They were clearly so superior to any other make that Alfas, who considered themselves the likely runners-up, approached the Sunbeam team manager with an offer that if he would permit Alfas to occupy second and third position they would gladly let Sunbeams take first place without pressing any of the cars too hard.

Needless to say, this offer was turned down and Sunbeams went to the line confident of victory, plus second and third. The night before the race they were visited by the Bosch Company, who exclaimed upon the burnt contact break-up covers of the magnetos, which were placed at the rear of the engine facing outwards towards the exhaust pipe. These particular instruments had remained untouched since the previous year, and no doubt the addition of the blower caused the piping to get much hotter and caused the burning to start. Bosch made a replacement with some magnetos of the latest type that had just arrived from Stuttgart. During the race the Sunbeams suffered from constant misfiring and, although superiority in speed was confirmed by unofficial timing of maxima during the race, which gave Sunbeam 130 m.p.h., Alfa-Romeo 124 m.p.h. and Delage, running unsupercharged, 114 m.p.h., nobody could account for the irregular running of the cars which constantly held them back, despite a record lap by Segrave. In the middle of the night following the race, their development engineer, Captain Jack Irving, leapt from his couch, rushed to the sheds, put back the old magnetos and the trouble vanished. By such a small incident were the Wolverhampton Company deprived of the rare honour of winning the French Grand Prix for two successive years! But Sunbeam ill-luck gave Alfa-Romeo the rare distinction of winning the French Grand Prix with their first entry for the event at 75.3 m.p.h. Micola Romeo and Ing. Jano must have felt very well satisfied. Seven years had to pass before they won this race again, although they had great success on other circuits.

The Bugattis suffered badly from tyre trouble and finished seventh and eighth, whilst the Fiats at the end of the tenth lap were running second, tenth, nineteenth and twentieth, a sad fall from grace after their predominance in the previous year. When Bordino retired with defective front brakes their four cars ceased to be effective challengers and, although Nazzaro survived until the twentieth lap before he also went out with brake trouble, he was then lying last.

In the Italian Grand Prix of 1924 no Fiats were entered, and four Alfa-Romeos were so much faster than any other car that when their slowest model finished, the next car, a Schmidt, was flagged off 10 laps behind. The winner, Ascari, put up the lap record to 104.24 m.p.h. and had a winning average of 98.76 m.p.h., *i.e.*, he improved over the 1923 Fiat times by 8½% and 5½% respectively, and the former figure stood for seven years.

Just previously to this Sunbeams secured compensation for their French Grand Prix disappointment by winning the Spanish Grand Prix, Segrave coming in first at 62.54 m.p.h., a minute and a half ahead of a Bugatti, with a Delage running third. Bugatti put up the best lap at an average of 69.79 m.p.h.

In these two latter races a team of straight-eight Porsche-designed Mercédès were run, but although the engine developed about 170 b.h.p. the chassis design was so inferior that they had no success; in fact, I believe these cars never ran in a race without one of them having a serious accident.

In 1925 no new European cars appeared. Bugatti (still running unblown) won the Targa Florio. Then came the European Grand Prix, run by the Belgian Club on the Spa Circuit. In this race Delage appeared with blowers, new, two of; and connecting rods, old, 12 of. This combination proved unsatisfactory, the latter number being rapidly reduced. As a result, Alfa-Romeo were first and second.

For the French Grand Prix Bugatti had a modified chassis and engines with five main bearings, Sunbeams had the previous year's cars almost unchanged, Alfa ditto, whilst the Delage engine had been stiffened up inside and was developing about 190 h.p. at 7,000 r.p.m., as compared with 114 b.h.p. at 6,000 r.p.m. without blower the year previous.

STATISTICS OF RACING ENGINES 1922–25

	1922 *Vauxhall*	1922 *Fiat*	1923 *Sunbeam*	1923 *Fiat*	1924 *Sunbeam*	1924 *Alfa-Romeo*	1925 *Delage*
Cylinders No. ... ... and Dimensions ...	4 85×132	6 65×100	6 67×94	8 60×87.5	6 67×94	8 61×85	12 51.3×80
B.H.P. & R.P.M. ...	129 at 4,500	92 at 5,500	108 at 5,500	118 at 6,000	145 at 5,000	135 at 5,500	190 at 7,000
B.H.P. per litre ...	43	46	54	59	72.5	66.5	95
B.M.E.P.	124	120	123	123	182	175	170
Piston area, in. ...	35	31.7	32.8	35	32.8	36.2	38.7
B.H.P. Piston area ...	3.7	2.9	3.3	3.37	4.45	3.7	4.9
Max. Piston speeds ...	4,000	3,150	3,400	3,400	3,100	3,100	3,500
S/B Ratio	1.56	1.54	1.4	1.46	1.4	1.4	1.55
Inlet Valve area ...	11.3	9.2	11.5	—	11.5	—	12.0
Ratio Inlet Valve : Piston area	0.33 : 1	0.29 : 1	0.35 : 1	—	0.35 : 1	—	0.31 : 1
B.H.P. Valve area ...	11.4	7	9.1	—	12.2	—	15.8
Induction System & Carburetter	Atm. Double Zenith	Atm. 1 Fiat	Atm. 1 Solex	Wittig supercharger; 1 Fiat under pressure	Roots Blower 1 Solex	Roots Blower 1 Memini	2 Roots Blower 2 Zenith

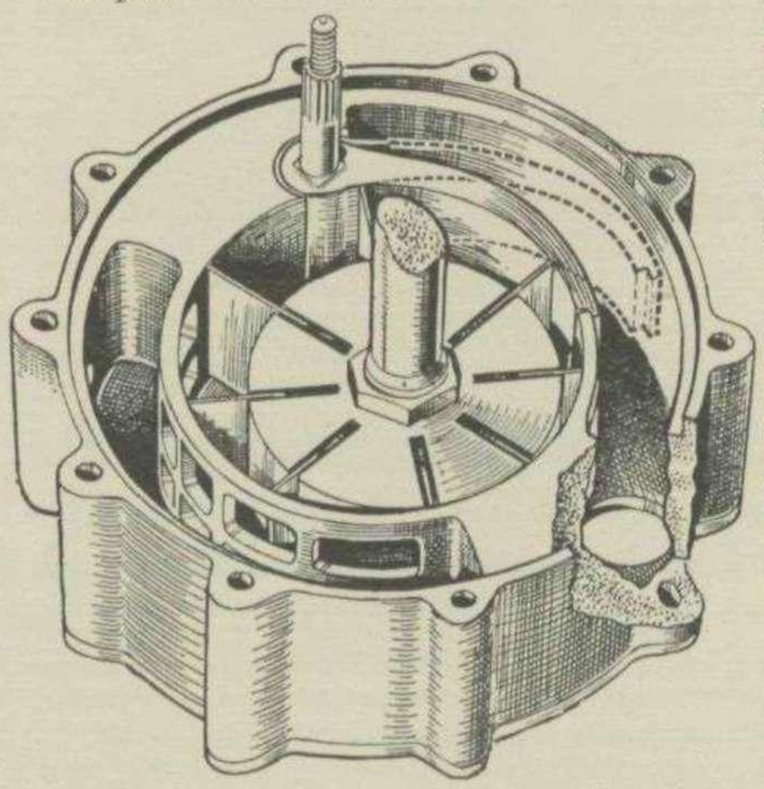
RACING CAR EVOLUTION—continued

Nevertheless, the Alfas got into the lead and held it until half distance, when the two remaining cars were withdrawn following a crash in which their leading driver, Ascari, was killed. At that time Delage were running second and fifth, with Sunbeam third. The finishing order was Delage first and second, Sunbeam third, Bugatti fourth, and it may be that Delage were playing a waiting game in the early stages of the race, for Divo was a little faster than Ascari for a lap and put in a record speed of 80.3 m.p.h.

Delage also won the Spanish Grand Prix at 76.4 m.p.h., whilst Alfa won the Italian Grand Prix at the rather surprisingly low average speed of 94.76 m.p.h., another Alfa being second and Bugatti third. Duesenberg ran fourth, and this make also put up the best lap of the race at 103.2 m.p.h., a little over 1 m.p.h. slower than the record put up for the previous year for the Monza Circuit. But at no time were Alfa challenged, and this accounts for the comparatively low speed recorded.

It will be seen that during 1925 Fiats had no part in European racing, but Bordino took a 1924 model to the U.S.A., and although he did not have any large number of wins he was timed to cover 25 miles on the Culver City board track at an average speed of 133.7 m.p.h. The American 2-litre cars, all now using straight-eights with centrifugal blowers and single-seater bodies on a light chassis, were even faster than this, and a Duesenberg averaged 139.7 m.p.h. for a timed distance. Indianapolis, won by the same car and the same driver (De Paolo) witnessed an average of 101.3 m.p.h., which stood as a track record until 1932.

As time went on the Indianapolis and European road racing cars became increasingly specialised. The former became incapable of success on the road due to lack of progress in chassis parts, but so superior in attaining sheer speed that not until 1939 did a European car win at Indianapolis, after an interval of 20 years.

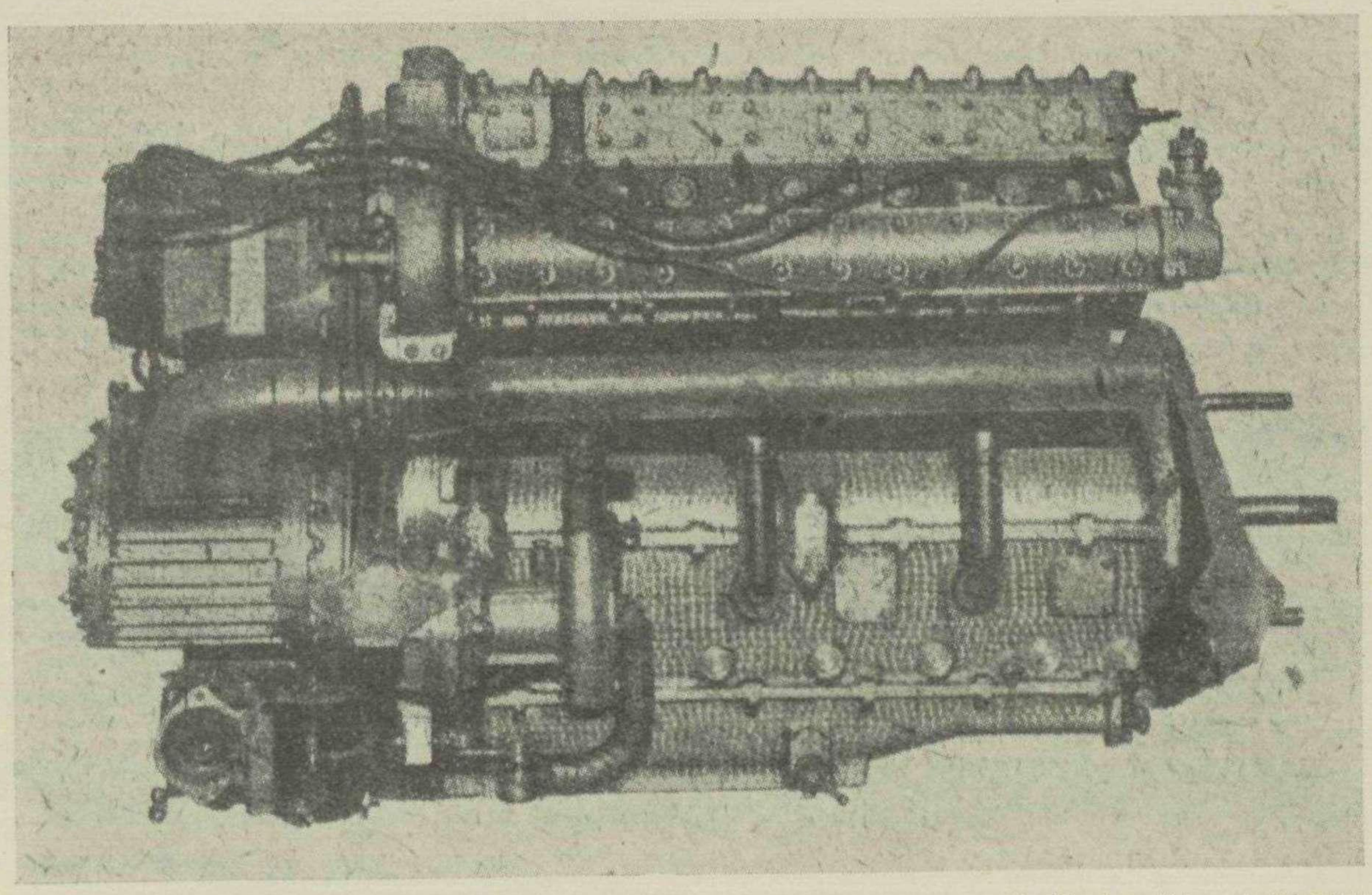


BLOWER BEGINNINGS.—The first efforts in supercharging by Mercedes and Fiat in 1922–1923 *were solely confined to restoring power at high r.p.m. Fiats in the* 1923 *French G.P. employed the Wittig blower, which had an output controlled by a movable flap as shown in the sketch. Air was delivered to the carburetter at a pressure which varied according to the position of the flap. The mechanic controlled this, so that high pressure was not realised except in the upper part of the engine speed range. For the Italian G.P. of* 1923 *this blower was replaced by the conventional Roots type*

The twelve-cylinder Delage broke the flying kilometre record, timed in both directions at 134 m.p.h., whilst the straight-eight P2 model Alfa-Romeo went slightly faster than this and was later developed to average 138.15 m.p.h. over 10 kilometres. These speeds were not exceeded by any perceptible margin on road racing cars until the advent of the 1934 models, so we must give very high marks to the engine designers of A.D. 1925. Let us, therefore, examine in some detail the engineering aspects of the 2-litre formula.

A notable development during this period was a steady increase in weight, although the engine dimensions remained constant. In 1922 the winning Fiat had a wheelbase of 8 ft. 2½ in. and weighed approximately 14 cwt. In 1923 the eight-cylinder Fiats weighed nearly 15 cwt., whilst the unsupercharged Sunbeams turned the scales at the exceedingly low figure of 13.3 cwt. By 1924, when Sunbeams developed new chassis to take the blown engine, having torque tube drive and a longer wheelbase (8 ft. 6 in.), the weight went up to 16 cwt., with Alfa-Romeo about half a cwt. lighter. Delage and Bugatti, running unsupercharged, were much lighter, being about 14 cwt. only.

