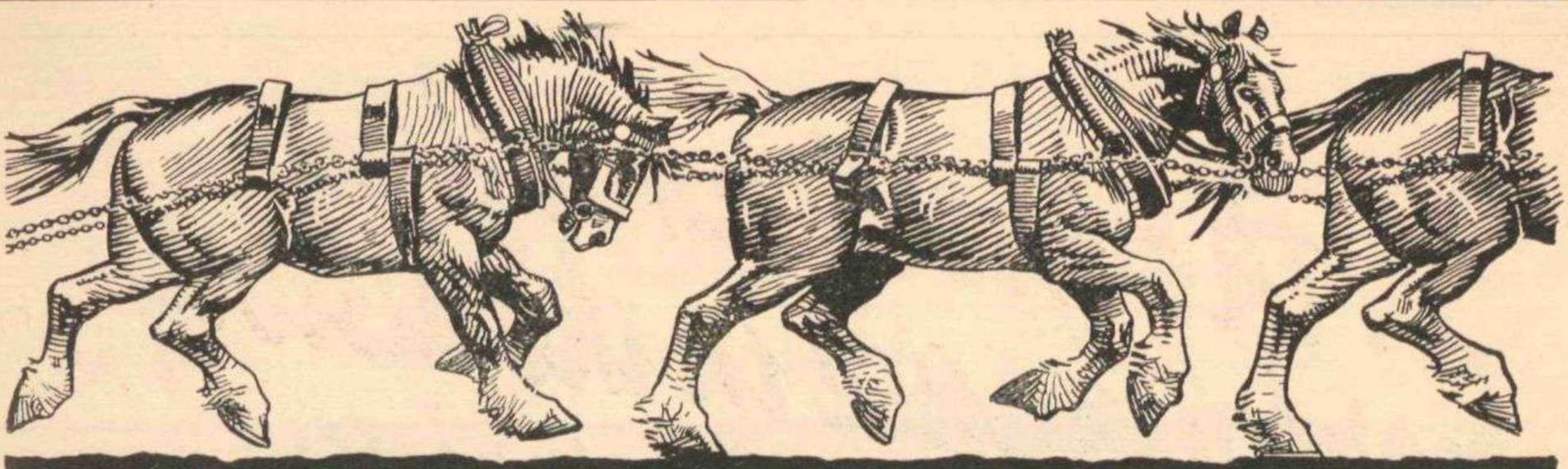


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MOTOR SPORT

INCORPORATING THE BROOKLANDS GAZETTE

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Editorial Notes

THE WAY OF THINGS

MOTOR SPORT has, in the past, been the journal *par excellence* for the enthusiast in matters motoring, that is to say the man, or woman, to whom a motor car means more than just a means of transport. It has existed for the pleasure and benefit of that happy band who regard an automobile, be it a two, three, or four-wheeler, not as an inanimate but useful collection of wood and metal; but rather as a trusted friend to be understood and considered and in return for good service to have everything of the best.

We have, however, so far confined our attention chiefly to motoring sport on terra firma, and although this is undoubtedly the medium of the majority of motorists, the development of the high speed internal combustion engine has opened up new fields which must not be neglected. Just as the great strides which have been made in recent years in cars and motorcycles have been mainly due to such events as the Tourist Trophy races and the great continental road races, so it is to the sporting side of the movement that we must look for progress in the air and on the water.

In years to come, when the small, fast, economical aeroplane is as much a business necessity as the motor car is to-day, and when small seaworthy cruisers, operating at a fraction of present costs are available at much lower than present prices, it will be to the select band who have supported races and competitions, for the interest and love of the game, that we shall have to render thanks for the progress that has been achieved.

This number therefore marks the beginning of a broader policy in our career, and one which we feel sure will appeal both to those old friends who have been enthusiastic readers of this journal since its inception, and to those who will find a new interest in the features dealing with their particular branches of motoring sport. Articles will be included by experts in every branch of the game, men who have actual experience of the hazards of motoring on wheels, wings or water.

Those who want interesting and accurate information on the many points which arise in connection with competitions and also on the technical points which so often worry the amateur tuner, will find in this new and better *Motor Sport* the filling of a long-felt need.

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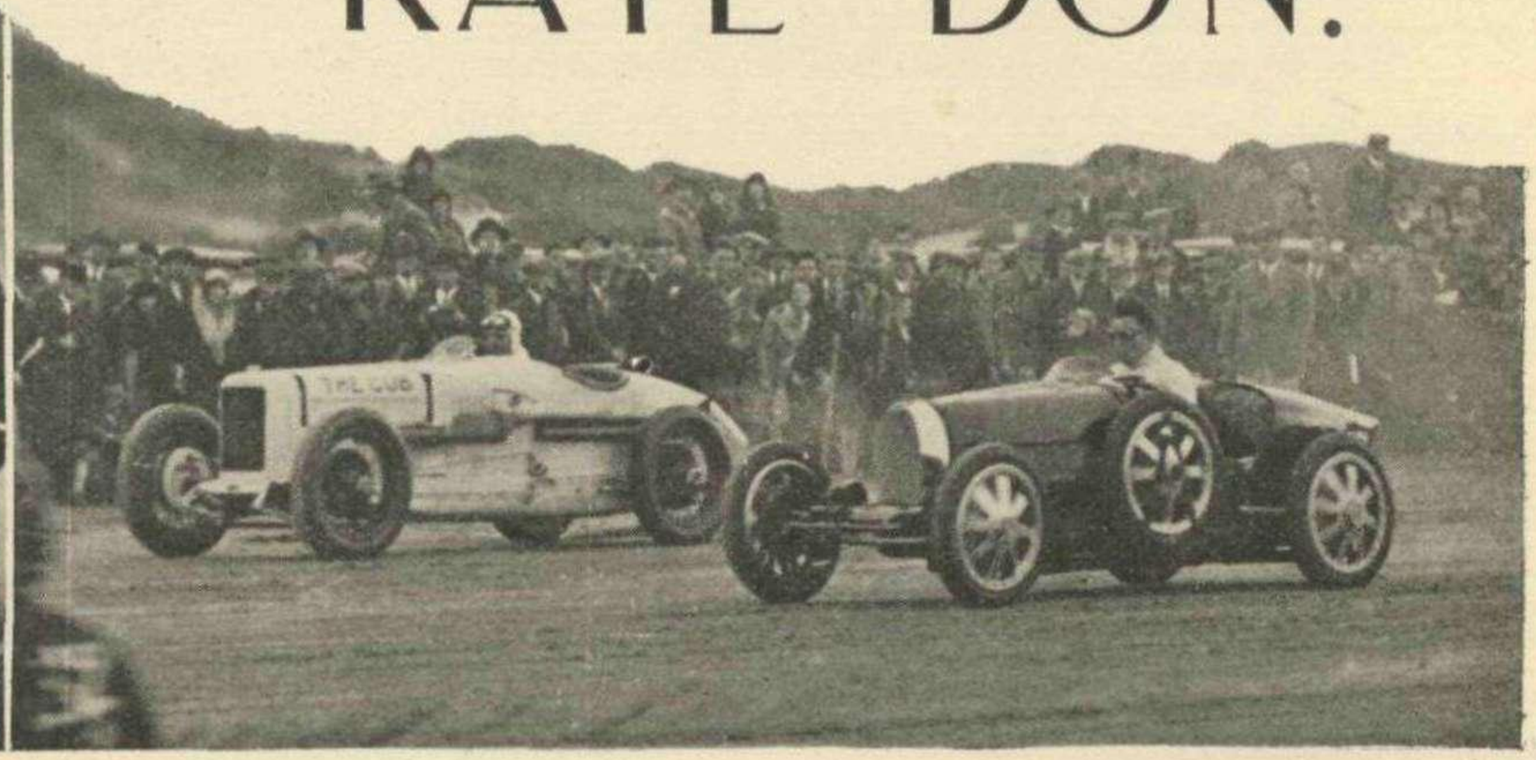
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"My Year's Racing"

By

KAYE DON.





KAYE DON RACING IN THE "CUB" ON SOUTHPORT SANDS.

IT has been a wonderful season for motor racing. One cannot call it a revival of the sport, for the popularity which it at present enjoys transcends anything which went before it. Brooklands has been better attended than in previous years, and there have been two big road races in Ireland. Add to these events the attempts on record which have been made, and we discover a season as full of sport as a ripe orange is full of juice.

To those of us who crowd the miles into minutes, motor racing has a thrill which does not reach the mere spectator, however he may be enthralled by incidents and episodes. To us, every minute is full of excitement; every mile is an adventure.

When the season opened, I felt that the going would be very good for me. I had "The Tiger," fastest of all track cars, I had "The Cub," a smaller but equally efficient Brooklands job, and I had a choice of cars for the two big road races in Ireland. No man ever started a racing season better equipped so far as tangibilities are concerned. But the best of cars is of no avail against the frowns of Dame Fortune, for unless you bask in the smiles of the Fickle Goddess you cannot achieve major successes.

It is a pity that we cannot harness that dictum of the idealists "Equality of Opportunity." But is it? Would life, or any department of it, be so entertaining if the element of luck were not pronounced? I think not. I was disappointed in the two road races this year, for in each case I found myself beaten at relatively early stages. I do not regard this as bad luck, since it is very rare that half the field finishes in such an event; and if you are among the survivors, well, you must have had the luck. It is all part of the game. It is no good having the fastest car in a race if that car cannot withstand the strain for the whole distance. I have often heard it cited as evidence of bad luck when a man is beaten in the last lap of a road race, but is it not rather that the car has failed to rise to the occasion?

The motor racing man must be philosophical, and I think that he is. Also, he is an excellent sportsman who can, as a rule, lose as gracefully as he can win. It is always somebody's turn, and we are all content to take ours, though, of course, it is up to each of us, to hurry along our turn by sound organisation and by the greatest effort of which we are capable. Racing cars are not so fickle as horses, but, in the racing game, they are not nor can they be expected to be, as reliable as touring jobs.

But if I failed to secure either of the Irish plums I certainly tasted the fruits of the chase. While it lasted the racing was very good, as it always must be. None of us could achieve greatly unless we enthused.

It is one thing to have the will to win, but it is even better to have a heart for the sport, and I think I can say that I am never happier than when I am in the seat of a racing car and the engine has just leaped into the pulsating, roaring life which lies at my command.

On the Track.

On the track I have been more fortunate. The Tiger has served me well. The track record is mine, many of the chief races have come to me, and I must write "content" over my log of the year for Brooklands. It is usually my lot to be on the scratch mark, which is as it should be considering that the Tiger has the heels—or should I say the wheels—of any other track car. And how I enjoy those terrific pursuits round the

"MY YEAR'S RACING"—continued.

concrete track. How the landmarks leap at you as you give her full bore. There is that wide sweeping turn from the railway straight to the fork, with the tiny bridge at the Byfleet end and the " matey-ness " of the people who, wise enough to have found the best vantage point round the track, fill the narrow span. There is the Members' Banking, just after which one may tread on the gas again to get every ounce of speed on the straight. There is the thrill of passing car after car until, with journey's end looming close, you know that there is but one competitor ahead of you.

Can you do it ? The answer is in doubt. The finishing line seems to be getting very close, and then—you swoop down from the banking to the straight to discover yourself on the tail of your rival. The Tiger has roared its way to the front again and you have won. But sometimes you have had to beat the record for the track in order to win the race.

It is not always easy. A strong wind plays havoc with your chances, for, believe me, it is a fight between muscles and mechanics when there is a lot of wind about.

Yes, the game is well worth while, quite apart from your triumphs.