Nevertheless, due to the greater power developed by the blown engines, the power-to-weight ratio figure very much favoured



ALTERNATIVE OUTPUT.—The 1925 *Delage engine coupled small cylinders* (166 *c.c. each*) *with stroke* (80 *mm.*) *and supercharging. As a result, even with the moderate m.e.p. of* 170 *lb. per square inch,* 95 *b.h.p. per litre was realised, a figure not exceeded on any subsequent Grand Prix car up to* 1937

RACING CAR EVOLUTION—continued

the latter type. In assessing this figure we should really take the car in running trim, *i.e.*, with fuel and crew. If we do this we find that the 1922 Fiat weighed approximately 22 lb. per b.h.p., the 1924 Sunbeam 15 lb. per b.h.p. and the 1925 (driver only) Alfa-Romeo 12.5 lb. per b.h.p.; in other words, the power-to-weight ratio in three years increased by 77%.

The power per square foot of frontal area also rose from about 7½ h.p. on the Fiat to 13½ h.p. on the Sunbeam, to about 18 h.p. on the twelve-cylinder Delage of 1925. On this basis one would expect the maximum speeds of the cars to be of the order of Fiat, 100%; Sunbeam, 121%; Delage, 133%. As we know that the latter car had a timed maximum over the kilometre of 134 m.p.h., it follows that the calculated maxima would be:—Sunbeam, 124 m.p.h.; Fiat, 102.5 m.p.h.; and I think we may safely assume that under neutral conditions these figures are very close to the truth.

The whole of this increase in speed was due to improvements in dimension and design. I have set out the specifications of the leading motors in a table and have added as a matter of interest the 1922 Vauxhall with Ricardo engine, for although this was not a Grand Prix type it was designed in the same period, and being unsupercharged is strictly comparable with the Fiat of the same year and the Sunbeam of 1923. The figures realised enhance one's regret that the Vauxhall executive were not aware of the current racing regulations. It is clear that if they had done so and built a 2-litre model they would have had amongst the fastest cars in Europe.

A study of the table shows that power per litre, which is, after all, the determining issue under a capacity formula, was more than doubled during the course of the three years. The m.e.p. was raised by nearly 50% and power per square inch of piston area raised by 66%, and although piston speeds did not increase very greatly, r.p.m. were raised from approximately 5,000 to as high as 7,000 on the Delage by reducing the piston stroke. The stroke-bore ratios varied between 1.4 and 1.55 : 1, in place of the 1.72 : 1, which was so popular during the 1920–1921 period.

Compression ratios changed but little, being about 6 : 1 on the earlier engines and 7 : 1 on the 1925 types. Using atmospheric induction one would, from the foregoing considerations, expect maximum horse-power to increase from the 92 b.h.p. of the 1922 Fiat up to about 135 b.h.p. for the Delage, *i.e.*, by 40%. It is, therefore, evident that the 100% gain in power per litre may be credited 40% to mechanical improvements and 60% to supercharging, and this in turn implies a supercharge pressure of about 7.5 to 9 lb. per square inch. The initial approach to blowing was much more tentative and moderate, and nothing approaching these figures was attempted.

As an example, whereas the 1925 straight-eight Mercédès had a directly driven and constantly engaged Roots blower, the first blown model from the Stuttgart works in 1922 had a blower engaged at will through a clutch and supplying air under pressure to the carburetter at 5 lb. per square inch. This practice was followed by the 1923 and 1924 Mercédès, and a scheme of similar intent, although different in function, was adopted on the 1923 Fiats and 1924 Alfa-Romeo cars.

On the former type the original installation consisted of a Vane type blower (patented by Wittig), in which there was a hinged flap surrounding part of the blades, movement of which increased or reduced the supercharger delivery. On the Alfa-Romeo a Roots blower was employed, but there was a by-pass valve allowing air to spill from the delivery to the intake side, thus once again giving control over the delivery pressure. On all these earlier blown cars the carburetter was placed under pressure, which meant, of course, a sealed float chamber and petrol tank with balanced pipes to both.

The blowers were not usefully employed at low engine r.p.m., for designers considered that to actually *super*charge would cause detonation and/or breakage of gudgeon pins, piston crowns or big-ends. The intention of the boost was restricted to restoring volumetric efficiency at high r.p.m. from the 75%, which would normally be a good figure, up to 100%. Actually, as the tables show, the first Fiat engines had no higher m.e.p. than the unsupercharged Sunbeam, and their slightly greater power was probably just as much due to their choice of eight cylinders instead of six as to the fitting of blowers.

This is probably because the early design of Wittig supercharger absorbed a good deal of power to drive it, and there is little doubt that when the Roots blower was installed for Monza the power output must have increased substantially.

The year 1924 really sees the beginnings of supercharging in a modern sense, for first Duesenberg at Indianapolis and then Sunbeam for Lyons adopted the now universal practice of aspirating through a carburetter and delivering a mixture to the cylinders at a pressure sufficiently high to give a fair measure of *super*charge. With the continuously engaged blower applied thus, the increase in power and m.e.p. was held right down to low r.p.m.; as an example, on the Sunbeam the gain was approximately 25% at 2,500 r.p.m., 29% at 3,500 r.p.m. and 38% at 5,000 r.p.m.

One of the unexplained mysteries of the early years of motoring was the conservative ideas held by practically all designers regarding valve timing. Overlap between inlet and exhaust valve opening and closing has, on many modern engines been 70 degrees, or even more, usually divided equally on top dead centre. But on the 1922 Fiats the inlet valve opened on top dead centre and the exhaust valve closed only 10 degrees after t.d.c. Even on the 1924 supercharged Sunbeams inlet opening was only 9 degrees before t.d.c. and the exhaust 10 degrees after, a beggarly overlap of less than 20 degrees.

The period under review marks the end of petrol-engined racing cars, for as compression ratios were increased in 1922 and 1923 from 6 : 1 up to 7 : 1 it became necessary to add liberal percentages of benzole to the petrol. As supercharging became a fact as well as a name, it also became imperative to add alcohol.

It is not now possible to discover the exact fuel specifications used in this period, but it is likely that the earlier blown engines used something like a 40 : 60 petrol-benzole mixture, and that later types ran on about 40 : 40 : 20 petrol-benzole-ethyl alcohol.

In construction the V12 Delage stood alone, for the straight-eight type was dominant throughout. Design conformed very much to a pattern in which the crankshaft ran on ball or roller bearings and was of one piece, the connecting rods also having roller bearings and split big-ends and roller cages. Pressure lubrication through the crank was general, as were two valves per cylinder, inclined at a very wide angle around 100 degrees. In other words, the Bertarione concept replaced that of Henri.

Bugatti was consistently exceptional, with engines having three vertical valves per cylinder, two inlet and one exhaust, plain big-ends, and jet type lubrication to them. For the journals he employed a centre ball bearing on his three-bearing types, which had solid crankshafts, and five roller bearings on his latest models, which had built-up crankshafts held together by taper keys.

The cooling on the majority of the engines was exceedingly good, being facilitated by the wide angle of the valves; by contrast, Bugatti, with his vertical valves, found himself with what may be best termed iron-cooled head, although it must be admitted that performance did not seem to suffer greatly thereby.

Turning now to chassis design, one sees universal employment of four-speed gearboxes and typical ratios taken from the Sunbeam car give speeds for the indirect gears of about 93 m.p.h., 70 m.p.h. and 45 m.p.h.

Braking systems showed exceedingly little change, 14½-in. brake drum, giving a brake area of about 1 sq. in. to every 5 lb. of car weight, being almost standard components. These were operated at high unit pressures between the brake lining and the drum, and this in turn involved a friction servo mechanism driven off the rear and off the gearboxes. Movement of the brake pedal applied a middle brake system running at one-thirtieth engine speed and the reaction was used to apply the normal brake shoes.

Frames, springs, shock absorbers and steering mechanism remained basically unchanged; in fact, the only chassis trend worthy of note is a gradual acceptance of the view that the rear springs should be relieved from torque either by torque tube drive or by separate radius arms, as employed by Bugatti. The latter designer, incidentally, was one of the few who omitted the brake servo motor.

Nevertheless, although chassis design to some extent stagnated, there is no denying that engines made greater strides in the two years 1924 and 1925 than they have done at any similar period subsequently. On twisty circuits, which put a premium on brake stability and cornering power, the 1925 2-litre cars were slower than the 1½-litre types which followed them, but on really high-speed circuits they maintained their superiority for an astonishing length of time; it was, for instance, six years before the lap record at Monza put up by the P2 Alfa-Romeo in 1929 was beaten.

It was this disproportion between engine power and maximum speed on the one hand and inadequate chassis design on the other which led to the abandonment of the 2-litre formula in the interests of safety and the introduction of a capacity limit of 1½-litres for the period 1926–27.

It is with a study of these years that I will finish these notes in a following issue.

DESIGN FOR CORNERING

Joseph Lowrey, B.Sc.Eng., writes of some elusive characteristics in reply to certain Editorial remarks

IN the September issue of MOTOR SPORT the Editor put forward certain views on the subject of cornering qualities. While agreeing with his statement that "a whole lot remains to be written" on this matter, I cannot find equal agreement for his other comments.

My first criticism of his interesting, even if controversial, remarks on the subject of cornering qualities concerns the statement that his Lancia "Lambda" "has vintage stiffness about its construction."

Here, I would suggest, the Editor has gone right off the rails. It may be that the "Lambda," with its stressed-skin construction, is reasonably rigid in spite of its open body; but to describe rigid construction as a "vintage" quality is grossly misleading. The basic idea of "vintage" designers in their search for good road-holding seems to have been to use stiff springs with heavy friction damping, in conjunction with a frame having considerable flexibility, particularly in torsion.

Provided the weight distribution was reasonably satisfactory, this scheme worked exceedingly well over most road surfaces. Occasional really bad bumps were dealt with by the springs, while normal road irregularities were apparently dealt with by the tyres and by torsional flexing of the frame.

In contrast, the modern car, with a steel saloon body rigidly secured to a box section chassis, is really rigid, in both torsion and bending. Vauxhall Motors, Ltd., have released some interesting figures for their cars, showing that between 1933 and 1938 the torsional rigidity of typical complete cars of their construction was roughly quadrupled; chassis rigidity without body was increased tenfold, and this is a particularly relevant figure, since the open body of the vintage sports car did little to add to chassis rigidity.

In conjunction with this vastly increased chassis rigidity, the "modern" vehicle uses flexible springs, relatively light hydraulic damping, low pressure tyres and probably independent suspension at front and/or rear.

The use of extremely large section tyres running at very low pressures is a distinctly questionable step, so far as road-holding and cornering are concerned. It is true that the pneumatic tyre is the only form of suspension having negligible unsprung weight, a considerable aid to good road-holding (taking this in its strict sense as meaning grip between wheel and road), and is desirable as such. But, on the other hand, one can scarcely hope to obtain really accurate steering when the final link between steering wheel and road is 6 in. of wind wrapped up in a rubber bag: when subjected to a sideways load, as in cornering, a modern pneumatic tyre can move in a direction very different to that in which it is pointed, purely owing to flexing of the tyre and without any skidding taking place.

My personal view on the subject of tyre sizes is that we have gone rather too far in recent years. With modern suspension systems it should be possible to obtain comfort and road-holding with quite modest tyre sections, and to improve steering accuracy accordingly. As it happens, a "scorched earth" policy in the rubber plantations will probably result in reduced tyre sizes being forced on designers willy-nilly, and this may well prove a blessing in disguise.

The popularisation of independent wheel springing has, in general, been a good thing, particularly as regards the front wheels. It should reduce unsprung weight, reduce or eliminate steering disturbances caused by incorrect geometry or by gyroscopic effects, and give stable steering under conditions of heavy braking. It should also provide good cornering without undue roll. In this paragraph, the important word is "should." A good i.f.s. system is better than a good front axle, but a good front axle is very much better than a bad i.f.s. system.

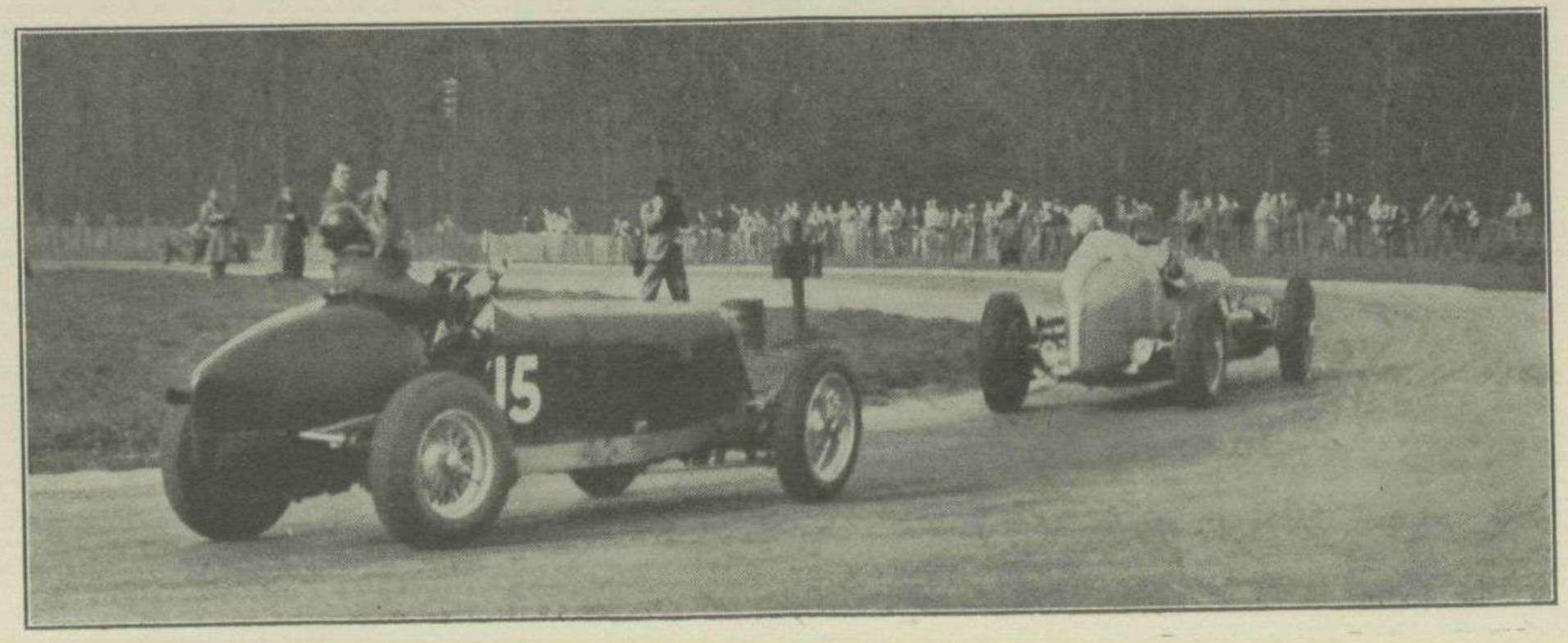
As far as reduction in unsprung weight is concerned, most i.f.s. systems do improve on the orthodox rigid axle. But, as a rule, such a large proportion of the unsprung weight is represented by tyres, wheels and brakes that the saving over a tubular axle with quarter elliptic or cantilever springs is quite small. The only way to reduce unsprung weight drastically is to use smaller wheels and tyres, and to mount the brakes on the chassis as on certain front wheel drive cars.