I think that of all my performances during the present season, the palm must go to my successful attempt on the standing start record for a mile. Again it was the Tiger which took me to victory and enabled me to claim the land speed record from a standing start. My speed was over the 100 miles an hour, and to really appreciate what this means, let me put it to you as spectacularly as I can. Imagine that you are at rest in your car and that another car flashes by you at a hundred miles an hour. You get going and in less than a mile you have caught and passed the other vehicle.

That is what you have to do to beat 100 miles an hour for a standing start mile. During the season I have beaten a number of records, and I suppose I have had my share of the races, but I think that my mile record must be accepted as the highest achievement of all.

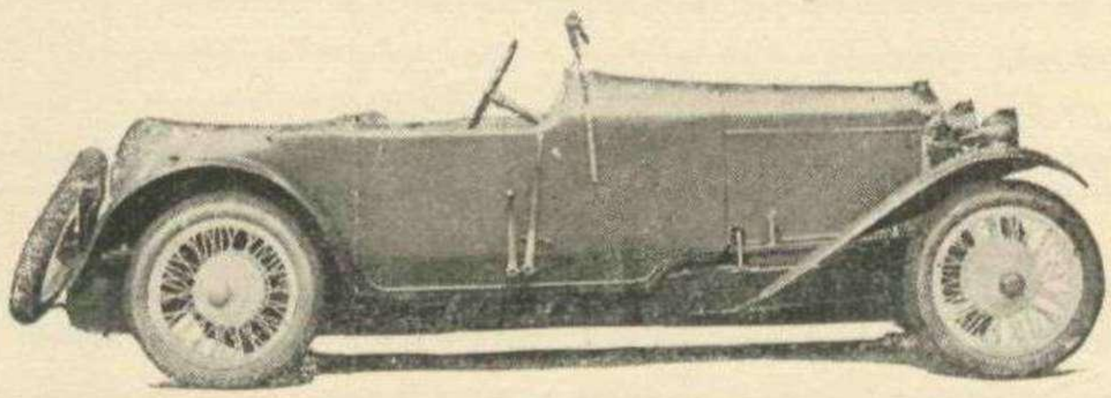
The Future.

And now, there is the future to be considered, with my highest adventure close ahead. Early next year I go to the United States to defend the land speed record at Daytona. A wonder-car has been built for me, and I am well pleased with the way it is shaping. I am looking forward with great eagerness to that little dash on the Daytona Beach. And of course I am confident. I think that I shall walk in the footsteps of Segrave and Campbell, who already have shown the Americans what British engineering and British driving is capable of achieving.

Sir Henry Segrave has given me a he-man's job to undertake, and he has discussed with me the problems and the difficulties attaching to the attempt. I do not know whether there is basic foundation for the rumour that the Americans are to make a more serious attempt to win the record than they have ever before organised, but I hope so.

I think that we shall be able to score over them.

CRUISE AT SIXTY !!



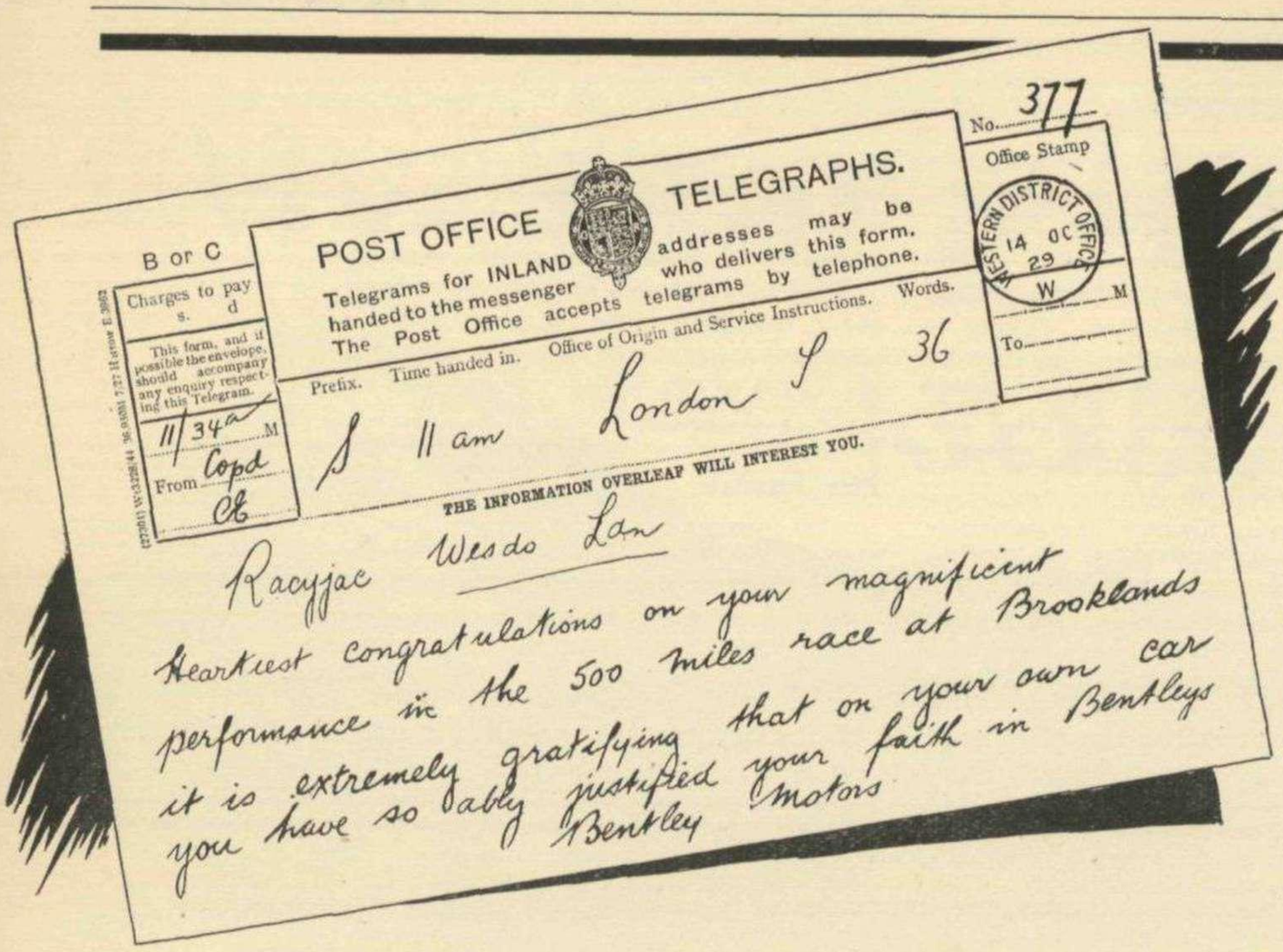
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Two Years with Two Bentleys

By MANNIN.

THE writer went to the 1926 show without a bias of any description but simply requiring a genuine sports car which would have the wearing qualities of a staid tourer. The number of suitable vehicles, however, was soon narrowed down and a road test gave the decision in favour of the 3-litre Bentley.

The principal features of the chassis are well known, but the writer was impressed by the four valves per cylinder, large brakes, two magnetos and exceptionally stiff frame.

The first run on the car was from London to Liverpool, which accomplished as it was in pouring rain, justified our expectations as far as steadiness and nice handling were concerned and we immediately felt at home in our latest acquisition. The running-in period of about 1,000 miles was not irksome, as naturally on such a car a 50 m.p.h. cruising speed calls for no appreciable effort from the engine. When this mileage was completed we permitted ourselves to indulge in something nearer the speeds for which the car was built, and began to appreciate the reasons why the name of Bentley has so quickly come to the front in the world of motoring. A few minor troubles were experienced in the teething stage, as is only common with most cars, but these did not prove of any consequence owing to the excellent service we always obtained from the firm. The five years guarantee which the firm give with their products is no mere form of words, and the man who remarked that when one buys a Bentley one buys the works for five years, was little, if any, short of the truth.

A most elusive trouble which did occur early in its life was a persistent habit of the tappets slacking off their adjustment, resulting in irregular running and some broken valve springs. The works eventually traced this trouble to the experimental duralumin rockers with which our particular car was fitted. They therefore replaced them with the standard type steel rockers and the trouble was gone, never to return. One occasion, on which a magneto ceased to be sufficiently magnetic, produced another example of service, a replacement being despatched by return. Practically the only other need to call on the works for replacement, was caused through the tailing of the writer rather than the car.

On occasion when both in a hurry and a bad temper our engaging of the various ratios was not marked with that tender care which shows up the good motorist, in fact to put it crudely we were sometimes infernally rough with it. Eventually the gear box decided to put a stop to this and a particularly crude effort broke a selector and left us to perform a rather uncomfortable journey to the works in third gear only. A new gear box was fitted in a day, and we took to being a little more rational in our treatment of the gear lever. The subsequent post-mortem on the old box inspired the remark "Can that young man really drive?" made by a member of the staff to a friend of ours at a trade luncheon.

The performance of the car on the road left little to be desired in the matter of getting from point A to point B, especially when it is borne in mind that one does not expect a car with a comfortable four seater fabric body (ours was the actual show model by Vanden Plas) to behave like a Targa Florio racer.

The car would do a genuine 85 m.p.h. whenever circumstances permitted, and owing to the excellent road-holding and powerful brakes, they permitted very frequently! At 70 m.p.h. in third, no undue fuss was apparent, and the gear ratios proved ideally chosen for fast cross-country work, and some quite unpublishable averages were attained on many occasions, but as I am not writing in the correspondence columns of the weekly motoring press I will refrain from boring readers with a list of figures. The highest speed actually attained on the road was 97 m.p.h. down Benson Hill, and several unofficial records to or from towns in the vicinity of Oxford were put up. The steering was excellent, though possibly a trifle high-geared. However this suited the high pressure tyres fitted, and the car was pleasant to hold and could be cornered with extreme violence without any sign of rolling. Economy is frequently a secondary consideration on a car of this type but in spite of being always driven as fast as was safe, an average of 19 miles was obtained from a gallon of fuel, and the oil consumption seemed to depend entirely on how often one changed the oil in the sump as it never seemed to use any in the ordinary way. A set of the high pressure tyres of that date lasted about 8,000 miles, which on a car like this, driven as it was, shows that the rear-wheels must have refrained from bouncing to any extent.

The "4½-litre."

About this time, following their success at Le Mans, Bentleys put their famous 4½-litre on the market, and having obtained such good service from the 3-litre we decided to sample one of the new models. A trial was followed by arranging a part exchange with Jack Withers, and we duly became the owner of a 4½-litre, not without a tinge of regret at parting from our faithful first Bentley. *Pax cineribus!*

The new car was very similar, apart from engine size, to the old one, as the body was another 4-seater fabric model by the same firm as before, though owing to the slightly extra room on the new chassis, it had been possible to arrange rather more comfortable seating, especially for the rear passengers. Minor alterations including pressure or "Semi-balloon" tyres which in turn required somewhat lower geared steering than the 3-litre car, also a larger Autovac was fitted to avoid any possibility of "drying up," when long bursts of full throttle were indulged in. When we first took over the new model we were attacked by a fear that we had bought a definitely "touring" car as opposed to a "Sportwagen", the features responsible for this impression being the much greater flexibility of the engine,

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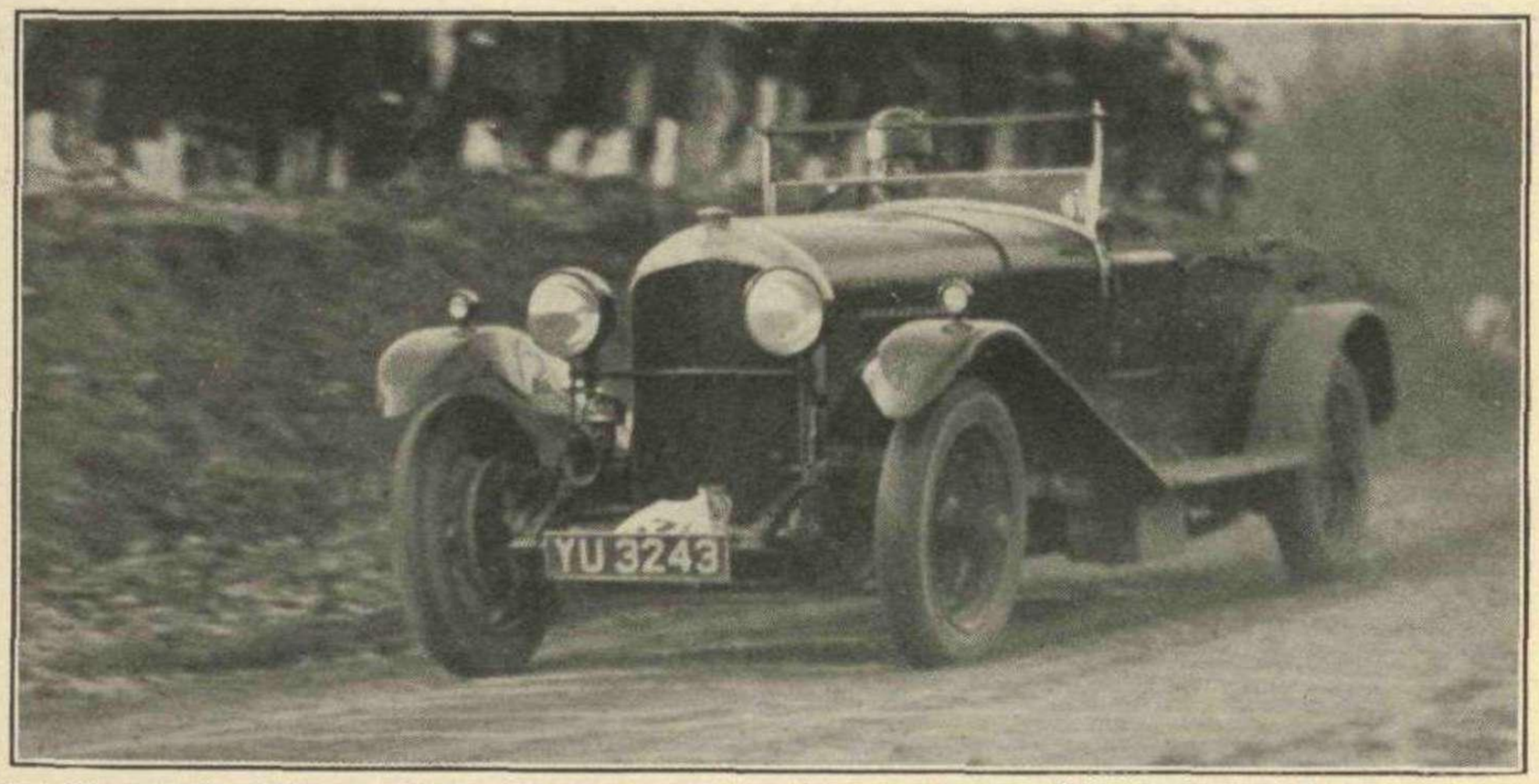
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TWO YEARS WITH TWO BENTLEYS (continued).



The Writer's 4½-Litre Bentley at the last Intervarsity Hill-Climb at Ewelme Down.

and the feeling of extra height in the new body. However our fears were dispelled as we found that the new model had a performance surpassing the old one both as regards acceleration and speed, and at the same time it was accomplished in a smoother manner. Whereas with the 3-litre one definitely had to "live in the gear box," on the larger car one could if one was feeling lazy, drive about almost everywhere in top. Not that this means that the gears were any less use than before, and when in the mood we used them with singular effect. Also our previous experiences had given us rather more respect for the gear lever as an instrument of destruction, and we have never had any further trouble in this department.

Shortly after taking delivery we managed to seize up the magneto cross shaft, due to revving rather carelessly with cold oil, and this opportunity was taken to have Bosch magnetos fitted in place of the others, and they have since been absolutely satisfactory. This repair was done on a Saturday night and Sunday morning and no charge was made.

The car was just run in in time to be entered for the Inter Varsity Hill climb at Ewelme Down, and it performed quite well. It won the touring class and ran third to two supercharged six-cylinder Amilcars in the Racing Class, managing however to beat a third car of the above breed. The cornering was found to be very good though we never felt able to be quite as brutal on corners as we had been with our first Bentley, and the greater weight and slightly different steering, were probably responsible. However, the road holding on the straight more than compensated for this.

Having given the car a fairly rough time in this country without any ill-effects we decided to take the car to New Zealand, and the works having advised us that they considered the present ground clearance of 7¾ inches sufficient for colonial work the car was duly packed up and despatched.

Of course we suffered the usual troubles over Bills of Lading, etc., on landing in New Zealand, but the car was eventually located, a spare accumulator fitted, and thanks to the assistance of the Canterbury Automobile Association, was licensed and on the road the same afternoon.

Although tarmac roads exist near the towns the usual highway consists of a fenced gravel track 66ft. wide, deeply furrowed by two sets of ruts. After a misguided attempt to avoid driving in the ruts, we took the easier course, and found that in so doing a certain amount of reduction in the quantity of stones flung up was apparent. On two occasions however these holed the petrol tank and it is certainly advisable on all cars destined for this part of the world to have a netting or wooden protection for this rather vulnerable part.

Apart from once flattening out the exhaust pipe we found the ground clearance sufficient, and a rousing speed could be maintained on the gravel roads without trouble. With a full load 85 m.p.h. was held, and on one of the few tarmac surfaces 90 m.p.h. was achieved. Owing to the large distances over monotonous country which have to be covered, the ability to cover them in the minimum time was a great blessing, and we were very thankful that we had brought the Bentley for the job.

After 5,000 miles in New Zealand we despatched the car once more to its native country, and decided to belie the title of this article by keeping the car another year. It was therefore sent back to the works for its first decarbonisation after 18,000 miles of distinctly hard usage.

Shortly after its return we achieved 103 m.p.h. down a long incline, but as this involved exceeding the makers' maximum safe revs, by about 500 r.p.m., we could hardly be surprised that a valve touched a piston and caused a little internal bother thereby. However, the necessary bits were immediately replaced and we are now anticipating a further period of faithful service.

With the exception of having a thermostat fitted for £10, a modification well worth while, we have not bothered to get any special fitments, as in view of a rumour that a supercharged model may appear at the show, there may yet be a third Bentley for the third year, and if it gives as good service as its predecessors we shall have no cause for complaint.

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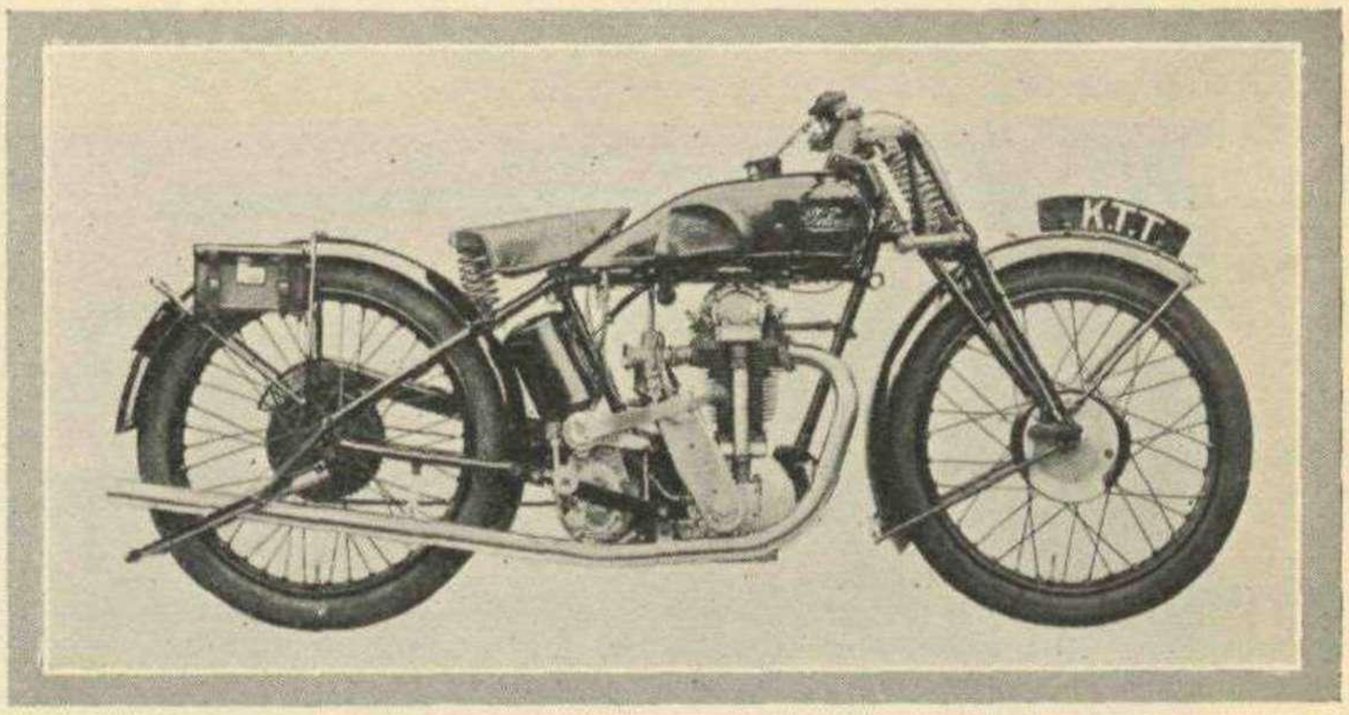
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The K.T.T. Velocette
ON THE ROAD.

By THE EDITOR.



WHEN a manufacturer styles one of his models "T.T. Replica" one is inclined to wonder whether the similarity to his actual I.O.M. machines extends beyond the external features or whether the machine is designed for the benefit of that obnoxious product of recent years, the "high-street" type of "racing" motorcyclist.

In most cases it is impossible by any ordinary road test to ascertain, whether the machine in question is a genuine long distance racer or not, and so the man who wishes to buy a machine with a view to serious speed work is left in the dark as to whether the successful marque which takes his fancy is anything approaching the "same as you can buy."

It is for this reason that our impressions of a K.T.T. Velocette under actual racing conditions should prove of interest to prospective speedmen. Early in this season we had been discussing the question of a mount for the T.T. with Mr. Dunham, of Dunham and Haines of Luton who, as many of our readers are already aware, are distributors of Velocette machines for a considerable area in that part of the country, and it was suggested we should ride a machine entered by his firm. However when Veloce, Ltd. were acquainted with the plan they politely pointed out that they had three entries of their own, whose machines incorporated some experimental modifications and they could not see their way to produce any more "specials," adding however that if we cared to buy a K.T.T. machine and enter it, they could not stop us riding and stating that all entries except their own were also standard models. Such was Dunham's faith in the machine that he decided on this course and the result was that yet another Velocette was numbered among the Junior T.T. entries of this year.

Our first impression of the machine on the road was its amazing smoothness of running, and almost complete mechanical silence. Readers may remark that such features are hardly points of importance on a racing machine and that some harshness is only to be expected. However anyone who has done any long distance racing will agree that mechanical sweetness and good balance play a tremendous part in easing the strain of a long race, and the pleasurable feeling that the motor is quite happy and not becoming "hot and bothered" enables one to concentrate on the business of riding with an easy mind, and really enjoy navigating the machine at speed.

Of course the engine is by no means the only part which must inspire confidence, and we can truthfully say that we have never ridden a fast machine on which we felt more completely at home from the first time of riding it, and every detail of control and position shows that the designer really knows the requirements of a T.T. machine, as few men can know it. One of the features which is of the greatest help in saving valuable seconds is the foot gear-change of the "*one kick-one gear*" type, first introduced by this firm and now widely recognised as an almost essential feature of the modern road-racer.