The provision of steady steering with i.f.s. is largely a matter of geometry, in keeping the front wheels upright (to avoid gyroscopic effects) and in providing steering linkages suitable to the layout chosen. In practice, these two objectives are seldom quite achieved, a certain degree of imperfection being accepted in return for such benefits as reduced tyre wear or simpler construction.

If necessary, quite considerable wheel tilting can be "got away with" on cars used at normal road speeds; the best example of this lies in the l.m.b. layout, which works well in spite of gyroscopic effects equal in magnitude to those encountered with a rigid front axle. The more such effects can be reduced, however, the more high geared and frictionless the steering mechanism can be.

The question of correct steering geometry is largely bound up with that of complication, even where "cost is no object." I have vivid memories of a certain demonstration car, one of the most costly sports cars made in Britain in 1939: the makers had got their geometry right, by using about a dozen ball joints in their steering linkage, and even on a new car the cumulative effect of a little play in each joint was to completely ruin the accuracy of the steering.

Steering instability under heavy braking conditions is a fault of many rigid axle layouts; this is generally the result of half elliptic springs twisting and reversing the normal castor action of the steering. Any reasonable i.f.s. layout should be satisfactory in this respect, as are the



DESIGN FOR CORNERING—continued

better rigid-axle cars, although there is scope for cunning design in reducing the tendency for the nose of the car to dip under cornering or braking conditions.

The hydraulic shock absorber, which has completely supplanted the friction type on modern racing machines, has done much to improve road-holding. With the rigid chassis necessary when i.f.s. is used, free spring movement is necessary, to accommodate the slow rise and fall of the wheels over what may best be described as long wavelength road irregularities. Where the "vintage" machine dealt with these movements mainly by weaving of the frame, the "modern," with hydraulically damped flexible suspension, does the obvious thing and deals with them by movement of the springs. With friction shock absorbers any attempt to provide this free spring action would result in hopelessly inadequate damping at speed over rough surfaces: a suitable hydraulic damper will provide free spring action at low speeds, stiffening up for large or rapid wheel movements as is desirable.

I seem to have wandered some way from the original subject of cornering, ancient and modern, but all the detail differences in chassis design which have been adopted over the last decade, in the interests of either comfort or roadworthiness, have their effect on cornering.

Fundamentally, the speed at which a car can negotiate a corner depends simply on the available coefficient of friction between the tyres and the road, so long as the centre of gravity of the vehicle is low enough to rule out any risk of overturning.

On this basis, modern developments in suspension systems, which when properly applied can definitely improve wheel adhesion on imperfect road surfaces, should result in improved cornering. In some cases this improved cornering is realised, but in others it is not, since "complications set in" and prevent all the available wheel-grip being used.

The trouble is that, on the road, a car must not only be capable of taking a curve of a particular radius at a certain maximum speed, but it must also be readily controllable by the driver when doing so. Driving skill enters into the matter, of course, but if the driver is unable to direct the car accurately along the best path into and around the corner, cornering will suffer. Any divergence from the "best" path inevitably involves turning more sharply than is really necessary, with an appropriate reduction in speed.

It is on this question of controllability that quite a number of "moderns" seem to fail: they have good wheel adhesion, yet on the road they cannot negotiate a particular corner as fast as a "vintage" car with more accurate steering.

Faults such as steering having excessive lost movement, or too low a ratio, are purely mechanical and may be common to vehicles of any age or style. The more subtle vices which can affect cornering are "over-steering," "under-steering" and sluggishness in response to sudden movements of the steering wheel; or, of course, combinations of these vices. (This matter of under- and over-steering is nicely clarified in Pitman's "Elements of Automobile Engineering," by Maurice Platt.)

Over-steering is a fairly accurate description of a tendency for a car, when steered into the corner, to turn ever more sharply; you feel that the tail is drifting outwards and, after steering into the corner, you must turn the wheel back towards or even beyond the straight ahead position, in order to maintain a steady course.

Under-steering is the opposite effect, since it represents a tendency for the car to go straight on rather than to go round the corner, so that exaggerated steering wheel movement is necessary.

The best known example of an over-steering car is probably the Austin Seven, in which the characteristic is inherent as a result of the combination of transverse front spring and torque tube rear axle. Aircraft seem to show the same tendency, in that it is generally necessary to "steer" into the turn and then centralise the controls.

Under-steering is a common characteristic of modern touring cars, such as the Vauxhall, which generally have to be held forcibly into the corner.

Just whether a car over-steers, understeers, or has a neutral characteristic, depends on front and rear tyre pressures and loads, and on steering and springing layout. The main deciding factor, with normal suspension systems, is whether the front or rear tyres "creep" most, but with some suspensions rolling of the car "steers" the front and/or rear axles bodily, affecting the resulting behaviour of the car.

The view of American (and some British) designers is that, if a car is to be stable on a straight road, it should be made to under-steer. An over-steering car is said to be unstable and to need constant attention from the driver if a steady course is to be maintained; the Austin Seven certainly provides support for this belief.

From the cornering aspect, however, I think there is a lot in favour of an over-steering characteristic. A sports car is, or should be, an enjoyable car to drive, and an under-steering car always feels as if it is being cornered by brute force, whereas an over-steering car virtually corners itself and can be a real joy on winding roads. I should be interested to hear other people's views, but in my experience most cars which are really enjoyable to drive show a very slight over-steering tendency.

Sluggish response to the steering is sometimes confused with under-steering, whereas it is actually quite a separate phenomenon. It does not affect cornering under steady conditions, but rather the ease and precision with which sudden swerves can be dealt with. Soft tyres and flexible steering connections contribute to it, but I think weight distribution has a big effect.

Most "vintage" machines have a fairly long wheelbase, with the weight concentrated amidships; modern touring vehicles, in contrast, are usually of fairly compact wheelbase, with the weights of engine, spare wheels, etc., mounted far apart. This modern tendency has inevitably increased the moment of inertia of the complete vehicle, about all axes, and although pitching may be reduced one can hardly hope to be able to execute sudden swerves.

My references to under-steering and over-steering have dealt witb cases when there is no actual skidding; when skidding occurs conditions can be very different from those prevailing, when there is only tyre creep, at lower speeds. On the road the majority of corners are taken at speeds below the skid point, feel and accuracy of control under these conditions being important accordingly. But, for a sports or racing car which will fairly frequently be cornered at the highest possible speed, importance also attaches to what occurs when a corner is taken at and beyond the skidding speed.

According to most of the text-book laws, the coefficient of friction between tyre and road should drop when sliding begins, and skidding on a corner should, therefore, result in a waste of time. In practice, some skidding is essential to the fastest cornering, for two reasons. First, the most perfect of drivers cannot be certain that he is cornering on the extreme limit of available wheel adhesion unless he occasionally goes beyond that limit by a small fraction. Secondly, on certain surfaces, particularly those encountered when racing on cinder tracks or sometimes on sand, the grip between tyre and track obeys the laws of viscous rather than dry friction; in other words, a certain amount of sliding, on a loose surface, can provide the effect of increased friction.

The actual behaviour of a car when skidding a corner depends, of course, on whether the corner is taken at a steady speed or with the car accelerating or braking. Cornering tactics are very much a personal matter, but myself, on the road, I prefer to enter a corner at a speed just below the highest I think possible and to use as much acceleration as possible while still rounding the corner. My preference for this technique, which others may dislike, inevitably affects my views on the desirable characteristics of a car, and this must be borne in mind in considering my further remarks.

Different types of vehicles vary enormously in their skidding characteristics, particularly noticeable being tendencies to either front or rear wheel skidding.

Most British sports cars seem prone to skid their tails outwards on corners before the front wheels lose their grip. I have never driven one, but the S.S. 100 always appeared an outstanding example of this tendency, when it was used for racing. Provided skidding does not occur too readily, of course, it is probably best for the rear wheels to slide first, so far as the average driver is concerned. Within reason, a rear wheel skid is usually quite controllable, but the same cannot always be said of a front wheel skid.

A point which is brought home by study of racing, and of action photographs, however, is that most of the very best drivers, on purely racing machines, tend to corner in a gentle front wheel skid. Where the lesser lights may be doing spectacular broadsides, the true experts corner relatively inconspicuously, usually with the front wheels pointing straight at the kerb on the inside of the corner.

Continued on page 234

G.N. GEN.

The touring G.N. has, we fear, without exception, gone from amongst us, although MacLagen of the "Scuderia Chemvamo" is hoping to revive an example bought recently from T. P. Breen. Peter O'Reilly was one of the last persons to appear with such a car, but its remains are now useful only as spares. Nevertheless, the G.N. in sprint form is almost certainly going to be with us in post-war sprint events, and those who are working on such cars will read with interest this chronological description of the standard G.N. models, written by John Bolster himself, who pays the marque the great compliment of saying that it shares a place in his memory with the "30/98" Vauxhall.—Ed.

IT is now so long since the G.N. car went off the market that some of my younger readers may never have seen one in its original form. The G.N. chassis lent itself so well to "Special" building that there were a number, more or less drastically modified, racing in sprint events right up to the start of this war, which is rather astonishing, considering that they were produced as an ultra-cheap utility car.

The earliest type of G.N., built just before the last war, had a side-valve air-cooled twin-cylinder engine set with its crank across the frame, driving the rear wheels through two enormously long belts. It was a sporty-looking little machine, with a pointed cylindrical petrol tank mounted over the engine, and the steering was by a cable passing over pulleys and round a bobbin on the steering column, which, surprisingly enough, gave very light and accurate control. H. R. Godfrey and A. G. Frazer-Nash built the first few cars in the stables of the latter's home, so the car was designed to be as simple to produce as possible.

Shortly after the last war a new model was designed, and was built more or less unchanged for several years. This was the type which "Special" builders still seek, and was a very popular car, selling well from 1921 to 1925.

It consisted of a rectangular channel section steel chassis frame, the two straight side members being joined together in front by a cross member and strengthened by gusset plates riveted at the corners. The frame was about $3\frac{1}{2}$" deep by $\frac{1}{8}$" thick, with $1\frac{1}{4}$" flanges. Apart from the engine bearers, there was only one other cross member, which was bolted to the rear spring brackets. The front axle was tubular, with plain bearing hubs, and quarter elliptic springs above the axle, plus strip steel radius arms below, looked after the suspension. The rear axle was solid, $1\frac{1}{2}$" in diameter, and was carried on ball bearings of the cup-and-cone type, with strong radius arms and quarter elliptic springs. The wire wheels wore 700×80-mm. beaded-edge tyres and were of the centre-locknut type, the drive from hub to wheel being by seven dogs on the earlier cars and three dogs on the later ones. The wheelbase of the standard 2-seater was 8 ft. 6 in. and the track 3 ft. 6 in. These cars were not crab tracked.

The standard engine was designed to require as little accurate machining as possible, and bore no relation to the motor-cycle type of V-twin with inside flywheels. The aluminium crankcase had a long extension to the rear and contained an overhung crank. This was a built-up affair, consisting of a shaft with a taper at each end, which lived in the rear crankcase extension in a bronze bush. The heavy flywheel was mounted on the rear taper and the crank web and balance weight on the front one, the crank pin being held in place by a large nut. The two con. rods, one of which was forked, had a bronze bush, and the overhanging front end of the crank-pin fitted loosely into a hole in an arm, which was carried by a shaft projecting from the front cover of the crankcase. This drove the timing gears and the magneto.

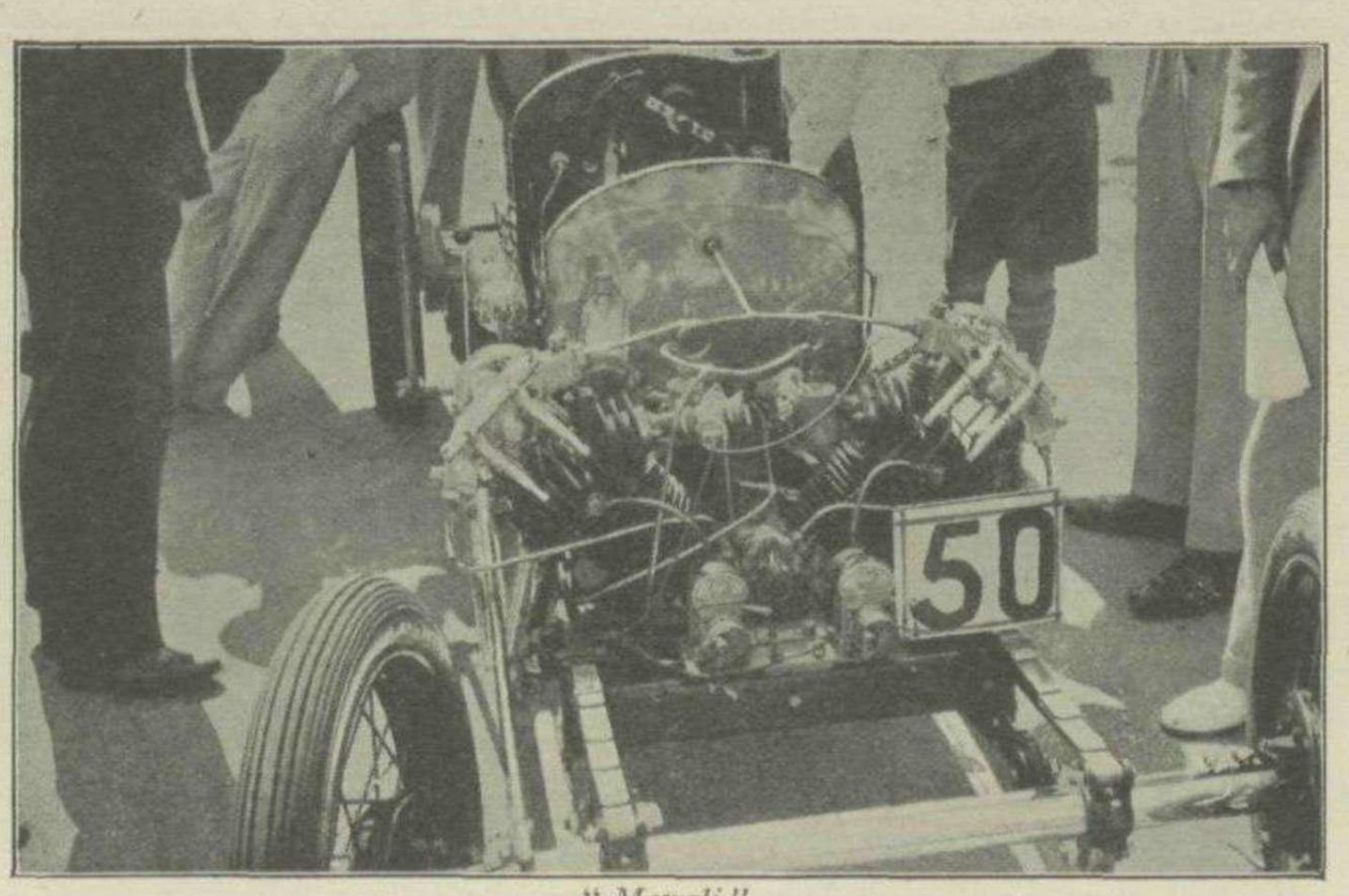
The two cylinders were mounted at an angle of 90° and had overhead inlet and side exhaust valves. The single carburetter was exhaust-heated and was fed by gravity from a dashboard petrol tank. The front engine bearers were bolted to the crankcase, but the rear engine bearer had a hole in the centre, in which the crankcase extension was free to turn, to allow for chassis whip. The single-plate clutch was carried on four pegs on the flywheel, the powerful clutch spring being on the propeller shaft. It was designed so that the clutch thrust would be taken rearwards by the transmission, and not forwards, as the crank had no provision for taking end-thrust.

The transmission was one of the most famous features of the G.N., and was remarkable for its simplicity and efficiency. The propeller shaft had no universal joint. The front of it was supported on a spigot, fitting into a bush in the centre of the flywheel, and the rear by the bevel box. The bevel box consisted of three parts—the two halves and the extension. The extension contained the ball-races, radial and thrust, in which the propeller shaft ran, a straight-toothed pinion being secured to a taper on the end of the shaft. The pinion drove a bevel, which was keyed to the centre of the bevel shaft. The bevel shaft emerged from each side of the bevel box and was supported in self-aligning ball-races in aluminium housings bolted to the chassis side members.

Thus the whole outfit was supported at three points—the two bevel shaft ball-races and the spigot bush—and the torque reaction was taken by the propeller shaft. Unlike the Frazer-Nash, the bevel box was not fixed to the chassis in any way.

On each side of the bevel shaft was a key, which drove, on one side, a double dog and, on the other, a combined dog and gear. The double dog could be slid into engagement with either of two sprockets, and the other dog either with a sprocket or a gear. The three bevel shaft sprockets were connected by $\frac{3}{4}" \times \frac{7}{16}"$ chains to three different sized sprockets on the rear axle, thus providing the three forward speeds, and the gear drove a sprocket in the opposite direction, to give reverse through a fourth chain. The dogs were controlled by a pair of selectors and a right-hand gear lever. An adaptor was screwed into the offside end of the bevel shaft for a starting handle, so that one wound one's G.N. up from the side, just in front of the back wheel.

The car was normally fitted with a very smart 2-seater body with a small dickey seat. Long, low and rakish, its dummy radiator set well back and its large steering wheel carried into the driver's lap, it was easily the smartest small car on the market. The very high-geared steering was light and positive, and the road-holding and suspension were miles ahead of the typical light car of the period. The gear change was much better than the normal gearbox of that date and there was not that horrible noise which every cheap gearbox was expected to make on the indirects. With all these virtues, plus its low first cost and economical running, it was deservedly popular, but it had its faults. The engines were incurably noisy, and they varied a great



"Mowgli"

G.N. GEN.—continued

deal in their reliability. The design was sound enough, but I have come across poor workmanship and bad material in some of them. Given a mechanically-minded owner, a lot of them gave very satisfactory results, and they were certainly delightful to drive. With the solid axle and splendid road-holding, one hardly noticed that one had only rear wheel brakes, their stopping power being remarkably good. So much for the standard model.

The sports and racing G.N.s were extremely fast, doing very well at Brooklands and being absolutely unbeatable in sprint events. The most remarkable thing about them was that the standard chassis was always used, though some of the sprint cars had a shorter wheelbase, and Capt. Frazer-Nash had a longer chassis for Brooklands. The engines were all 90° V-twins, of 84-mm. bore × 98-mm. stroke, giving 1,086 c.c. A certain amount of competition work was done with the "O.H.V. Conversion" engine, and quite a number were sold to private owners. It consisted of a vertical o.h.v. head fitted to the standard engine, the valves being operated by push-rods. This gave a considerable increase in urge, but the standard bottom half would not put up with too much use of the loud pedal, and the strength of the valve springs was limited by the rather skimpy timing arrangements. Nevertheless, they went very well and were good enough to win the 1,100-c.c. class in several events. Later there was another push-rod head called the "Frazer-Nash Conversion," which had inclined valves.

The first type of genuine racing engine was the "Mowgli," and this was also available in a super-sports G.N. called the "Vitesse." It had an entirely special crankcase, with all parts proportioned to take the increased urge and a roller-bearing big-end. The valves were inclined and each cylinder had its own overhead camshaft, which operated the valves through rockers. The camshafts were driven by an exposed $\frac{5}{8}" \times \frac{3}{8}"$ chain of enormous length, which was tensioned by a jockey sprocket. This engine was one of the most reliable pieces of machinery ever made. My brotner had one, which he hotted up considerably, and it gave him a lot of most enjoyable racing, but it was on the road that it was most delightful. The acceleration was tremendous and I have never driven a car with a better top gear performance. The fact that my brother got it up Shelsley in 49 secs. will give some idea of its urge, and it would climb a 1-in-5 gradient on *top gear* at a rousing speed. I was very pleased to hear recently from Cpl. Green, R.A.F., the present owner of this splendid old engine, that it is in 100 per cent. condition and sounds healthy still. H. J. Aldington used to have a most beautiful "Vitesse" 2-seater with one of these engines, and it went like a flash, the staccato crackle of the twin merging into a steady roar at round about the 80-m.p.h. mark. The car and driver used to get a liberal dose of oil from the exposed o.h.v. gear, and Castrol "R" at that, but it was worth it.

The later racing engine was called the "Akela," and had four valves per cylinder with pent roof heads. The camshafts were driven by enclosed vertical shafts and two magnetos were fitted. This was a really beautiful-looking engine, with none of the "rough but strong" appearance of the older G.N. machinery, and it did very well in racing. As turned out originally there was a weakness in the camshaft gears and severe damage could result if they were stripped, because it usually caused a valve and piston to collide. With that trouble cured, though, the "Akela" was a thoroughly sound engine and kept its oil inside better than the "Mowgli" did. I always preferred the "Mowgli" because it was such fun seeing all that machinery rushing round and round!

Most of the racing chassis had a fourth forward speed instead of the reverse, though the o.h.c. engines were so flexible that this was hardly necessary. For sprint work it was usual to fit a single-seater body, or no body at all, and transfer the steering to the centre of the car. It was easy to lower the chassis by putting wedges under the springs, and one could fit shock absorbers if desired, though it was a common mistake to do these up too tight. My brother's car was perfectly steady at maximum speed with the shockers slacked right off, in spite of being a foot shorter than standard. After the engine was hotted up it would do 87 m.p.h. with a 2-seater body, but we never checked its maximum in monoposto form.

The G.N. firm had business connections in France and a lot of G.N.s were made over there. The Salmson was developed from the G.N., and I believe it was the French side of the business, more than anything else, which went wrong and got the firm into difficulties. Be that as it may, the "N" of G.N.s left the firm and continued to race and sell the "Akela" under the name of Frazer-Nash, also making a few enormously powerful cars with 1½-litre two-cylinder engines. (Remember Basil Davenport's "Spider"?) G.N.s forsook the sports car and built an entirely new model, with shaft drive and disc wheels. It could be had either with a side-valve air-cooled twin, which was much quieter—and slower—than the old I.O.E. engine or a four-cylinder water-cooled unit. If I remember aright, this was a push-rod o.h.v. affair of about 1,200 c.c. and was made in France. This was rather an ordinary little car and not to be compared with a "real" G.N.

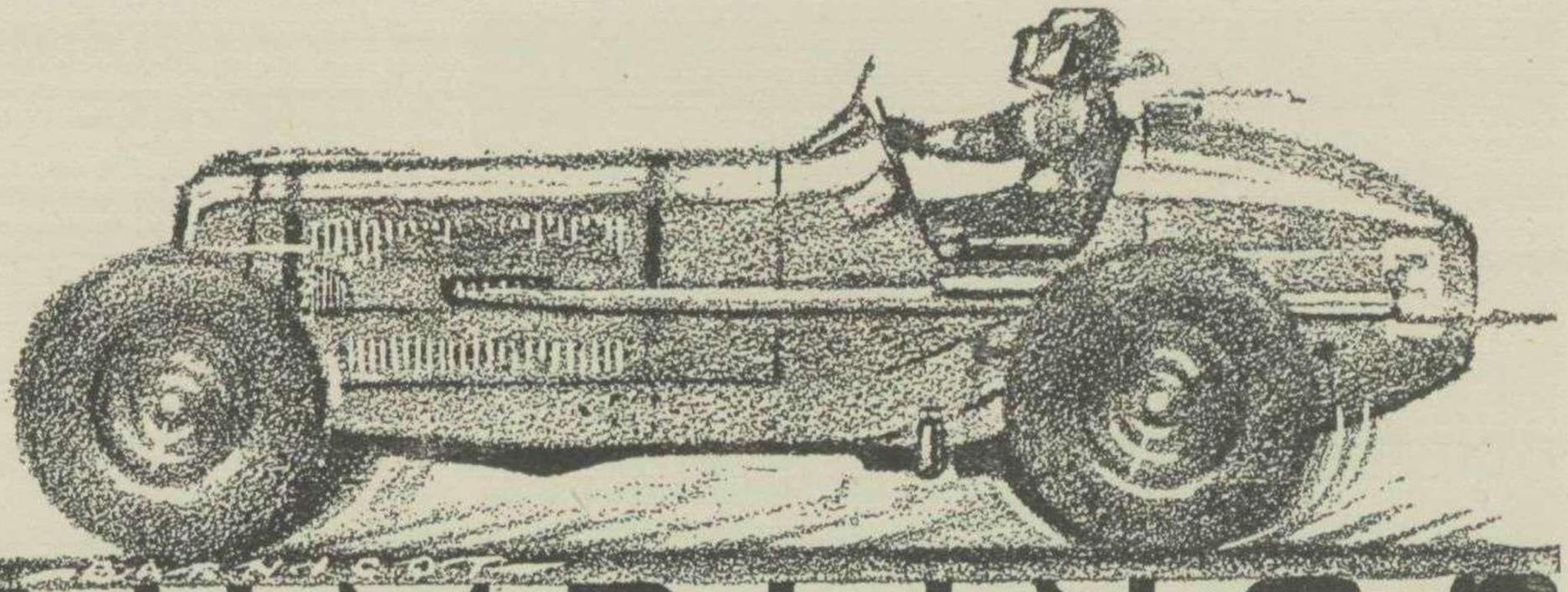
Meantime, Archie Nash had redesigned the chain-driven chassis, and it now had genuine Rudge wheels and a much stronger front axle, among other things. The famous Frazer-Nash radiator appeared for the first time and the engine was a four-cylinder Powerplus o.h.v. of 1½-litres capacity. These cars also had that cunning device to stop you getting into two speeds at once, and the famous bulbous-tailed 3-seater aluminium body. The Powerplus engine was rather on the delicate side, but Hugh Ebbutt was still running a "Plus Pip" Nash shortly before the war.

The G.N. concern had more or less given up manufacture and were doing ordinary garage work, but they suddenly threw away the shaft-driven chassis and reappeared with the original chain-driven car, this time with the side-valve Anzani engine. The 1½-litre four-cylinder Anzani was an astonishing engine and gave more power than it had any right to do, in spite of its very light construction. Some of the chassis parts, notably the front axle, were not really up to the job, but the complete car weighed only some 10½ cwt. and could leave a contemporary Frazer-Nash standing. This was the G.N.s swansong, but I expect a lot of people remember Halford, of H.R.G.s, doing very well in a quite recent relay race with one of these Anzani-engined cars. Subsequently, Aldington persuaded Nash to fit the Anzani to his cars in place of the "Plus-Pip," and many Frazer-Nashes of great fame were so powered. (Who will ever forget "R.G.J." doing his stuff in "The Terror"?)

I have driven numerous Frazer-Nashes and H.R.G.s, but none of them has had the fascination of a good G.N. "Vitesse." Their faults were many, but all was forgiven when those two big cylinders were thundering out their joyful song. To say that the G.N. shares a place in my memory with the "30/98" Vauxhall is the highest praise I can bestow on it.

VETERAN CAR CLUB'S IMPORTANT MOVE

The Veteran C.C. has issued its *Journal* again, after a three years' break, to announce a most important development. In order to save pre-1905 veterans from destruction it has formed an Acquisition Committee to purchase such vehicles as soon as they appear on the market. This decision is both opportune and apt. Problems of transport and storage are against the acquisition of such cars by private individuals at the present time, and, even under normal conditions, the possession of one such car is as much as many veteran enthusiasts can encompass. The plot is to start a guarantee fund amongst members to secure the necessary finance to buy the cars and to store them, for possible re-sale to members on a strictly non-profit-making basis. The undertaking, as we see it, will be no easy one, for such cars fetch anything from £70 to £100, and more these days, and even examples in less good order will, collectively, absorb considerable sums of money, while transport, storage and restoration present individual problems of a severe nature. However, we wish the undertaking the greatest success and would wish that some public or national support would be forthcoming. The Veteran Car Club already has 180 pre-1905 cars registered with it and knows of many more "probables" awaiting confirmation. Our "Register of the Unique," published last March, was responsible, we are pleased to record, for a Paris–Vienna Replica de Dietrich, an Alldays and Onions, and a single-cylinder Wolseley, and possibly an Aster, all of "Brighton Run" age, being found and saved by enthusiasts, not to mention other later veterans of the sort fostered by the Vintage S.C.C. But there must be no relaxation of this endeavour to preserve the antique, and if anyone wishes to become the owner of an early car, we know of many excellent examples still at the mercy of unsympathetic garagists or scrap-metal vandals.