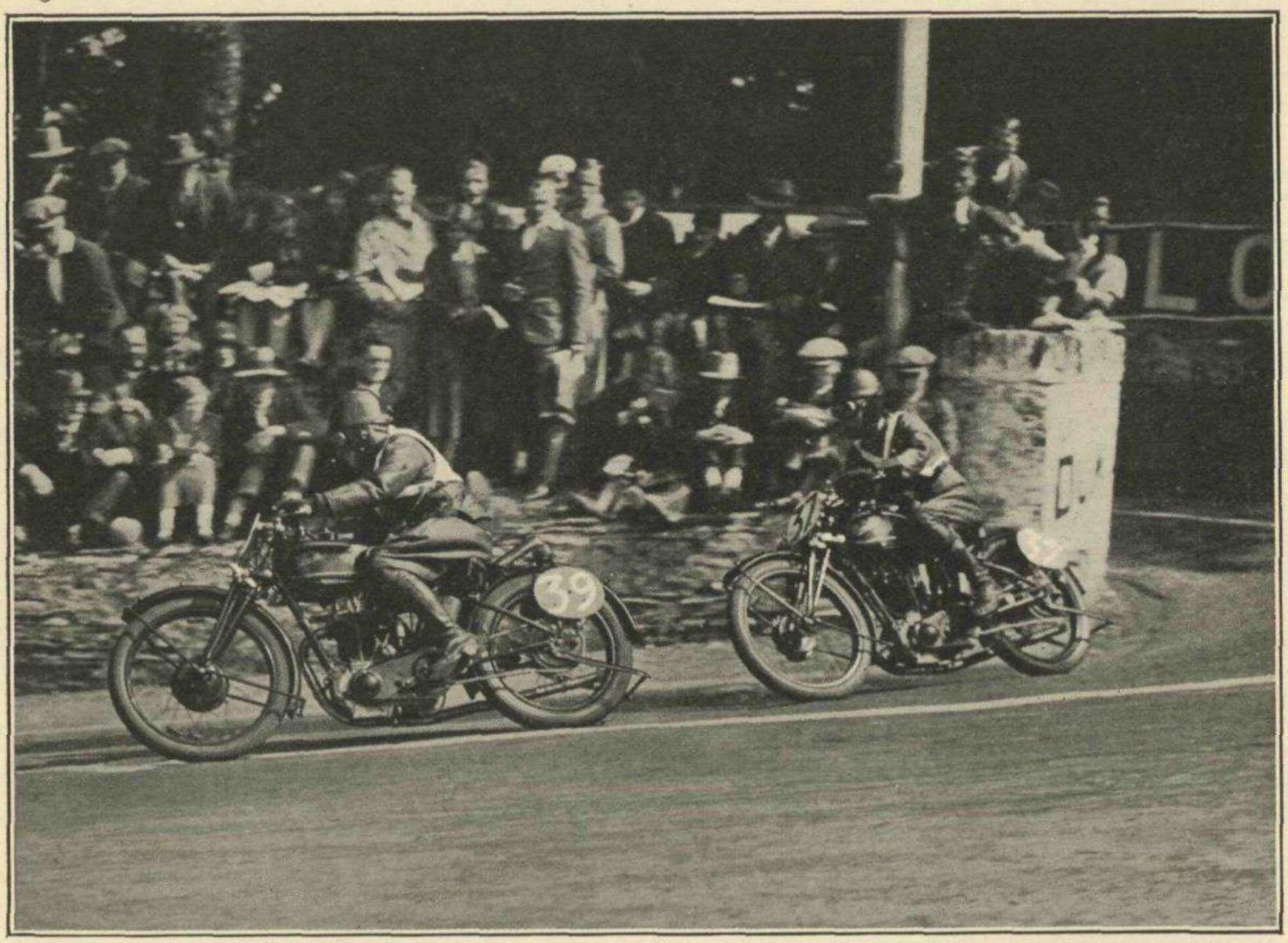
It was only on changing back to a machine with the more conventional hand gear change, that we were able to realise the great amount of time wasted at corners with the old type of control, which a year before we had used without complaint, though we had long been convinced that more than two hands were required if the quickest possible course was to be taken.

When braking for corners with one foot and one hand brake it is necessary to leave go of the hand brake to change gear, and so considerable braking effort is lost and braking landmarks farther from the corner must be chosen. Many people suggest both brakes operated by foot, but although we once regarded this as a solution we are now in favour of hand operation for the front brake as being more accurate than a foot encased in a field boot. Another point is that a foot gear change obviates the necessity for removing a hand from the bars at any time.

The Velocette steering was irreproachable at all speeds but we must confess that at speeds over a mile a minute on bumpy sections or when braking violently, the fact of having both hands in their appointed place on the bars, gives a pleasant feeling of security which does much to keep our brow unfurrowed and our nerves well padded.

Harder men may consider the above points of refinement a trifle irrelevant when discussing a fast motor; but though we have a wholesome respect for those who will cheerfully ride a none too navigable machine all out down Bray Hill holding it with one hand, we have no wish to emulate them; in fact until we rode a Velocette, going all out down Bray Hill except in the actual race was never a habit of ours, and the fact that it became a habit in practice on this machine as well as when racing, and moreover quite a pleasant habit, is a wonderful tribute to the steering and road holding qualities of our mount.

THE K.T.T. VELOCETTE ON THE ROAD—continued.



ALEX BENNETT LEADING S. A. CRABTREE ROUND GOVERNORS BRIDGE IN THE JUNIOR T.T.

By this time we can hear many readers saying " Yes this is all very well but the point is how fast does the machine go ? " and we must tread delicately, for nothing is more subject to rumour and conjecture even among those who should know, than the maximum speed of a T.T. machine. We have heard that Hick's machine, the winning Velocette, had maximum speeds vouched for by sundry knowledgeable persons of varying optimism of anything from 84 m.p.h. to 96 m.p.h. on the level. We can only suggest that the truth lies between these two limits, and in answer to the oft repeated question of " How did the standard K.T.T.'s compare with the alleged " specials " in the island ? " we can only give some extracts from our own experience in the actual race. Practice performances are of course interesting but as no one will ever believe that anyone else is all out in practice, they are not usually considered as evidence.

Soon after 10 a.m. on the day of the Junior T.T. we set off among a band of other hopefuls to attempt to cover some 264 miles of road on a motorcycle, which, as the object is finally to arrive at the starting point again, seems an unnecessary and pointless amusement to the uninitiated though to those who have tried, or even watched it, the T.T. stands alone, and always will, as THE Motorcycling Event.

Not wishing to damage a perfectly good engine by ill-treating it when cold, we took things quietly at first, letting the next competitor behind come past in the first few miles, and refraining from repassing him again until about a third of a lap had been covered, and things being then pleasantly settled down we proceeded to go all out to the best of our ability, and found that the Velocette every now and then caught and passed sundry other machines in a most agreeable manner. (We are not only referring to those which had stopped by the wayside, what time their riders were thinking of a good yarn to spin to the nearest marshal as to their cause of retirement).

However, few are they who can do many laps in a T.T. without being passed, and after sundry scraps in which we found the Velocette could hold its own, we were humming nicely down the long slope to Kirkmichael on our third lap when a new exhaust note became manifest, and Alec Bennett came gently by in answer to our enquiries as to the relative speeds of our machine and those of the works team. Bennett's machine was pulling a slightly higher gear than ours, this being possibly due to his light weight, and the result was that his motor was definitely faster down hill. However once through Michael we were on the level once more, and we were pleased to find that by lying down as far as possible (and no one knows how much it can be done till a real scrap is in progress) we were just able to keep on his tail. So through Ballaugh and Sulby the space between the two machines hardly varied a yard, and at Ramsey we were

THE K.T.T. VELOCETTE ON THE ROAD—continued.

still about 50 yards apart, and for our own part having a most enjoyable and instructive ride, as one cannot race many miles behind Bennett without picking up some useful information about the way of negotiating the I.O.M. circuit. We had expected that we should lose a bit on the mountain climb but after the Gooseneck Bennett took top gear, possibly to save his motor a bit, but we were still in second which suited the gradient perfectly while our opponent was a trifle overgeared, and we proceeded to gain ground.

Alec Bennett, however much he may believe in driving to schedule, etc., is after all only human and when our front wheel drew level with his rear wheel he glanced round, his right foot pressed gently on his gear lever, up went his revs, and he drew gently away to his previous station in our line ahead formation.

Thus across Snaefell, but when we started on the drop down the other side, his higher gear showed its value and he drew steadily ahead all the way to the start, and as we drew up at our pit to refuel he was just leaving his, not to be seen again by us till after the race.

Later Nemesis, in the guise of a patch or sticky tar on a bend overtook us and we performed an unrehearsed broadside, followed by a loop which distinctly marred the showroom finish of our model. The left handlebar was roughly parallel with the fork blades, the tank was split open and our rear brake among other things no longer functioned as the makers intended, as the pedal mounting and footrest had tried to tie themselves in a knot. However a temporary kicking straight followed by a more elaborate attack on things at the pits, enabled us after some delay to join in the fun once more.

One of the next things to overtake us was another Velocette piloted by F. G. Hicks who looked round with a cheerful grin as he passed and disappeared into the distance without further ceremony, proving that his machine was undoubtedly the fastest Velocette, but seeing that his small but vital margin of speed was the result of his own efforts we could only think " Good luck to you," and were not in the least surprised on pulling in eventually after 7 laps to find he had won, at well over 69 m.p.h.