RUMBLINGS

IN the September issue we published details of a Thomas Special now owned by Douglas Kay and cared for by Sgt. Easterbrook-Smith, in New Zealand. Evidence pointed to this being Parry Thomas's 1½-litre single-seater car of the 1924–26 era. We have now received a letter, which appears in this issue, from Flying Officer M. R. J. Chetwynd-Stapylton about his Thomas Special. This car appears to be fundamentally the same as the one in New Zealand, except, perhaps, for certain chassis details. Yet it does not seem likely to have been one of the single-seater Track cars, for, from examination of photographs sent to us by the owner, it is very evident that the steering column is clearly well on the off side of the car, while the chassis is lower and wider than that of the racing 1½-litre. Then front wheel brakes and wire wheels are found, and the body work is probably specially made up. We confess that the origin of this car baffles us, but it seems likely that it is one of the Spurrier-Railton cars, of which the Arab was a cheaper version. Or, of course, it might be a special-bodied Arab, which cars were in production for a time at Letchworth, designed by Parry Thomas and supervised by Reid Railton. The engine number suggests a 2-litre unit and the Arab was a 2-litre. We hope to throw some further light on the mystery by communicating with the firm whose name-plates appear on these engines, and, meanwhile, we must confess to a doubt as to whether the New Zealand car is not one of these cars rather than Thomas's own little racing car. Chetwynd-Stapylton's car has a four-branch outside exhaust system on the near side, a single carburetter on the off side, and it certainly has the unique Thomas leaf-valve springs. Poor Thomas's handiwork seems sadly scattered these days. A friend of ours reports a Leyland Eight tourer dejected and forlorn, and less engine, in a Surrey breaker's yard and likely soon to go for scrap. But Sir Lionel Philips's Leyland 2-seater is safely stored and, we believe, could change hands for quite a modest sum of money.

Rather a Mystery

Visiting Ian Metcalfe at his mushroom farm at Shepperton—he keeps fast cars there, not mushrooms, of course—we came upon the racing single-seater Rapier which the late Roy Eccles and his wife used to race. This is really one of the smartest little cars of its kind we have seen for many a day and should make a very pleasant mount for a trainee. The twin o.h.c. four-cylinder engine is endowed with urge by reason of a big Zoller compressor nestling beside the block on the off side and drawing from an Arnott updraught carburetter. Special attention has been paid to cooling the cylinder head and the water leaves *via* four outlets rising above each cylinder. The radiator and dumb-irons are cowled neatly by means of a one-piece cowl and the radiator filler cap is beneath the bonnet in the best modern tradition. The gearbox is of self-changing type, controlled by a tiny lever on the left of the seat, working in the gate, as is usual practice on a Rapier. The driver sits very much on the off side of the car, there being no side panel to the cockpit on this side, while the body is completely faired in on the near side, terminating in a long tail, for which a faired headrest is available, although never used. Getting in is something of a tussle and getting out involves calm, methodical leg motion, but the cockpit is very comfortable and the forward view adequate for a Track car. The brake lever lies horizontally beside the off side side-member. The facia contains a big Smith's rev.-counter reading to 8,000 r.p.m. and fuel blower and oil pressure gauges and oil and water thermometers, the needles of which are said all to move in the same plane, which has involved inverting the blower gauge dial. The fuel pressure pump protrudes neatly from the panel, which saves space. The four-branch exhaust system is external, the pipe following the contour of the near side of the body, the whole liberally picked out with aluminium paint. The short front half-elliptic springs have Hartfords ahead of the non-underslung axle and hydraulic dampers behind it, and the rear springs are well set out from the chassis, bound, underslung and

A Fast Rapier

RUMBLINGS—continued

damped by four transverse Hartfords. The front wheels carry 4.75″×19″ Dunlops and the rear wheels 6.00″×16″ Dunlops, and Mr. Girling looks after the anchorage, aided by rather amateur cooling-scoops on the drums. Altogether this is a very pretty and clean little car and it should be of interest to someone, the price being around £300, with racing jacks and equipment and a number of spares. It will be recalled that Eccles had many successes with the car, including winning a short handicap and dead-heating for first place in a Mountain Handicap at the 1936 August B.A.R.C. Meeting. He lapped at 115.55 m.p.h. in the former and at 70.91 m.p.h. in the latter event. The previous year he won a short handicap, lapping at 110.19 m.p.h., and in 1937 netted a Mountain Handicap, in the course of which he lapped at 74.68 m.p.h., later winning a Campbell Circuit Handicap at a lap-speed of 68.47 m.p.h., which constituted a Class G (1,100-c.c.) lap record for the new course. Metcalfe, who is a purveyor of old school Bentleys, also has the ex-Rothschild 38/250-h.p. Mercédès-Benz which, with its imposing red 2-seater body, close-up wings and built-in number plate, looks even more massive than the usual run of blower Mercédès. Just at present it needs a gearbox car, but it does suggest very nice unrationed motoring.

* * *

We publish below an appreciation of the late Stanley Martin, the well-known Irish Bugatti exponent, written by his close friend, Noel Hillis, of Belfast :—

An Appreciation

It is with deep sorrow that I pen the obituary of a great Irish enthusiast, the late Stanley B. Martin. I know that the sad news of his death at 22 years of age will come as a great shock to his numerous English friends, as it came as a veritable tragedy to every Irish enthusiast.

Stanley Martin sustained fatal injuries when his motor-cycle collided with an Army lorry near Castledawson, Co. Antrim, on Sunday, August 9th, last.

He was a rabid Bugatti enthusiast, and the lure of Molsheim was with him when I first made his acquaintance at the tender age of 14 years. Though having competed regularly throughout the trials season of 1937, his first sprint event was Craigantlet Hill Climb, 1938, where he was the youngest competitor at only 18 years of age ; in this event he drove a Brescia Bugatti. This was followed by an intense period of trials work on various vintage motors, and he was high up in the bidding for the Victor Ferguson Memorial Trophy. He then obtained the ex-C. G. Neill 2-litre G.P. Bugatti. This he competed at Donabate Speed Trials, Kilternan and Ballinascorney Hill Climbs, where he obtained second fastest time of the day in all three events and collected numerous class awards. He set a very high standard of driving and always brought his cars to the line in superlative order. His latest Bugatti was a single camshaft 2.3-litre G.P. engine, and again was always seen in typically scrupulous condition.

It was to him that Irish enthusiasts owe a debt of gratitude for the highly successful Crawfordsburn Rally, which was written up in these pages not so long ago. This was entirely *his own idea and was typical of his enthusiasm, which could* never go for long without a practical outlet. The whole show portrayed his great organising ability clearer than any words of mine.

He also managed to save the power unit of the practically immortal 2-litre blown G.P. Sunbeam, which was the property of the late Trevor McCalle. I think his one motoring worry was that he never got a chance to save the car as a whole.

Although a great Bugatti and vintage enthusiast, Stanley Martin had yet another great sport, to wit, motor-cycle competition work, and was a consistent exponent in trials and grass track events.

He was, since September, 1939, engaged in important war work in connection with the building business, and held a high post in the Belfast Rescue Service.

There is nobody in Irish motor sporting circles to-day who does not realise that the Sport over here has lost an enthusiast who cannot be measured by the number of events in which he achieved success, but rather as a young man with the organising ability and infectious enthusiasm which would have had us all motoring to stop-watches after the war with the minimum of delay.

Although young in years at the time of his death, he had managed to extract a very full life from the sport which was the predominant passion of his life, and it is perhaps tragically fitting that it was on an enthusiastic mission to pay rightful homage to a resurrected child of Molsheim that he met his sad fate.

I know that every Irish enthusiast will join me in extending our deepest sympathy to his bereaved parents and relations.

DESIGN FOR CORNERING—conttnued *from page* 230

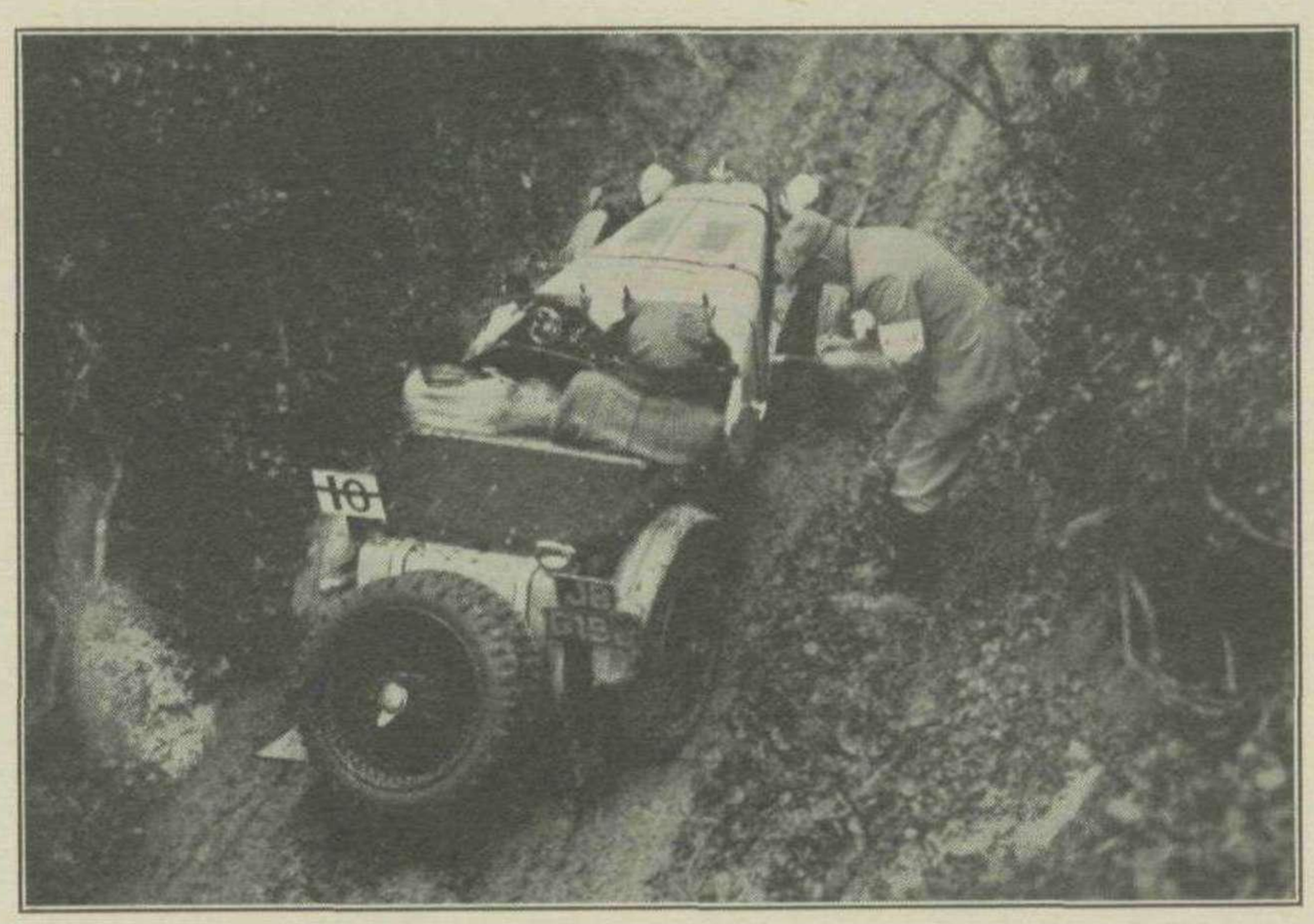
There appears to be little doubt that this style of cornering can give about the best possible results, but its adoption seems to depend on a correct combination of driving technique and car characteristics. A very nice balance between front and rear skidding tendencies is necessary, as far as the car is concerned ; also, the driver apparently has to enter the corner at a speed extremely near the limit, since if he approaches more slowly and then accelerates, wheelspin will start a rear wheel skid and put him off his course. Effective cornering by this method seems to call for extreme judgment and delicacy of control, such as few drivers are capable of (I certainly am not), and although a really well-balanced car should be amenable to this technique, most folk will not actually use it.

Another point which affects the behaviour of a sliding car is weight distribution. Apart from its effect on a machine's tendency to front or rear wheel skidding, the positions of heavy items such as engine in the chassis, either amidships or near the front or rear end, will affect the rapidity with which a skid develops. A car with a large moment of inertia, apart from being liable to sluggishness in its response to the steering, will often corner in a fairly slow broadside skid, whereas a more compact vehicle may, when it slides, flick its tail round extremely quickly. Which type of skid is the easier to control I can hardly say.

Looking over what I have written, I seem to have talked around the subject of cornering, and the comparative behaviour of vintage and modern types of machinery, without producing any definite conclusions. I see little else that one can do. The more we can get different people's views on this complex subject, the better we may be able to assess the merits of different points in design and driving technique.

Meanwhile, cornering remains very definitely an art. By obeying fairly clearly defined rules, any sports-car designer is able to produce a machine which handles better than its touring counterpart ; by obeying rather similar rules, the ordinary sports-car driver can develop greater cornering skill than the average saloon car motorist displays. But there still remains just that little extra something, which makes a Bugatti or a Nuvolari, and which cannot be put on paper. . . . [Still no one has cleared up the phenomena of tyre howl under varying conditions and in differing circumstances, around which my ramblings in "Rumblings" mainly centred.—Ed.]

MUSING ON MUD



MUSING on Mud—it might well be the name of a village on some desolate stretch of coast, but in reality it is just a little weakness in which I regularly indulge at this time of the year. To the enthusiastic trials supporter the autumn is indisputably *the* time of year, and when the beech trees begin to spread their yellowing leaves upon the muddy ground our thoughts go irresistibly out to those tortuous little lanes in the South Downs and the Chilterns and the Cotswolds where once would hang the pungent blue haze of exhaust smoke above a line of quaintly-garbed people in comic motor-cars. Up the hill would be set a series of numbered cards, whilst at the foot would stand the enticing announcement: "Observed Section Begins." A hand would beckon, and the leading car would move forward—or not—depending upon a variety of factors. A foolish way of spending one's Sundays, perhaps, but strangely attractive.

Indeed, what *is* the compelling fascination of mud? Purely the association with trials, I suppose, yet here am I with my present occupation causing me, during the past 40 months, consistently to wallow in the various muds of Monmouthshire, Breconshire, Gloucestershire and Surrey, and *still* the fascination persists. Combating wheelspin on a tractor is admittedly a rather different proposition from similar pursuits in a motor-car, but I confess, without shame, that I find it difficult to resist an ever-present temptation to pick the muddiest path on all occasions—and I might add that to hear the Fordson's healthy exhaust barking in obvious enjoyment is definitely reminiscent of the "real thing." Recently we built a hybrid sort of tractor comprising 60% Chrysler, 20% Maxwell and 20% ingenuity, and this vehicle, of course, heightened the pleasant illusion even more.

Our war-weary island has surely a unique variety of mud to offer, and what real enthusiast is he whose heart has not warmed at the sight of his potent motor-car, back in the prosaic drabness of the city, with liberal helpings of mud still adorning the wheels and chassis? Doesn't it carry with it a breath of the country—perhaps a memory of a particularly villainous hill or a flat mud section skilfully conquered?

From the creamy-white caking of the downlands, through the browns of Berkshire, the yellow of North Sussex and the reds of Devon and Worcestershire to the repellent black ooze which denotes an ancient accumulation of leaf-mould or the unsavoury presence of foreign bodies in Mother Earth—all have their peculiar attraction and all have claimed their victims. A finer example of the last-named brand of mud cannot be found than that encountered at Wyck Hill, near Selborne. Here I well remember a pale grey A.C. coming to a sudden and sticky halt during one of those grand Southsea Club trials. The exasperated driver looked about him with growing alarm, sniffed the fetid atmosphere and murmured, "Great heavens, what an evil brew!" The sight of his hitherto immaculate companion pushing steadily at the rear was at once an inspiration and a warning to all would-be passengers.

But that, I confess, is not my idea of nice mud at all. Give me the good clean mud, unsullied by farmyard or other "outside influence," and all is well. I recollect with a blush that when putting the gallant Austin "Arrow" (known affectionately as "Petroleum Blownaparte") into forced retirement last summer, I deliberately refrained from washing the wheels on account of their cheerful coating of rosy Devon mud. From the colour of the wheels one could often tell at a glance what trial a certain car had last been through, and it was not an uncommon sight to behold a number of slightly-battered vehicles motoring through the University towns each November with liberal layers of that bright yellow mud peculiar to the western end of Hatch Farm and several other of the Haslemere hills. When mixed with the ominous black of Cosford this sometimes had a most imposing appearance, and the smell of the two blends cooking together on the exhaust pipes was really quite distinctive.

But why mud? Why not sand, for a change, or stones? All these types of obstacle play their part in trials, of course, and all test the competing vehicles in varying manners, but it is mud which is seasonable, as it were, and thus it is to mud that my thoughts turn in October. As the driver of somewhat ineffectual motor-cars, I naturally preferred the autumn mud, for then the surface is pleasantly slippery without the depth being too great for novices such as myself. Possibly my conception of trials is concerned mainly with mud because, too, I have always lived in the southern half of England—where rocky hills are the exception rather than the rule. I recall discussing the point with Bert Kay, the successful M.G. exponent, when covering the Scottish Six Days Motor-cycle Trial several years ago, and it would seem from his remarks that in Scotland the popular idea of a good trials hill is synonymous with rocks.

But give me mud every time. Tip it up at an angle of about 1 in 7, and put me in (assumed) control of something fairly stark—with under-inflated rear tyres and intelligent weight distribution. Then, and only then, am I happy. But that means looking back at least three years, or ahead to Heaven knows when. Still, there is one consoling thought—the mud will still be there when we again have the opportunity to pit our skill against it. And may that day be not far off.

R. G. V. V.

VETERANS IN AMERICA

A recent issue of the American magazine "Life" published many excellent photographs of James Melton's collection of veteran cars, many of which are soon to be housed in a $50,000 museum to be built at Merritt Parkway, Stamford, by the State of Connecticut—the sort of thing we should have had long ago in this country. Melton is a radio singer and vice-president of the Veteran Motor Car Club of America. He owns some 60 veterans, including 1898 de Dion Quad, 1900 Rockwell Hansom, 1903 one-cylinder Oldsmobile tonneau, 1904 Orient Buckboard, 1904 air-cooled four-cylinder Franklin, 1905 two-cylinder Buick, 1908 model-T Ford, 1909 7-seater White Steamer, 1917 Rauch and Lang electric brougham, 1910 Stanley Steamer, 1910 Speedwell roadster, 1908 Mercédès, an 1893 steam-propelled stage coach, a 1903 Ford, a 1907 solid-tyred Fuller, and the 1908 Fiat landaulette owned by "Diamond Jim" Brady. His wife has been using a 1903 Columbia electric for short runs since petrol rationing began, and they plan to use the Rauch and Lang electric brougham this winter. These cars are cared for at Melton's Westport, Connecticut, estate, and restoring them has represented thousands of dollars and man-hours. Those mentioned are all beautifully illustrated in "Life," the 1910 Stanley Steamer very much in action.

Club News

WE HEAR . . . .

Lord Avebury, of Jowett Cars, Ltd., is now the owner of the 1924 2-litre ex-Conan Doyle V12 Delage, which was given independent front suspension by L. M. Ballamy some years ago, as described in MOTOR SPORT at the time. Grosscurth hopes to continue collecting interesting and fast cars, but at present uses a Swift Ten. J. V. Bowles, "Ulster" Austin Seven owner, has resorted to a 175-c.c. S.O.S. solo motor-cycle and a 750-c.c. B.M.W. combination. The Meadows Frazer-Nash mentioned last month as in regular use on work of national importance turns out to be the car which Tom Moore and Braidwood of MOTOR SPORT drove in a "Double Twelve"; its owner also has one of the saloon Anzani Frazer-Nashes, of which we believe only two were built. Harold Pratley ran an o.h.v. J.A.P.-engined Morgan for a time, but, disliking three wheels, was heard to be disposing of it, and still hopes to restore to absolutely original order a three-speed "Chummy" Austin Seven. Before the end of October over 200 applications for entry forms for *The Aero Modeller* petrol-driven model racing car contest, to which we referred last month, had been received by the Managing Editor, Mr. D. A. Russell, so it looks as if he is to be congratulated on starting something. Cecil Clutton has had round about 90 m.p.h. out of his solo Brough-Superior, which has the 1,000-c.c. 86×85-mm. push-rod inclined valve engine designed for racing, which gave 45 b.h.p. on mild dope with 8 to 1 compression ratio, had a 60° overlap and tours very nicely on a more moderate compression ratio. A Hampton 4-seater is reported running about near Coventry and may be one of the small six-cylinder examples, as it is described as of "very low build." There is no end to news of veterans—a 1905 "16/20" Humber in reasonable order is for sale at a breaker's near Cheltenham for £20 (and three Bentleys are reported also), and a one-cylinder Rover has come to light in Kent and could apparently be bought for £15. Harry Mundy, now a Squadron Leader, recently acquired a 1932 Alvis "Silver Eagle" 4-seater from George Foxlee and, with the aid of John Cooper, towed it from London to the Midlands behind his "Silver Eagle" 2-seater.

W. S. Gibson, another member of the "Scuderia Impecuniosa," has acquired Leslie Marshall's "Brooklands" Riley Nine, a party, on 250-c.c. New Imperial and 500-c.c. Rudge motor-cycles, being organised to view it. Cooper's "12/50" Alvis has been fitted with 1931 front axle and springs to improve steering, stability and stoppage, but, although in regular use, it seldom goes outside a built-up area these days. Capt. Pat Stephenson, another member of this cheery Scuderia, unfortunately has not been heard of since he went to India with the R.A.O.C., but was not officially reported missing at the time of writing. A breaker in Finedon recently sold a Talbot-Darracq-engined "14/40" M.G., known as the Ross-Hammond Special.

Louis Klemantaski was last heard of doing war work in the Midlands, and Stuart Wilton has been seen in a very new-looking Morris Eight.

G. G. Smith has discovered a Rolls Royce enthusiast in Miami, where he is training under the Empire Air Training Scheme. This gentleman was formerly with Rolls Royce, Ltd., and has several "Phantom III's," two "Continental" Twenty-Fives, a "Silver Ghost" and the ex-Barbara Hutton V12.

We very much regret to report that Sub.-Lt. D. B. McLean was killed when the single-seater fighter he was flying experienced fuel starvation last September. McLean wrote a very enthusiastic "Cars I Have Owned" article for us in 1941, and when he visited England last year he made friends with many fellow enthusiasts over here. We quoted from a letter of his only recently and he was due to return to this country very soon. We tender our heartfelt condolences to his parents in New Zealand.

A 16-h.p. 1937 Hansa 4-seater is said to be for sale at Bexley, and Windsor Richards has a "30/98" Vauxhall saloon, less front axle, which might be useful to someone. If any Midlands enthusiast wants to do his bit to save a veteran, what is probably the only Colibri in this country can be had for £7 10s. from York Auto-wreckers, Ltd., of Hull Road, York (York 4006)—and it will definitely be broken up before the end of the year. It has a tiny monobloc two-cylinder water-cooled engine, with some form of coil ignition, outside gear and brake levers, petrol tank under the seat, and a 2-seater body. I. M. Adam, whose letter appears elsewhere, would like to hear of 10-h.p. Enfield spares—actually we think we have found him some—and Ralph Venables is very anxious to obtain an issue of MOTOR SPORT for September, 1941, to complete his set; his address is "The Moors," Tilford, Farnham, Surrey.

There is a supercharged four-cylinder F.W.D. Alvis 4-seater for sale in Leighton Buzzard at £20 (85, Church Street), and Austin Partridge, who is putting in good work on his 2-seater F.W.D. Alvis, is willing to exchange his blown 4-seater F.W.D. Alvis, with plenty of spares, for a "12/50" Alvis, "12/60" Alvis, Brescia Bugatti, Austin Seven "65" or something similar. He reports using up 18 large reels of tape and 100 yards of cord in stiffening his 2-seater's front suspension! Boddy would exchange his Lancia "Lambda" for a "12/50" Alvis or something of this kind. Mr. Kipps has bought the Granville Grenfell Straker-Squire. There is a late "12/50" Alvis saloon for sale at around £35 in Hampshire, and a rear-engined two-cylinder G.W.K. and a Rhode have come to light in Surrey.

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THE "REMBRANDT" GATHERING

The very warmest congratulations are due to S. H. Capon and to A. Rivers-Fletcher on the success and enjoyment-factor of the Enthusiasts' Luncheon at the Rembrandt Rooms, Kensington, on September 27th. A. Percy Bradley was in the chair, and he, Raymond Mays, Laurence Pomeroy, Peter Clark, Gordon Wilkins, Major Alan Hess, Capon and F. J. Findon were the speakers—as reported elsewhere in this issue. W. Boddy was unable to be present and sent a telegram from Skipton. Some 150 people sat down to lunch, many of whom had come long distances to attend. J. Lowrey and Holland Birkett arrived from Hampshire, the former in his "Aero" Morgan, the latter in his Austin Seven-engined one-wheel-in-front tricycle, out on its first long run and somewhat retarded by a temperamental coil. Bateson came from Cambridge in his "Aero" Morgan, still using a hand-throttle and pouring in "Wonderweld" in a brave endeavour to retain the cooling fluid. There were also a few motor-cycles. There was a good exhibition of racing pictures and L. M. Ballamy showed two short Monkhouse films and Raymond Mays's 1939-season colour film.

Bradley told the assembled company that racing is very likely to happen again at Weybridge after the war, which was splendid news. Peter Clark paid a tribute to the motoring Press, to which Eric Findon, of *The Light Car*, replied. All those who are expected to be at these gatherings who could manage a break from war labours were there. Capon tells us that he hopes to manage another London Zoo meeting soon—perhaps on the first Sunday in November.

★

300 N.W.

Someone once said that to form sound judgment of a place one should either live in it for years or make a fleeting visit to it. With the latter basis in mind these notes are penned; they refer to a journey to Lancashire, roughly 300 miles N.W. from London, that is. Such a journey, in itself, is a most refreshing business these days, especially when, as in this instance, a spell of leave made it possible to formulate plans a mere couple of hours before the commencement. Incidentally, the car was definitely doing a job of such importance to the war effort that its nature cannot be named nor the exact localities visited disclosed. Long runs like this emphasise the true worth of this motoring and bring out

CLUB NEWS—continued

the desire to drive a really sound car in a way the usual restricted motoring in war-time does not. Actually, an elderly Austin Seven saloon was pressed into service on this occasion as being able to do what rail transport could not, and still the run seemed thoroughly worthy of keen anticipation. Early impressions were that London was little less trafficked and no less fashionable than usual, even boasting a crawling police patrol car. The Great North Road was noticeably less crowded, what traffic there was being essentially predominated by lorries. After dark, power fell off beneath our insignificant bonnet and the cause was curious indeed—the exhaust valve of No. 2 cylinder had risen further than even its cam could lift it and there it had stuck. All attempts to re-mate it with its tappet proving unavailing, we proceeded on three cylinders, a mode of progress less trying than might be imagined, save uphill, which augurs well for the post-blitz three-cylinder Austin. York proved full of taxis, irritatingly large and very active throughout the small hours. Worse, it proved so full that even the mighty Royal Station Hotel barred its doors and the car became our couch, relief later being found in the Police Canteen, which very hospitably opens its portals to H.M. Forces—and leaves them open all night. Emerging, torrential rain dispelled any desire to walk along the famous wall.

After breakfast had done something to combat the damp, clinging cold of a September Northern morning, a garage removed the head and released the errant valve with a display of inefficiency surprising even under the circumstances. Fortunately, the arrival of a "327" B.M.W. coupé with "328" engine (on Air Ministry and War Department contract work) did much to alleviate this episode. What a large car and what performance for two modest litres!

Wetherby had lost its glamour of speed trial days and produced only a coachful of happy policemen and a meal we would rather forget. The fascination of motoring long distances later began to exert its full appeal, driving in the clear evening light through meadowland offset by winding rivers—until the amps. ran out just beyond Skipton. That town provided accommodation for the night and a new battery next morning, but was depressingly devoid of entertainment and places of sustenance, its "waterfall" in the middle of the town adding to the general air of dejection. A contrast to Harrogate, where sheep grazed in its smallest enclosures and huge lorries from the North barely moved up the steep hill which modern cars and the smaller commercials take quite stirringly, provided they have a clear run along the straight road at the foot. In that town, too, the London omnibuses did their best to make 200 miles motoring even more mythical than it seemed. Pausing to fill up early the next morning—garages are now far between in the Lake District—a Type 45 B.M.W. went past in the opposite direction. A Rolls-Bentley, two Rolls Royces, a Packard, an Alvis—nothing much else of note had been seen. At the commencement of Lake Windermere traffic fell off altogether and we went miles without meeting another car, until a farming Austin towing a trailer full of dustbins broke the spell. At Ulverston, typically "Saturday afternoon," we called a halt, put the car temporarily to rest and tramped its steep, cobbled streets in search of food and shelter. In these parts potent motor-cycles abound, and very special examples of Norton, H.R.D., New Imperial and cammy A.J.S. were seen, while Ariel was unquestionably popular amongst more ordinary mounts, with Triumph a good second. One really early s.v. example of the latter make was seen, with a semi-sports sidecar in keeping. Of unusual cars, pride of place goes to a late type Delage coupé motoring fast, while a couple of model-T Ford lorries—a tonner and a Bacio conversion—and an early Hupmobile saloon represented the veterans. A Crossley Regis saloon and a three-wheel Reliant four-cylinder van cornering well were also seen. The local breaker had a 2-litre Lagonda chassis and would sell you a six-cylinder pre-selector Riley Twelve saloon for £20. Barrow, notable for its wide streets, vivid traffic lights, even more vivid vehicle headlamps and Leyland gearless 'buses, produced a T-type M.G. Midget carrying "Police" boards back and front, and a small saloon, driven by a fair member of the Force, was similarly labelled. We rode by 'bus to and from Barrow in search of food, gazing at its slums, its shipping and its huge gantries. We tramped around Ulverston and hiked in beautiful scenery where clear streams ran over rocks flanked by bright green meadows and a dye works gave a brilliant blue hue to most of its surrounding village. More potent motor-cycles prevailed. Walking over the cockle-floored beach of Morecambe Bay, the sea far out beyond the mud flats, a cold September sun setting in the mist, the writer glanced out over the flat grassland behind the little Austin. "How different from Cornwall," he reflected, "300 miles away, I suppose." "Nearer 500," retorted his companion. Idle thoughts ceased, random memories of this unexpected break in the war-time routine were banished. We forgot the archways in York, where such touching faith is displayed in traffic control by automatic lamps, the old-world market thoroughfares of that town, the fussy little 0–6–0 locomotive in Ulverston Station, which, starting on a gradient, gave such an object-lesson in the control of wheelspin by throttle-opening. . . . We saw ourselves rushing to a garage to fill the tank of a fast car brimful, preparatory to covering those 500 miles for no better reason than the contrast between the N.W. and S.W. coastlines that prompted the journey. Some day that sort of thing will again be possible.