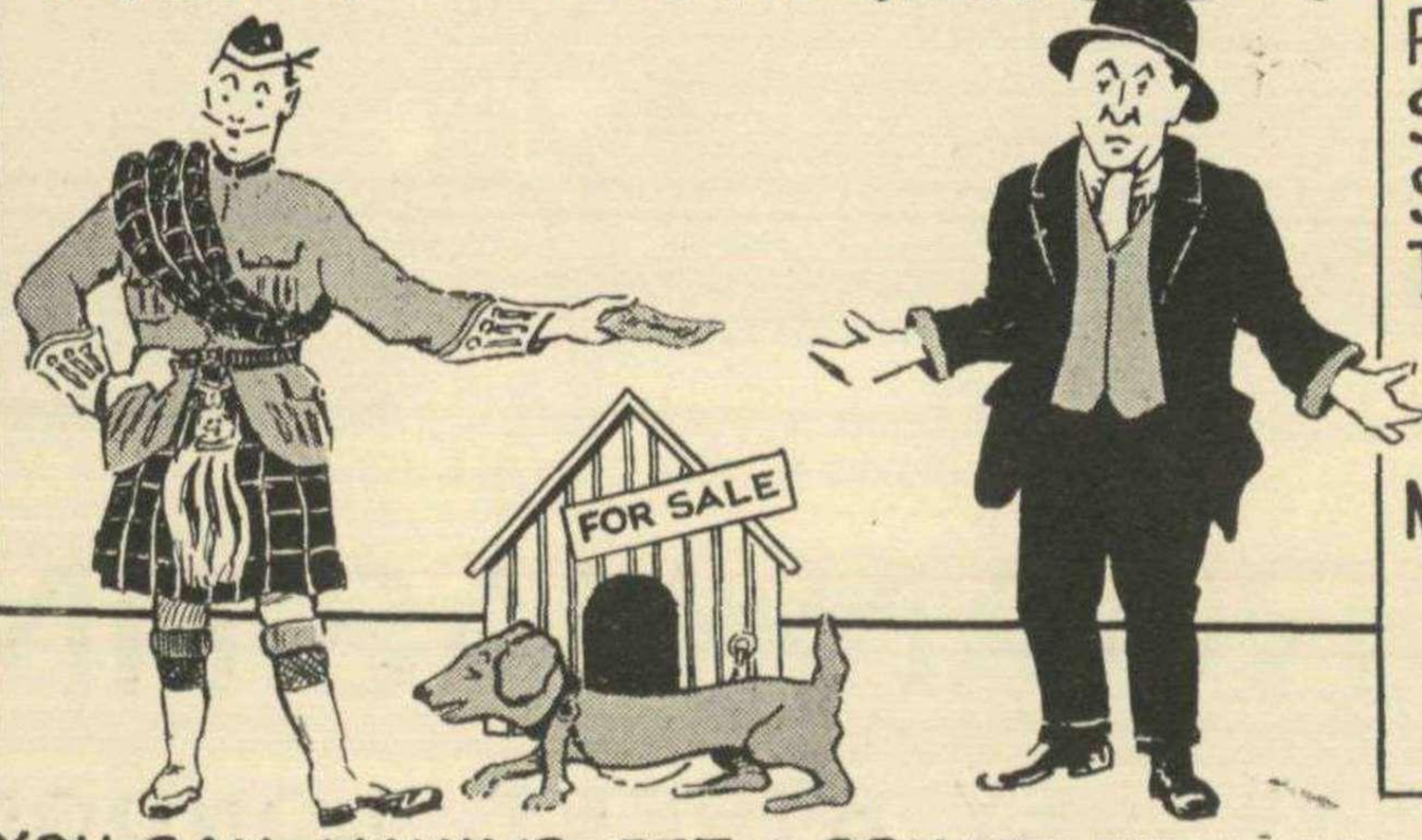
With regard to the actual performance of our own model the engine was still in excellent condition after the race and going nearly as well as at the beginning. The average for the race of just over 64½ m.p.h. is, it is true, nothing remarkable, but it must be remembered that anything in the nature of extensive repairs and extra fill ups are liable to spoil average speeds, and there is no blame attaching to the machine for not getting in sooner. During practice several laps were completed in times under 34 minutes, without any hectic moments, while the fastest laps in the race which included pulling in at the end of it to fill up, was 33 minutes 11 secs. or a fraction under 69 m.p.h. which for a machine which can be purchased by anyone for £80 is we think a performance which cannot be complained of. No trouble was experienced with any part of the machine during the whole of practice, with the exception of the brake linings which were inclined to spread, and this trouble

(*Continued on page 18*).

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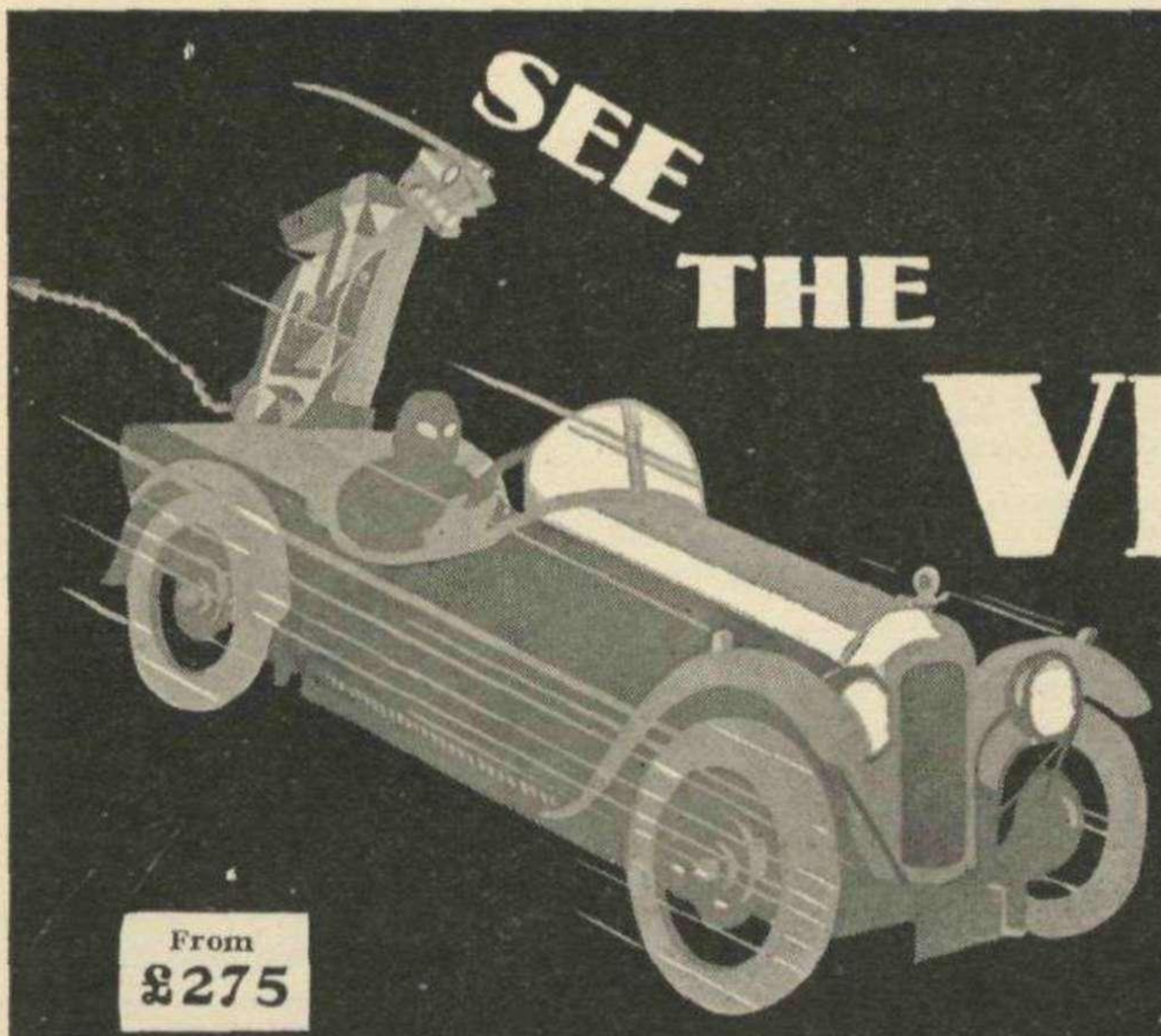
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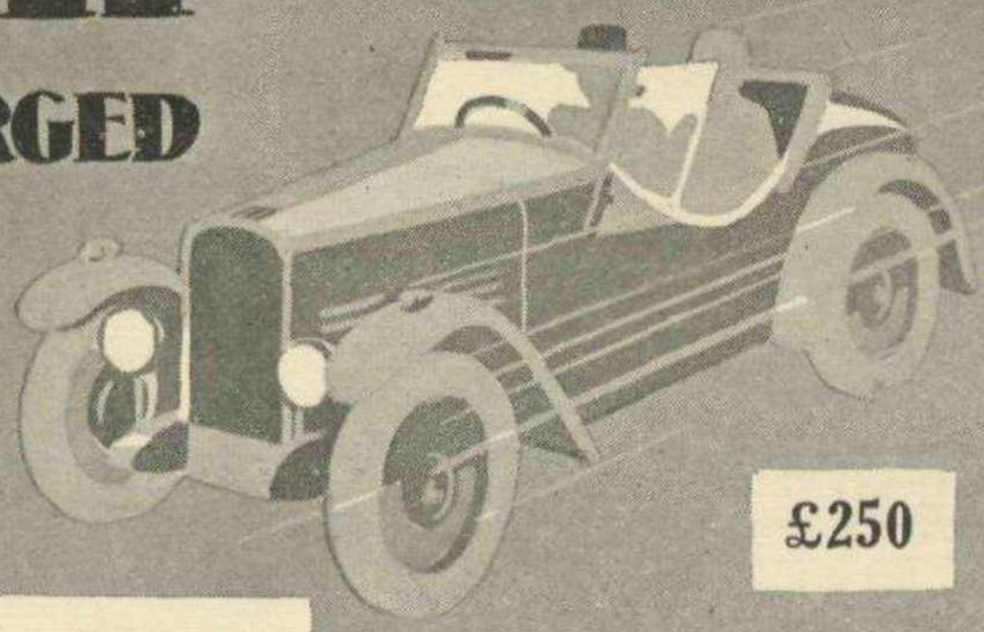
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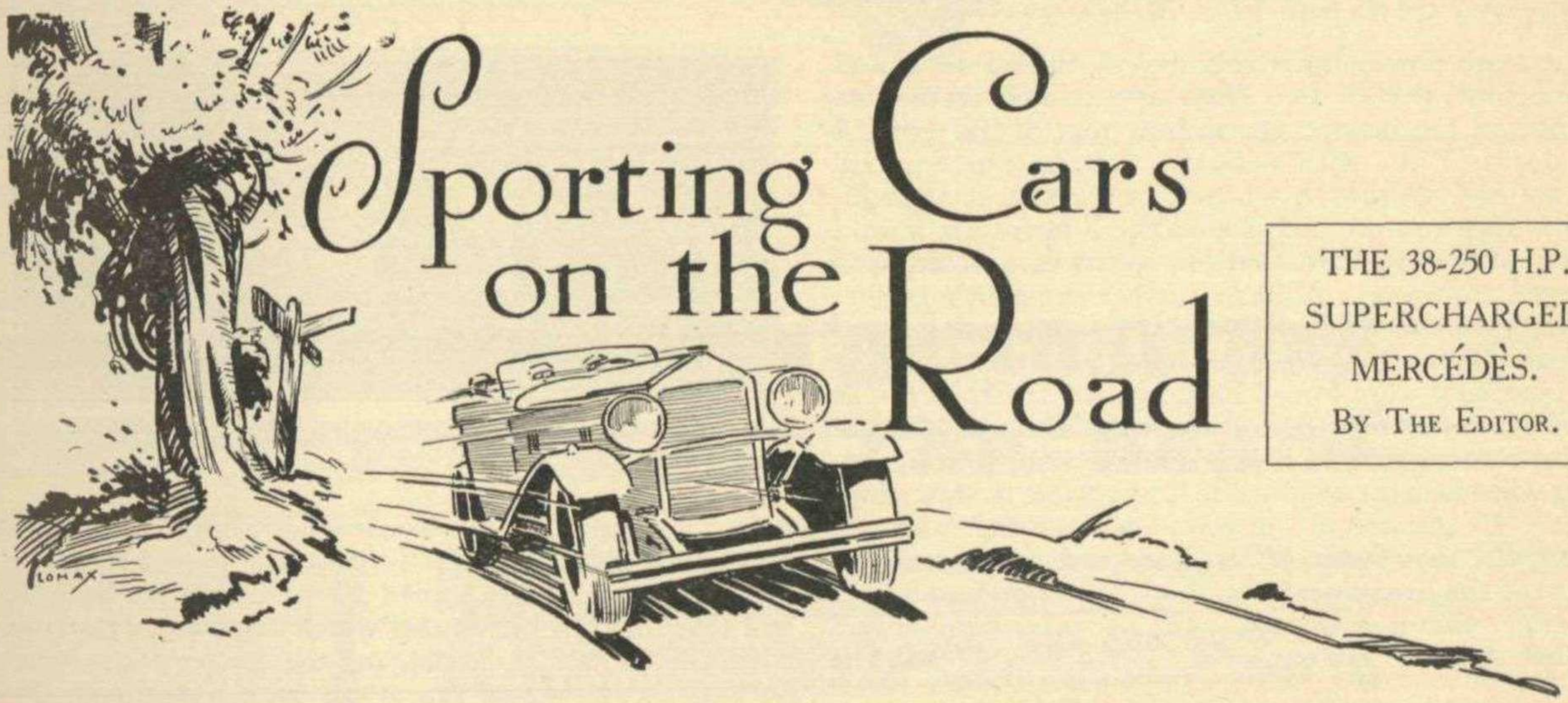
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Sporting Cars on the Road

THE 38-250 H.P. SUPERCHARGED MERCÉDÈS.