CORRECTION

Last month we blundered badly over the Bolster Delage. The big eight-cylinder D8/100 has a plain gearbox and it is Mrs. Bolster's D. which has the Cotal electric change. The hush-hush Lockhart Miller engine is, or was, of course, a straight-eight and not a V16 as stated. These technical errors are deeply regretted and we thank the many readers who wrote in about them.

Stop Press!

The ex-Hunter Alta, together with a spare engine, has been purchased by John Gaul, of Horley, who would like information about it from anyone who used to know it. The mystery of the four-cylinder Thomas Special, referred to in "Rumblings" this month, seems to have been cleaned up by some excellent photographs of the car, which have been sent by Geoffrey Easterbrook-Smith from New Zealand, but which have come to hand too late for publication. There seems little doubt that the car in question is one of the 1924 200 Mile Race Marlborough-Thomas jobs, which broke up badly in the course of the race, in which they were handled by Thomas and Duller. They were 2-seaters with torsional suspension and an engine based, presumably, on that of the single-seater Thomas-Special. In 1924 one of them appeared on the Marlborough stand at the Motor Show, in racing guise save for the addition of tiny flaired wings, so apparently it was contemplated as a production model complementary to the then current 2-litre Marlborough. The tail of the body and the exhaust system seem to have undergone some changes since the car ran at Brooklands.

A reader finds he has to dispose of a 1911 Triumph motor-bicycle and a couple of "Petit Sports" Amilcars, the latter partly dismantled, and seeks a good home for them. They are in London and replies can be forwarded if stamped envelopes are sent.

Charles Lambton, Bugatti enthusiast, is doing much to promote motoring enthusiasm in his regiment, the 5th Battn. Coldstream Guards, and is experiencing a ready response. He took a party of his drivers to his home to inspect his 1½-litre G.P. Bugatti, and is giving weekly lectures to the Forces. If anyone would like to help him out in this self-appointed task he would be delighted to hear from them, or from anyone who would allow parties to visit stables of real motor-cars. Letters will be forwarded, but obviously we cannot disclose the locality. The owner of a 1,750-c.c. twin-cam unblown "8,000,000 Series" Alfa-Romeo, first registered in 1941, would exchange it for a Lancia "Aprilia," a Fiat "1,100" or a B.M.W. A 1910 16-h.p. Brescia is about to be broken up unless someone offers a fiver for it. Stuart Wilton is now motoring in a Big Four Riley saloon. Sub.-Lt. P. J. Byrne is trying to get hold of an instruction book for a blown 2-litre Lagonda and Pitman's "Book of the Morgan" to send to his brother, Sgt. T. A. Byrne, R.A.F., who is a prisoner of war in Germany. If anyone can oblige, we will willingly send these books on, as they must be sent out by a publisher. In case anyone wishes to correspond with this enthusiast, letters should go to Sgt. T. A. Byrne, R.A.F., 748546, Stalag 137, Stalag Luft III, Germany.

Letters from Readers

Sir,

I have read Mr. Riddle's letter regarding the varied Alvis models since 1920 with interest. If my memory serves me right there are a number of mistakes in his list.

The "10/30" model was made from 1918–1922, and was followed by the "12/40" and "12/50" cars. I have no recollection of any "11/40" or of any 8.3 or 8.9 models in production, nor do I think the "12/50" needs dividing into so many categories.

The s.v. 12-h.p. cars were of 1,496 and 1,645 c.c., as were all the o.h.v. of that nominal h.p. The latter can be divided as follows :—

1924–1928 : "12/50," 68×103 mm., 1,496 c.c.

1926–1932 : "12/50" and "12/60," 69×110 mm., 1,645 c.c.

The side-valve cars ceased production in 1925.

In 1928 the 14.75 six-cylinder car was produced in TA form ; the next year the bore was increased from 63 to 67.5 mm. with the same stroke of 100, which size continued until 1934 for the "Silver Eagle." In 1930 there was also the 2-litre of 65×100 mm. six cylinders. These six-cylinder cars were TA, TB, SA, SB mainly.

The year 1932 saw the first 2,511-c.c. cars with 73×100-mm. engines, in "Silver Eagle" form, followed by Speed Twenty. This year also marked the introduction of the "Firefly," 1,496-c.c., 69×100-mm. engine, of four cylinders.

By 1934 the i.f.s. was introduced, which added so much extra weight that the stroke of all models was increased to 110 mm., and the various models since then have been :—Speed Twenty, Sixteen, "Firebird," "Silver Eagle," "Crested Eagle," Seventeen, Speed Twenty-five, 3½-litre, 4.3, and, lastly, the "12/70," a four-cylinder again.

The f.w.d. series are even more tricky, as the earliest racing cars were of four cylinders, followed by eight cylinders, all of 1½ litres ; raced from 1925 to 1926.

In 1927 or 1928 the production four-cylinder f.w.d. 1,482-c.c. cars appeared subsequently in supercharged form. These were followed by eight-cylinder supercharged cars of the same capacity, which continued until 1931 or thereabouts.

I trust that these notes may be of interest, and I would emphasise they are compiled entirely from memory, of which mine is a notoriously bad model !

I am, Yours etc.,

Send, Surrey. M. W. B. MAY.

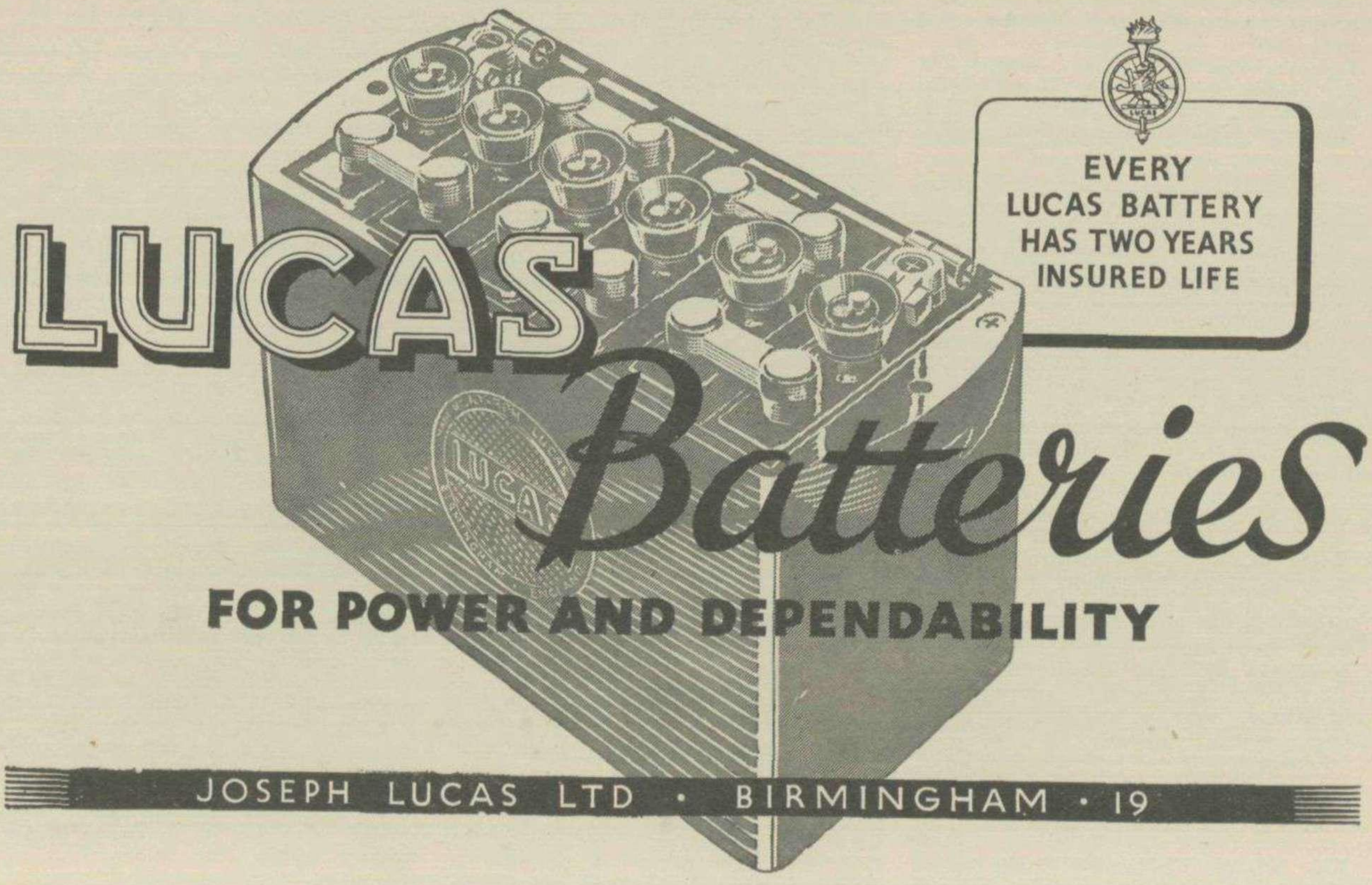
Sir,

I was exceedingly interested in your September article, "A Thomas Special in Retirement," by Mr. Easterbrook-Smith.

I, too, am a fortunate possessor of one of these little-known racing cars, and am under the impression that four of these cars were built, but understood that only two remain. I think I am right in saying that Mr. Taylor, of the famous Thompson and Taylor firm, mentioned that the other car was somewhere in Surrey—exactly where I have never been able to ascertain. Nevertheless, it is indeed good news that a third is still in existence.

The power unit of mine appears identical to Mr. Easterbrook-Smith's, mine also having two brass plates on the aluminium camshaft cover, one, "Manufactured by Peter Hooker, Ltd., Walthamstow, London, England," and the second, "Type 2L, Engine No. 3," as against Mr. Easterbrook-Smith's "Type 1½L, Engine number 5," but does not, however, bear the legend "Hooker-Thomas Special," but only the number EC 2685.

Again, my carburetter is a Solex, as against the Zenith, but my car has a wheelbase of 8′ 10″ and is decidedly crab-tracked, the front track being 4′ 11″, as



LETTERS FROM READERS
—continued

against 4′ 2″ at the rear, but I am under the impression that the front axle is ex-Hillman.

Unfortunately, I know nothing of this car's history or performance, although R. Walker, who used to race the ex-"Bira" Delahaye, once owned this car. Consequently I can give no idea of valve or magneto timing settings, not having had the chance yet of either being able to work or run the car.

I am forwarding to you, in the very near future, some photographs of the car, which you will see has an aluminium body with a long pointed tail—as had Mr. Easterbrook-Smith's before it met with its mishap.

I am, Yours etc.,

M. R. J. CHETWYND-STAPYLTON,
F/O, R.A.F.V.R.

Berkhamsted.

[Comment on this letter appears in "Rumblings."—Ed.]

* * *

Sir,

Mr. Massey-Riddle's list of Alvis cars prompts me, as an F.W.D. owner, to ask :

(*a*) About how many four-cylinder front drive cars were made in that period, 1928–1931 ? When I bought my own blown four-cylinder 18 months ago I fondly imagined that very few had been made, but I have since heard of them in all sorts of places, and Mr. Partridge knows nearly a dozen present owners.

(*b*) Was the eight-cylinder also made in any quantity ? I have never managed to get on the track of one of these engines and would be very pleased to hear if one were available. Apart from a vague idea that they would not hold their tune I know nothing about them. Were they single or double cam, plain or roller bearing, blown or unblown ? And, most important to me, would the eight-cylinder F.W.D. engine and drive unit interchange with the four-cylinder ? I imagine not, and yet any further increase in overall length of the engine unit would be undesirable, surely ?

Any comments, warnings, etc., will be very gratefully received.

I am, Yours etc.,

T. A. ROSE.

W. Bridgford,
Notts.

* * *

Sir,

You might be interested in the enclosed pages from *Life*, the American weekly, which show that enthusiasm over here is not so rare as one would imagine.

The Stanley Steamer is notable for the effect that it indicates that the "alligator" bonnet was quite an early innovation (and abominable).

The 1908 Mercédès is interesting and looks very distinctive in its group.

Believe it or not, but the other week a couple of friends and myself accomplished a thousand miles of motoring. I hope you are not envious, but a seven days leave gave us time to hitch-hike to New York, 500 miles from here, which we covered, travelling all night, in 24 hours dead.

Our hearts were much gladdened on the Jersey Highway by the sight of a 4¼-litre Bentley, and in New York City we saw a couple of Rolls Royce (*circa* 1932) and the tail end of an Aston-Martin, which dived round a corner rather smartly. Our journey was made in a wide variety of vehicles, from Ford "T's" upwards, and there is a hair-raising memory of a 15-mile ride on the back of a 6-ton lorry, hanging on to a rope and standing on a 6″ ledge.

For the most part we rode in cars of all sorts, most outstanding being a 1940 Dodge, which cruised at an effortless 70 odd m.p.h. (*according to clock*, anyway), in which we covered 250 miles from Albany to Rochester.

New York is a wonderful place and we must go there again some time, if only to see the 50-m.p.h. taxis, which seldom appear to hit anything. . . .

Next leave ? Why, Chicago, of course ! A mere 450 miles. . . .

I am, Yours etc.,

R. BAWDEN, L/Ac., R.A.F.

Ontario,
Canada.

[The veterans referred to are mentioned elsewhere in this issue.—Ed.]

* * *

Sir,

I trust these few notes are of interest and may bring comments from other past or present Cord enthusiasts, with views on the success, or otherwise, in their hands of this very interesting and unique f.w.d. car ; a car of no mean performance, although perhaps not coming into the class considered as "sports" by some readers of your paper.

The car was, nevertheless, produced in convertible cabriolet, and what America calls convertible phaeton, or 4-seater, form, and both supercharged and unsupercharged.

Although I haven't taken every number of MOTOR SPORT, I don't remember ever seeing any reference to this undoubtedly interesting car, and it is certainly not on your list of road tests. I wonder why ? There are quite a number about Britain, and I, at any rate, became quite attached to, and enthusiastic about—with some reservations—one of the more ordinary unsupercharged saloon models.

There was something basically *right* about the conception of this Cord, and in these days of the, American at least, tendency to bring the radiator ducts lower and lower into the front mudguards and fairings, and to camouflage it generally, there was the Cord, years ahead, with the radiator already completely hidden as such, and dispensing completely with grilles and chromium plate.

The front drive arrangement gave a beautifully low and flat floor and no running boards were fitted. The mudguards were perfectly faired and streamlined, and the headlamps—of which more anon—however retracted completely into these. Cars are only now beginning to have their lamps faired into the mudguards and thought of as part of the car as a whole.

Door hinges were completely submerged, the petrol filler was recessed in a trap in the rear panel, and this was lockable with the ignition key, quite a point when petrol got scarce and precious ! The

READERS' SALES AND WANTS

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

(1) Each announcement to cost 1s. 6d. and be limited to twelve words and the advertiser's address. Box Numbers cannot be used.

(2) The publishers accept no responsibility for loss of advertisements, non-publication, late publication, or incorrect wording, but will endeavour to insert announcements in the next issue, if posted within eight days of the publication of the previous issue.

(3) No advertiser may submit more than **two** announcements per issue and each must apply to a separate article. Only spares for sale, spares or cars wanted, or **really cheap** cars for sale, should be announced. Prices should normally be quoted.

(4) The proprietors of MOTOR SPORT offer this scheme for the mutual benefit of enthusiasts and can take no responsibility of any sort whatsoever. All transactions must be made to the published addresses and no correspondence can be entered into in respect of announcements, transactions or any other matters arising from the scheme.

(5) Announcements should be sent within eight days of the publication of the current issue of MOTOR SPORT, accompanied by stamps or crossed postal orders to the required amount. Cheques or coin cannot be accepted.

FOR SALE

NO. 9 POWERPLUS Supercharger. Reasonable offer to E. R. W., 9, Vincent Avenue, Chorlton-cum-Hardy, Manchester.

WANTED

ENGINE for 1936 M.G. Magnette or car complete for breaking. Drake, 50, Rowan Crescent, S.W.16.

BUGATTI Gears or Gearbox, Type 37. Cyl. block, Type 37 or 40. E. L. Turton, 1, Dryden Avenue, Cheadle, Cheshire.

WANTED for M.G. "P" type Scintilla four-cylinder magneto. P. O. Arbenz, 61, Birmingham Road, Sutton Coldfield, Warwickshire.

1938 1,100-c.c. FIAT engine, complete. Fitzpatrick, Lambley, Notts.

1935 SPEED Twenty Alvis, starting handle, bonnet, wire wheel, magneto and leads. G. M. Stevens, 7, Page Heath Lane, Bickley, Kent.

Spares Section,

MOTOR SPORT,
21, CITY ROAD,
LONDON, E.C.1

LETTERS FROM READERS

—continued

spare wheel was carried inside the streamlined rear-end of this altogether clean and excrescence-free body. What a pleasure to the eye, and to wash and polish!

When it comes to the mechanical side, at must be borne in mind, when considering my criticisms, that my particular ixample was bought " very second-hand " end these might not apply in the case of a perhaps less-sorely-used car. Anyhow! These headlamps of which I spoke, while beautiful for their retractive feature, were, as a means of illumination, only good as sidelights, and I added a big Bosch dipping driving light—unfortunately not retractable!

The 39.2-h.p. Lycoming V8 was entirely satisfactory, with very accessibly mounted carburetter, distributor and generator. Just as satisfactory was the four-speed gearbox, with 2.75 to 1, geared up, top gear, a joy on the open road, but, and this is, or was, the biggest " but " on this particular car, gear selection was by a small gear lever in a regular, but miniature, gate change on the steering column, beneath the steering wheel. This lever selected the gear required, or pre-selected it, if you wanted it to, electrically, and then the actual change took place pneumatically when the clutch pedal was depressed. Unfortunately, with this car this didn't always work, the most common fault being that the gear previously in use wouldn't " unselect " when the lever was moved; this fault persisted even after a quite expensive overhaul of this " box of tricks."

Another fault, to me at any rate, as a seeker after sports motoring, was that, no matter how carefully one tried to time the gear changes, even on its " good days," when everything otherwise worked nicely, there was always a distressing " cluck " as the gears engaged.

The steering of this Cord was absolutely perfect; finger and thumb light at 0–100 m.p.h., and the wheel came nicely to hand on an almost horizontal column. A very workmanlike instrument board was fitted with a most comprehensive array of instruments, including a rev.-counter and a " quantity-of-oil-in-the-sump " indicator, this in addition to a dipstick on the engine.

The road wheels had been reinforced by having plates welded on inside, but whether the wheels were not up to their work, or whether a previous owner had been over hard on the car, I do not know. The hydraulic brakes were very smooth and powerful.

I don't pretend that the Cord would ever have made a competition motor, but as a comfortable and fast means of covering longish distances in all weathers in Scotland it would have been hard to beat. The high gear made this sort of running reasonably economical, too.

If the war had not intervened and required my removal and the disposal of the Cord, I had fully intended to play about a bit with it. I would have liked to remove all that " electromatic " gear changing business and go back to a manual change by means of a " through the dashboard " pistol grip with a rod passing along the top of the engine and down in front of the radiator to the quite accessible mechanical part of the selector mechanism. I'm sure it would have been much more satisfying to " feel " the gears go in, and perhaps without that " cluck." I think with some attention the headlights might have been improved, too, yet still retaining the retractive feature.

There was no means of hand starting the car, and if the battery was flat one couldn't even engage a gear to get a push or tow start! With a well-charged battery, however, the car, like most Americans, was a " first time " starter.

Did anyone, by the way, ever see or hear of the six-cylinder Hupmobile which was produced with the Cord bodywork and was once illustrated? I tried to get details of it at the time, but no one seemed to know of any such car. Perhaps it never reached this country.

Up till a very sad day at the end of June, when I laid it up, I was running very happily a totally different car. A four-cylinder push-rod three-speed Frazer-Nash. Rather " spidery " compared with the Cord, but what accessibility! Every grease nipple just shouting to be attended to, and even the underside to the semi-cycle wings might be polished!

I am, Yours etc.,

Giffnock, Renfrewshire. IAN MCLARDY.

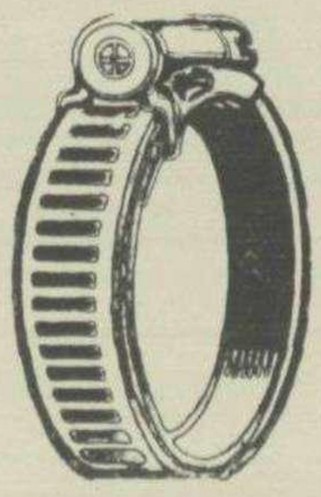
* * *

Sir,

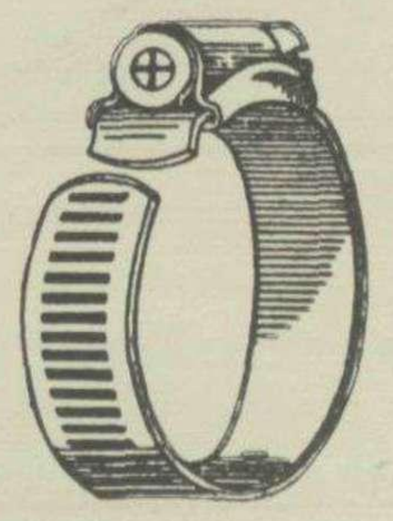
I have been a reader of your excellent magazine for several years, and I must say I am intensely pleased to see you carrying on in such a satisfactory manner in these hard times.

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LETTERS FROM READERS
—continued

As I'm not as old as I may sound I was unable to take a very active part in motoring of any sort until shortly before the war.

My first effort was a half share in the rebuilding of a 1928 Rover Ten tourer. This was fitted with a rather curious looking 2-seater body, made mainly out of bits of the old one. It gave us 2½ years of faithful service, being caned around town and out to various trials, speed events, etc., at colossal r.p.m. most of the time. The only trouble we ever had was a run big-end.

Shortly before the Rover was sold to a Naval officer, who is still running it daily, I bought a 1929 Type 40 Bugatti, which had unfortunately been somewhat hashed. The engine, despite the fact that we never got the mixture quite right and burnt valves and so on, was marvellous. It would give very fine acceleration, especially in third gear, and about 78–80 m.p.h. top speed.

I intended to rebuild it, but after I'd had it a few months first and second gears were stripped when I had some clutch trouble, and as I was unable to get spares and the war was clamping down on motoring, I sold it.

Just before the war I was quite closely connected with the Alexander brothers, of Edinburgh, who used to do amazing things with hotted and rebuilt Fords. Jack Alexander had a very potent Zoller blown V8, with a plywood single-seater body, which travelled at incredible velocities in local speed events, and was once driven from Glasgow to Edinburgh in 29 minutes, without breaking any speed limits!

I now have a 1930 "Aero" Morgan with 1,100-c.c. Anzani water-cooled engine, which is quite exciting to drive, especially in the wet. My friend of the Rover is running an exceedingly non-standard Riley "Gamecock," which goes very well indeed.

One other car, except for sundry Austin Sevens, of interest. I've been told by many it was never in existence, but, still, here goes. A friend of mine produced from somewhere what he claims to be a 1931 750-c.c. Bugatti. It seemed to be a Bugatti all right, with reversed rear springs, etc., but it had a rather weird 2-seater body made by some coach-builders, whose nameplate is illegible. The engine was typically Bugatti, with shaft-driven o.h.c. and a Zenith horizontal carburetter.

I am, Yours etc.,
J. V. STUART-DUNCAN.

R.A.F.

[The 750-c.c. Bugatti will doubtless prove to be our old friend the Ratier!—Ed.]

* * *

Sir,

Some time ago I wrote to you and suggested that you might kindly mention that there were only a few volumes of Prince Chula's "Road Racing, 1936," left, so that enthusiasts who were keen to have a collection of motor-racing books would not miss their opportunity and be disappointed. Your notes have done great service and the volume in question is now completely sold out. I wonder if you would now be kind enough to mention this fact, so that others would not waste their time and postage with further orders for the book. You may perhaps mention that "Road Star Hat Trick" are still available, though they, too, will sell out in time and will not be reprinted.

I am, Yours etc.,
A. RAHM.

Rock,
Cornwall.

♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦♦

A SUPERCHARGED ROLLS ROYCE
—continued from page 222

"Phantom III," as quoted in *The Autocar* road tests. The "Phantom II" was a short chassis "Continental," but the overall weight was only a little less than FitzPatrick's—namely, 49 cwt. The "Phantom III" went 51½ cwt. It is, incidentally, notable that the "Phantom II" had a much better selection of ratios than the "Phantom I," the overall being 3.41, 4.55, 6.77 and 11.9 to 1, which gave a useful maximum of 75 m.p.h. in third gear. The "Phantom III" is, of course, much lower geared, having an axle ratio of 4.25 to 1.

Car	0–50 *through gears*	10–30 *in top gear*	30–50 *in top gear*	*Maximum*
Blown Phantom I	11.5	8	8	90
Continental Phantom II	14.4	9.6	10.6	92.3
Phantom III	12.6	7.4	8.2	92

Both "Phantom II" and "Phantom III" were, of course, tested on real petrol and in perfect adjustment; the "Phantom I" on Pool and after three years of neglect, and this must be remembered when studying the figures, if, indeed, they need any apology.

As with the "20" Rolls Royce, about which I recently wrote in MOTOR SPORT, the further I drove this machine the better I liked it, and freely confess that the pair of them have turned me from a scoffer at what I looked upon as a dowager's professional carriage into an ardent Rolls Royce enthusiast. There is probably no particular in which the Rolls Royce cannot be rivalled by some make or another, but taken in the aggregate I can now read the well-known Claude Johnson slogan of "The Best Car in the World" without any dissentient thought; while that Douglas FitzPatrick should have taken upon himself to improve a Rolls Royce — and succeeded — is an achievement of which he may well be proud. In his "Phantom I" he certainly possesses one of the outstanding and individual motor-cars of the present day.

★ ★ ★

UN"TIME"LY ADVICE

As the owner of a baby car was frantically turning the crank handle a huge lorry passed him. The driver's mate leaned out and said: "Hi, mate, why don't you buy one of them eight-day ones?"

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FRAZER-NASH 1926 1,500-c.c. Anzani 2-seater, four excellent tyres, dismantled, engine complete. Near £50. 484, Green Lane, Seven Kings, Essex.

1933 2-SEATER J.2 M.G., black body, silver wheels. £40 overhaul April this year (bill giving full details shown), includes new set pistons and liners, new crankshaft, rebuilding clutch assembly. Car unused since June, engine not fully run in. Tyres very good, two are new. Brakes relined February, both front springs renewed. Whole car carefully maintained, same owner last four years. £80. Box 111, MOTOR SPORT, 21, City Road, London, E.C.1.

ALFA-ROMEO 1,750-c.c. twin o.h.c. 2-seater, excellent condition. First registered 1941. £165. Fitzpatrick, Lambley, Notts.

WANTED

LEA-FRANCIS, cheap, 10 h.p. or supercharged 12 h.p. Condition and age not important. Box 112, MOTOR SPORT, 21, City Road, London, E.C.1.

1935-6 AUSTIN "Nippy" or similar small open car. Lock, 12. Chase Court' Southgate, London, N.14.

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We wish to thank our large clientele of Bentley and Rolls Royce owners who have supported us so wonderfully since the War, but regret to inform them that owing to Government requirements no further repairs to private cars can be undertaken by us for the duration of the War.

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 five years. In order to make good this omission, we give below a new Index, of tests published from May, 1937, to the present issue. Read in conjunction with the Index in the May, 1937, issue 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 1¾-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 4¼-litre drophead coupé	Aug. 1938
Bentley 4¼-litre Mark V saloon	Feb. 1941
Bentley 3-litre "Blue Label" "Special" 2-seater (1928–9)	Feb. 19.9
Bentley 4½-litre "Le Mans" 4-seater (1928)	Jan. 1942
Bugatt 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 coupe	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 5¼-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 4¼-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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