BY THE EDITOR.

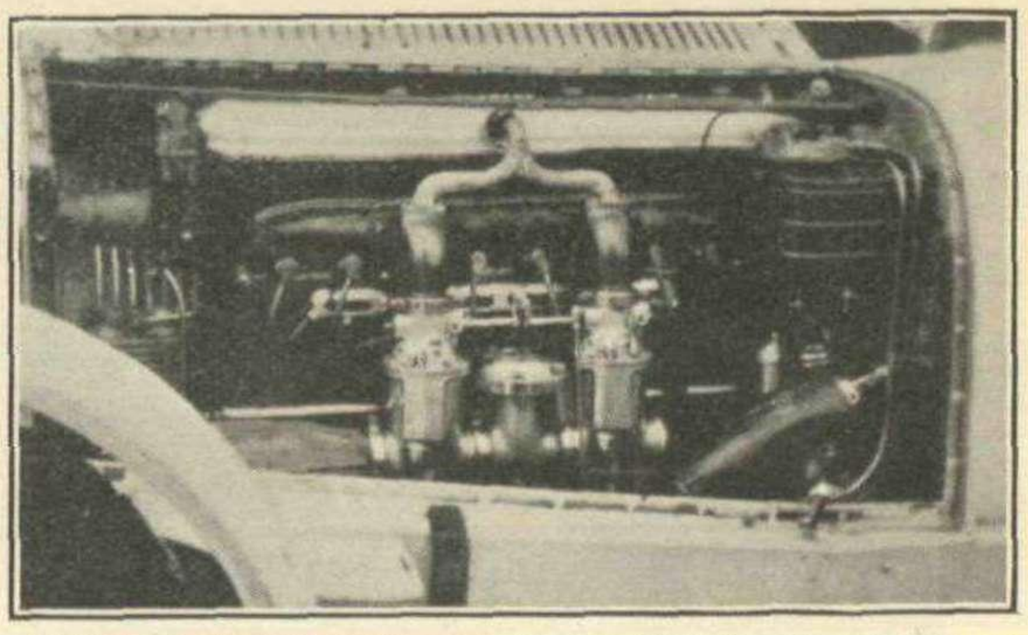
NOT long ago we were present at a motoring club dinner, and after the health of the club had been proposed in a very flattering manner by some eloquent stranger invited for the purpose, the somewhat embarrassed secretary rose to reply, Supporting himself both morally and physically by clutching the edge of the table firmly with both hands he delivered the following speech, "Er—Mr. Chairman, Ladies and Gentlemen.—Words fail me!" and resumed his seat amid tumultuous applause.

On commencing to set down our impressions of a run in the famous Mercédès in which Herr Carraciola recently won the Ulster Tourist Trophy, we cannot but envy our friend for the easy way in which he got out of a difficult task. However there is no such simple solution for us and we must attempt to convey with an inadequate pen, what can only be fully realised by actual experience at the wheel of the most amazing motor car it has ever been our fortune to drive.

Through the kindness of Earl Howe, who has now become the owner of the vehicle in question, we arrived at the Mercédès-Benz showrooms in Davies Street to find the famous white car waiting for us. We took the passengers' seat while Mr. Garman of Mercédès took the wheel and gave us an excellent demonstration of the handiness of the big car in London traffic, and also showed that the wet streets left by the morning's showers appeared to have no effect whatever on the stopping ability of the servo brakes, which pulled us up as violently as required without a sign of locking a wheel or deviating from the straight.

Once out of town we changed places with a view to finding out for ourselves whether the rumours of speed and power of the latest "Merc" were well founded. During the early part of our test the roads were still wet and we had some fears that it might be inadvisable to try and find out what was really possible in the way of speed. However a few minutes at the wheel sufficed to show us that although the Mercédès is a big car in actual size, it handles in every way as well as the neatest little road-racer ever built. When about two years ago we first tried the 33/180 h.p. model we realised that the firm undoubtedly held the secret of building a car of terrific power combined with absolute reliability. However, good car though that certainly was, we found that at 100 m.p.h. on an ordinary road the holding of it was a definitely full time job for both hands, but driving the latest effort soon explained to us why so many people who witnessed the Tourist Trophy stated that the Mercédès cornered on the wet roads "as if on rails." In fact the only trouble due to the wet roads was the fact that bringing the supercharger into action merely produced wheelspin even in the top gear of 2.75 to 1, which will serve to give some idea of the colossal power at our disposal.

For the benefit of those not already familiar with the principle of supercharging used on the Mercédès, we should mention that throughout the normal movement of the accelerator up to full throttle atmospheric induction is employed, but on depressing the pedal still further the blower is engaged by means of a clutch and the mixture is then fed to the cylinders under pressure. This system has a great advantage for ordinary road work over the continuously operating blower from the point of view of quietness and reliability, and alone makes it possible to build a car with a speed range on top gear from a little over walking pace to close on two miles a minute.



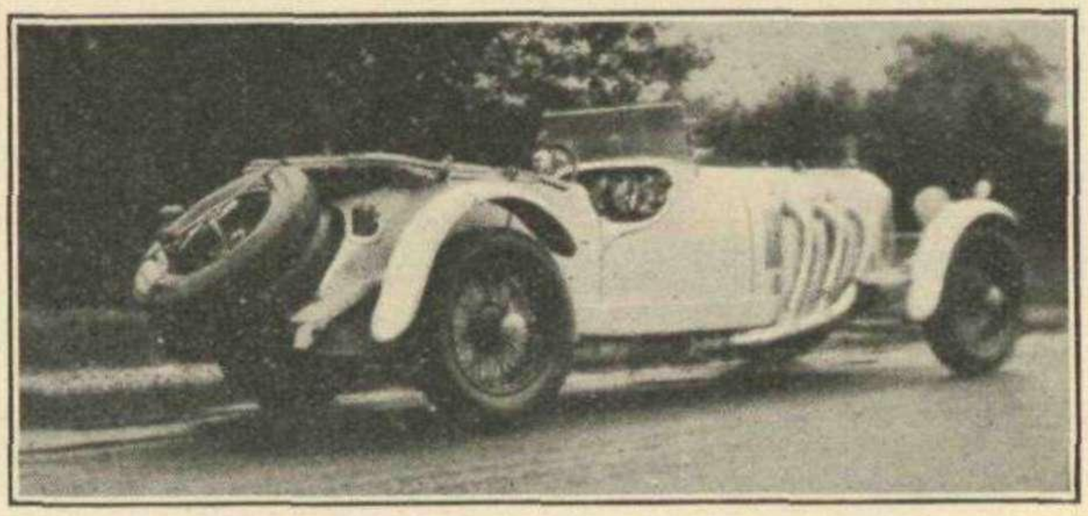
THE MASSIVE POWER UNIT, WHICH COMPLETELY FILLS THE SPACE INSIDE THE BONNET.

SPORTING CARS ON THE ROAD—continued.

The roads now being nearly dry we turned north and on the first stretch free from appreciable traffic, we stepped on the blower, the mellow roar of the exhaust was drowned in a shrill scream ; the car leapt forward and we had to shut down and brake almost immediately. However we had passed the 3-figure mark on a stretch of road so short that few sports cars would have engaged top gear. A little further on another more inviting piece of road presented itself and from a speed of about 45 m.p.h. without changing gear we again gave full bore, and were forced hard against the back of the seat by the terrific acceleration, while the whine of the blower rose higher and higher, and we were still accelerating when a slight bend made it advisable to slow down again. We glanced at our passenger who had been following the movement of the huge rev. counter in the centre of the instrument board. "Three thousand, two hundred, that's supposed to be maximum revs." "What speed ?" we enquired. "114 m.p.h." was the reply.

By this time we were thoroughly intrigued with this modern and very refreshing magic carpet, and the next few miles were covered at speeds which put quite a new interpretation on our previous ideas of road distances. There are many who may hold that high speeds on the open road are unsafe, and we agree that in many cars we have driven, half the speed of the Mercédès is dangerous. but on a car with steering such as this and brakes with which the merest caress of the foot is sufficient for all normal needs, it is definitely safe and easy to *average* speeds of over a mile a minute on any reasonable open main road run.

The gears are admirably chosen being very close, and the change is easy to operate. Upward changes can be effected with only a very short pause between the ratios,

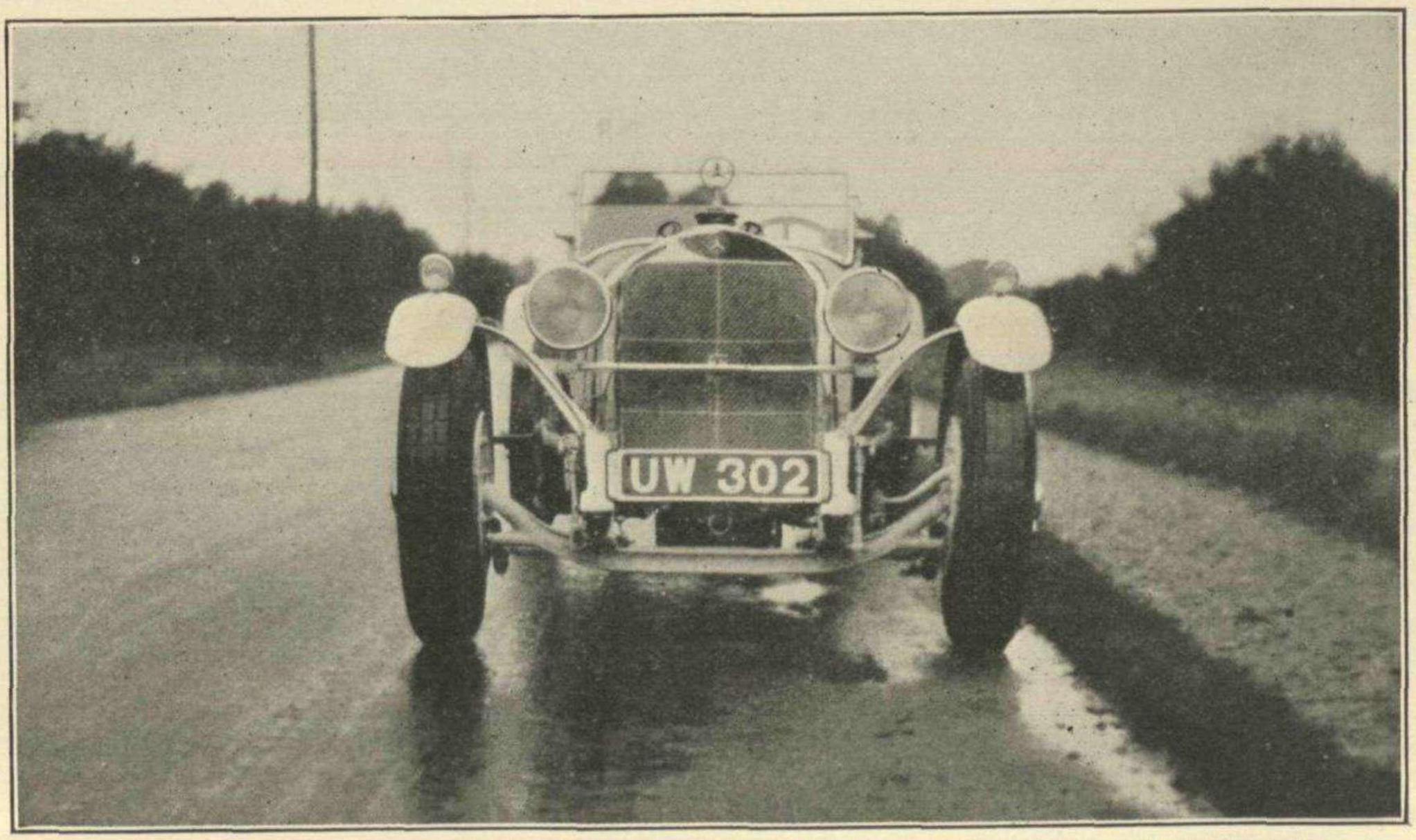


THE VERY LARGE BRAKE DRUMS ARE A PROMINENT FEATURE.

with the result that the acceleration using the gears is absolutely phenomenal. Without the blower in action it is greater than any sports car we have ever been in, and there are few racing cars which could equal it, while with the blower in action on the lower gears—well, nothing but an actual run in the car can give any idea of the power developed by the 7-litre engine of the latest Mercédès.

After a halt for lunch on our test we again boarded the car and set off for home, making at the same time a mental reservation of our only criticism of the Merc, and that is that it is not a very easy matter to get in and out.

This was largely due to the fact that the writer is somewhat above standard size, but owing to the lowness of the steering wheel and the fact that the body is merely cut low at the sides of the front seat instead of being provided with doors, it is likely that anyone would find the same trouble to a lesser extent. The seating is extremely comfortable however and the road-holding at high speeds is such that the motion is entirely free from that hammering which is the chief cause of discomfort



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¶ On July 12, at Dublin, it was class winner in the Irish Grand Prix, at an average speed of over 60 m.p.h.

¶ On August 7-11 a team of German-built Austin Sevens carried off the Gold Cup as team winners in the International Alpine Trial, covering 1,650 miles, which included the Stelvio, the St. Bernard and the St. Gotthard Passes.

¶ On August 17, by gaining 3rd and 4th places in the Ulster T.T. against fierce competition from some of the most powerful cars in the world, the 'Seven' showed its tremendous stamina and reliability and worthily upheld the prestige of British engineering.

¶ On October 12, in the Brooklands 500-mile race, an Austin 'Seven' was winner in Class I at an average speed of over 80 miles an hour.

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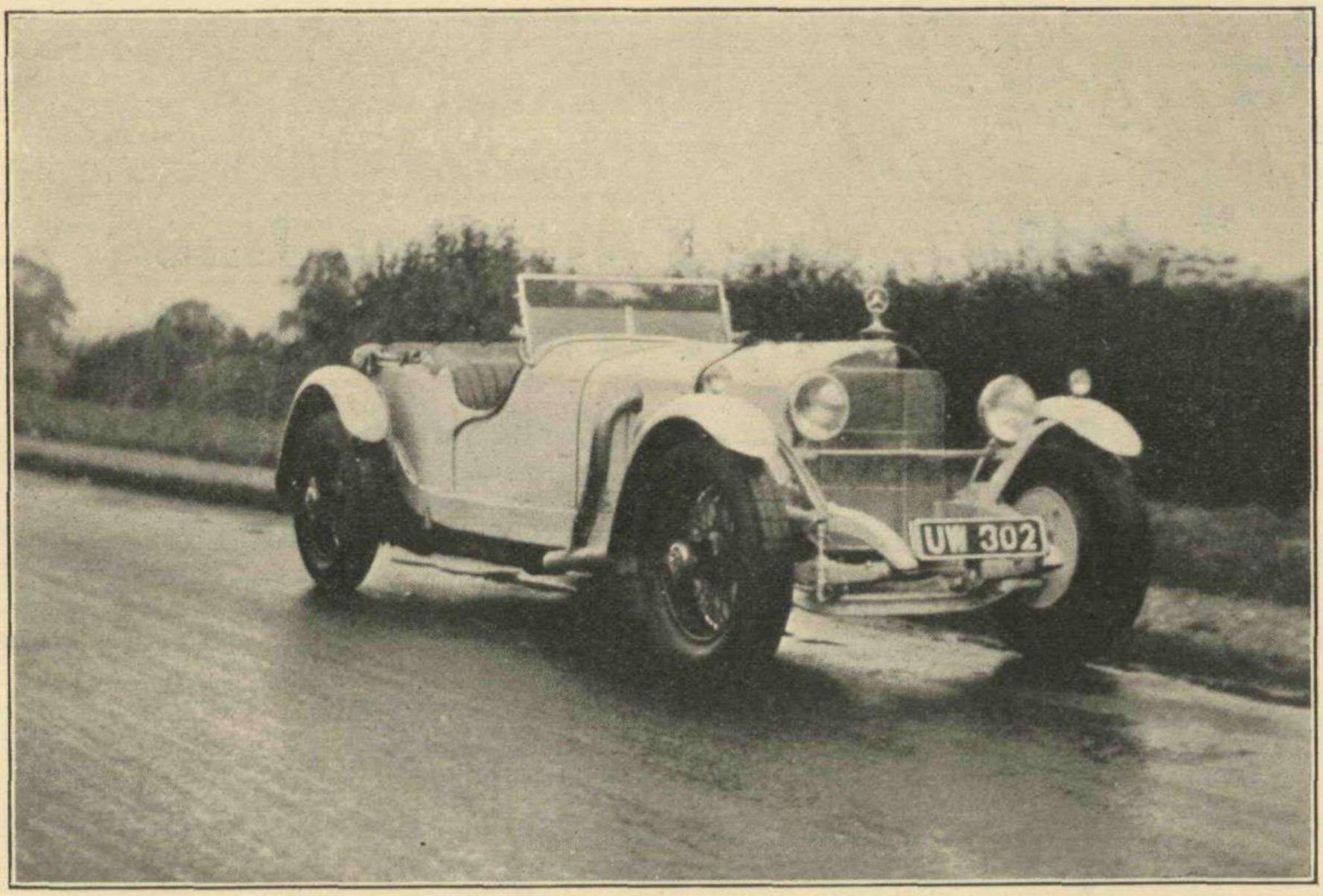
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SPORTING CARS ON THE ROAD—continued.



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in many harshly sprung racing cars, whose speed however is well below that of the Merc.

On the way back we kept up a more consistent pace and found that a very comfortable cruising speed of 70 to 75 m.p.h. could be maintained on the merest whiff of throttle, while not more than half throttle was sufficient to hold over 90 m.p.h.

Another instance of the astonishing power of the brakes was provided when a long, slightly up hill straight was being dealt with to the tune of 110 m.p.h. and the familiar red triangle of a hidden cross-roads loomed up in our path. We applied the brakes from full speed, and without a tremor in the steering or a squeal from a tyre, our speed was reduced to less than 10 m.p.h. well before the required point, we trickled gently over the danger zone as a good motorist should, and then without bothering to change down we were up to the century mark again in a few seconds!

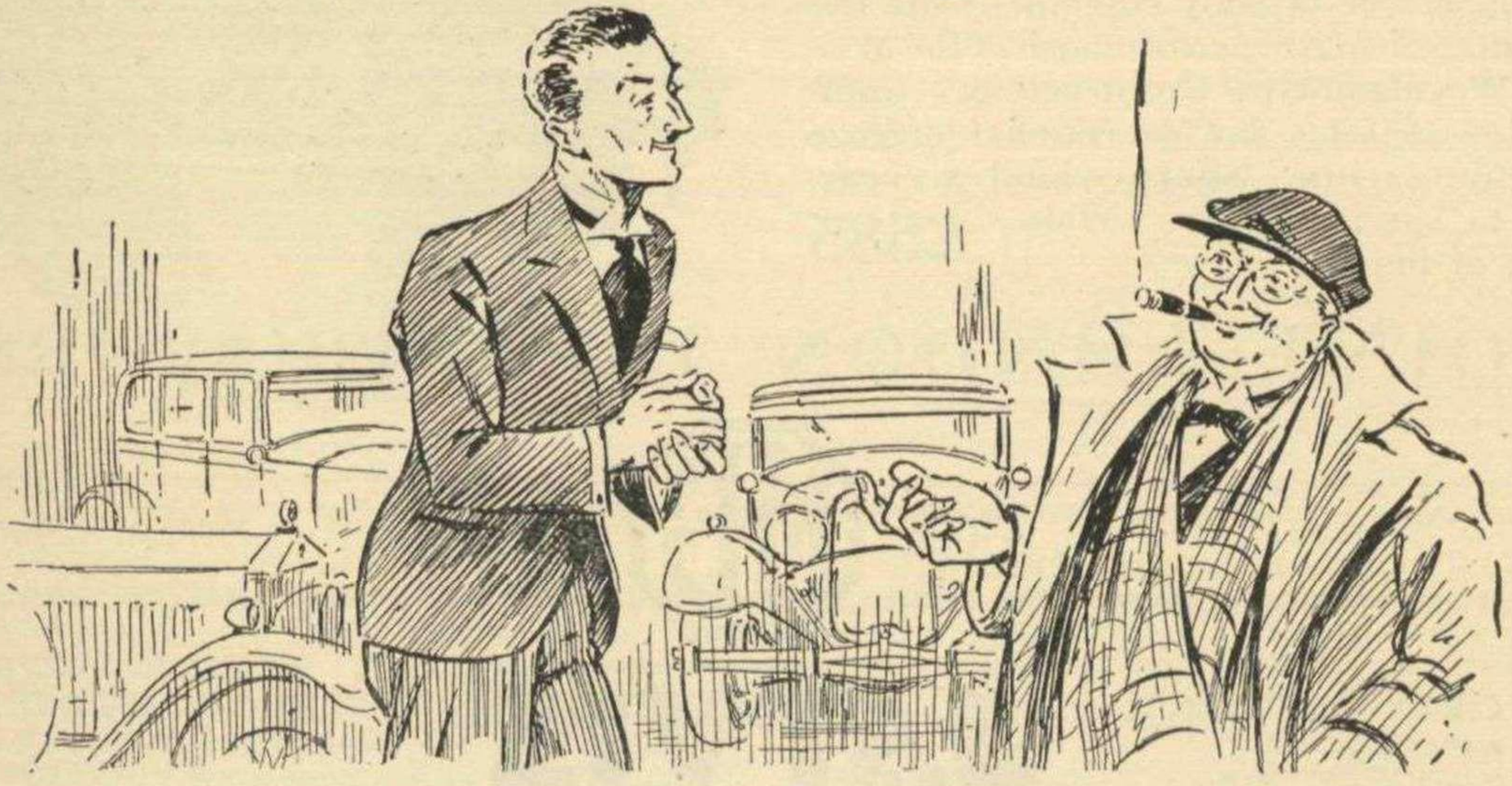
This property of low speeds on top is one of the outstanding features of the car and it will potter gently through traffic at 8 m.p.h. on this ratio without a sign of roughness, and if the spark is retarded will pick up from this speed without any fuss. In fact its extremely sober behaviour when once more back in the congestion which is London left nothing to be desired and when we regretfully pulled up in Davies Street nothing but its wonderfully impressive appearance suggested its amazing performance on the open road.

THE K.T.T. VELOCETTE—continued from page 13.

was obviated by changing to the product of Brake Linings Ltd., and it never recurred, and the machine was always a pleasure to ride at touring speeds as well as fast, a point to be considered by the man who wants to use a machine on the ordinary roads without having the annoyance of driving an intractable and noisy engine.

However further comment on the suitability of the K.T.T. for the amateur speedman is rendered superfluous by the fact that the Junior Amateur T.T. was this year also won by one of these machines, with several other Velocettes to chase the winner home.

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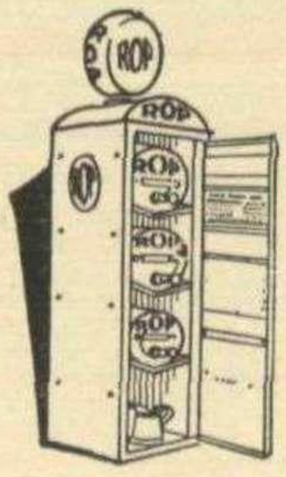
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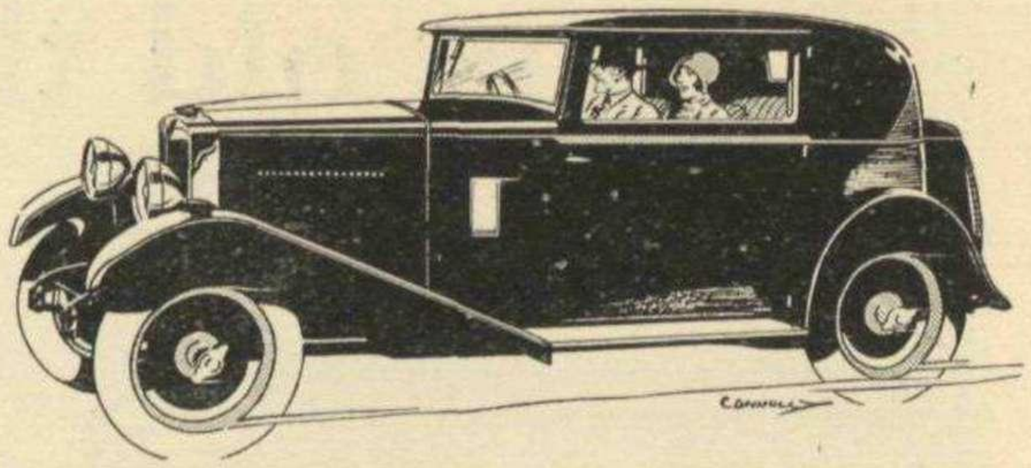


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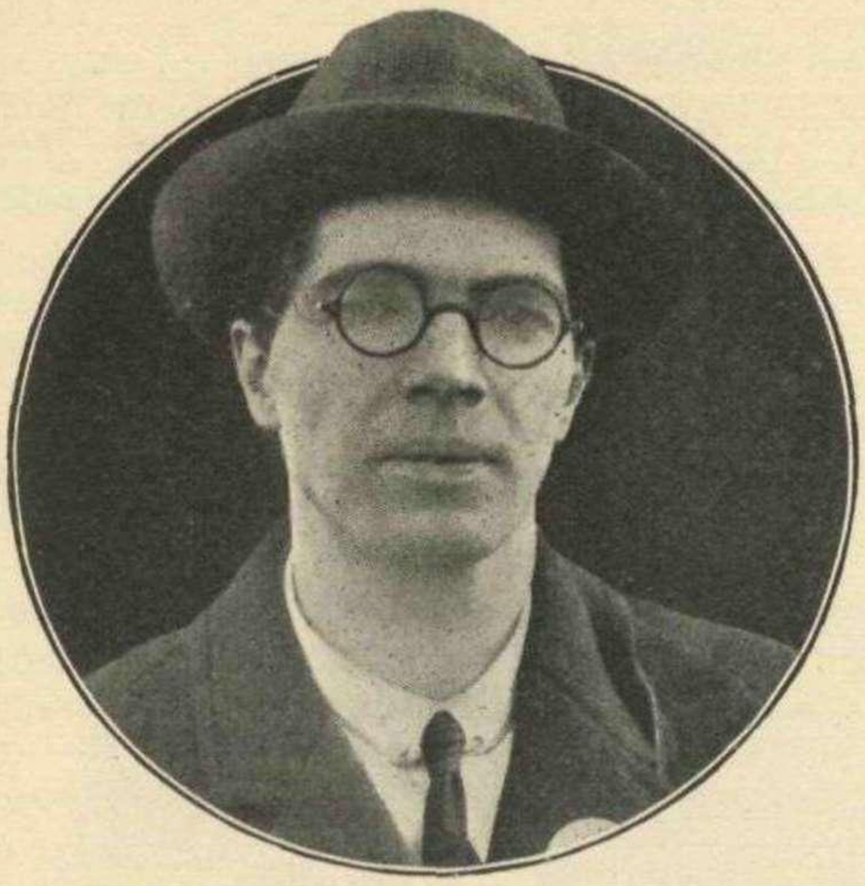
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"BROOKLANDS REMINISCENCES"

and other memories of the "good old days."

By

Prof. A. M. LOW, A.C.G.I., D.Sc.

Prof. Low is Chairman of the Junior Car Club, Vice Pres. and Vice Chairman Auto Cycle Union, Vice Pres. British Motor-Cycle Racing Club, Chairman Motor-Cycle Tech. Committee R.A.C., Pres. Surbiton Motor Club, Pres. S.E. Centre A.C.U., and S.W. Centre A.C.U. He has judged the T.T. and the Six Days Trial for many years.

FEW things annoy me more than the open-air fiend who makes a point of his adherence to historical and barbaric methods of sport.

He, or worse still she, will slap you on the back in the middle of a cold morning and talk brightly of football, tobogganing, and blood. It is easy to understand after a few minutes conversation with this species how it comes that the French typified the Englishman's comment, "It is a fine morning, let us kill something."

I suggest in all sincerity that the vast majority of alleged sports are mere excuses for the obtaining of business under the guise of the amenities of social life.

Now motor and mechanical pastimes are totally different. They are more developed from the days of woad and skins. It is interesting to talk to a racing man in the automobile world for he has the same experience of human nature, the same irritating difficulties to overcome, which are thrown into his path by chance, and above all he is employing his intelligence to conquer something of far greater standing than an attenuated dog or a pathetic rabbit.

It seems to me that motor racing on sea, land, or air has all the advantages of other games without their inanities and artificiality. Most competitions which are designed to demonstrate brute force are obviously remnants of the days when preparation for war was considered useful.

The engineering enthusiast is a man who would rather despise the possession of wiry legs or exaggerated biceps for he would tell you that by the product of his own intelligence he can greatly surpass the performances of either of these bodily items.

Mechanical sport is extraordinarily useful. It is due almost entirely to the racing motor cyclist that the modern aeroplane won its conquest of the air. The engine of many a famous 'plane is little more than that of a motor-cycle multiplied by an odd number of cylinders; the motor unit of a fast Diesel ship resembles nothing so much as a motor-cycle over-head valve engine seen after a dream that Brooklands had been lapped at one thousand miles per hour by an engine which has fired once in the process.

On any Sunday afternoon it is possible to see innumerable motor-cars upon the Portsmouth road. (Indeed little else can be seen in these days of charabancs and R.A.C. Inns). On all these cars exists a collection of ideas which serve to-day to transport Dick, Tom and even Harry when yesterday front wheel brakes, overhead cam shafts and aluminium heads were the cynosure of all eyes at the preparations for a race.

I believe that the reliability of taxicabs is attributable to racing, and I would dare to suggest that the alleged superiority of many French motor-cars was largely due to the racing experiences which their drivers could enjoy while our authorities were wallowing in red flags and police.

I have little patience with those who explain each year that speeds have reached a maximum and that racing has now become dangerous. There is no such thing as maximum speed for if you plot a curve indicative of T.T. time, Brooklands laps, or the average speed from London to Brighton after midnight, you will find that it has risen steadily for a decade and that this happy tendency is far more likely to continue than to stagnate.

The only difference between ourselves and Man Friday is that we act, think, and travel more quickly. No one wishes to secure safety at the price of speed. Everyone is willing to pay in order to save a few moments on the Atlantic crossing just as a newspaper will go to unlimited expense in order that by direct competition it may race pictures to the spot a few minutes before its rivals.

There is a moral due to that fact for time is one of the very few facts of which we can hold any feeling rather than an opinion. The test of these telegraphed pictures is a test covering every detail of production, distribution, and reading. This is the very reason why it is not sufficient to fasten an engine upon a bench and to say "Horse power is now at a maximum, we shall win the race, our machine will please the public."

There are countless details of frame, balance, brakes, vibration, carburation and ignition which may all give service under laboratory conditions but which at speed will fail in half a lap. It is not absurd to push an inlet pipe or to discover a cam which a tappet will follow when springs are hot if by an amendment of this design Jim Jones can be given a motor which will stand ill usage and which will perform its 5,000 miles at the equivalent of 50 miles at speed in the hands of a Denly or a Davis.

"BROOKLANDS REMINISCENCES"—continued.

It has been my good fortune modestly to assist at trials of every description for over twenty years. I have seen disputes fought out on the track, carried to the bitter end at a Steward's Meeting and settled after two years by an engine designed for the one purpose of wiping the floor with a rival.

How well I remember Cyril Pullin after finishing the T.T. upon a belt-driven machine pushing wearily to the tent with a gaping hole in the side of a silencer, or so it seemed from a distance. I will never give a decision as to whether a violent kick successfully sealed the gap or not for I believe that not every point should be noticed by a really qualified observer.

I try to remember the amusing details of a six days trial in which an eminent rider whose name shall be barred insisted upon throwing a parrot out of the window of an hotel.

I have seen a rider finish a continental race in the full knowledge that much of the distance had been covered by rail, I have watched side-car passengers pouring oil into gashed crankcases which were tied up with straps until the moment of official examination.

I have listened to innumerable noises behind hedges and from ditches, I have even been kind to competitors who see fit to tighten their cables before a brake test to a point when pushing a machine upon the level became an impossibility.

VERY HARD LUCK.

Perhaps Gus Kuhn had the unluckiest experience for after a trying six days of misery I noticed so many flies stuck to his crankcase that I suspected petroil lubrication. I was right. The oil tank had leaked badly into the petrol compartment.

In days when accumulators leaked through tanks, when machines had to be pedalled, when rear driven motor-cycles buck-jumped over bricks we used to argue as to the advisability of placing vaselene on contact breakers.

I have seen men argue as to the size of an engine which turned out to be over one centimetre in excess of its alleged diameter. The excuse of the rider who claimed that he was looking for a medal which he had dropped in the road when in fact he was waiting for the trade van behind the hedge to mend his frame was no better than that of a competitor in a foreign car competition who turned up with an obvious weld on his chassis and explained that he had been seeing some of the beautiful districts round about.

It has been my lot to travel in a judge's car which was full of spares for one of the teams. I have seen three riders in succession win ballot for nos. 1, 2, 3, and yet I retain my interest in sport.

Petrol consumption competitions provide much humour to those who pour lubricating oil into air inlet pipes and who linger by the wayside to blow up bladders or to fill tanks with stones.

Probably the greatest humour lies with the rider upon the trial from which spares were prohibited. Every morning at the hotel could be seen parcels, socks and underclothing of course, until our friend walking with his parcel of collars and ties dropped it with a resounding thud of obviously plugs, valves and springs.

Brooklands has been responsible for much humour, but still more progress. Who could doubt enthusiasm after Mr. George Brough had landed—well, landed in such a manner that a mackintosh was necessary before he could approach the grand stand owing to the almost entire absence of nether garments, only to realise his quiet determination to win the next event.

It is not everyone who like Reuben Harveyson could hit the Brooklands saucer, bound over the edge and return to argue the merits of a sparking plug. Few followers of the hounds would like to drive half a lap with a leg on fire, and none of them would push a 300 lbs. machine from Governor's Bridge to the finish in the Isle of Man until, like Cyril Williams they fought with the Marshals who tried to persuade him that he had won at last.

I have learned much of the philosophy of life from the tents which conceal the final examination and the weary competitors from the gaze of a public who have yet to learn the difference between one mile on the cinders and one hundred all out upon the road or track.

I have seen people deliberately dive from a machine to avoid injury to a deadly rival. From my own car I have watched ladies dive into a hedge with an impression of celanese, and I also have damaged my George Brough from the flashing boiler of a steam driven two-wheeler.

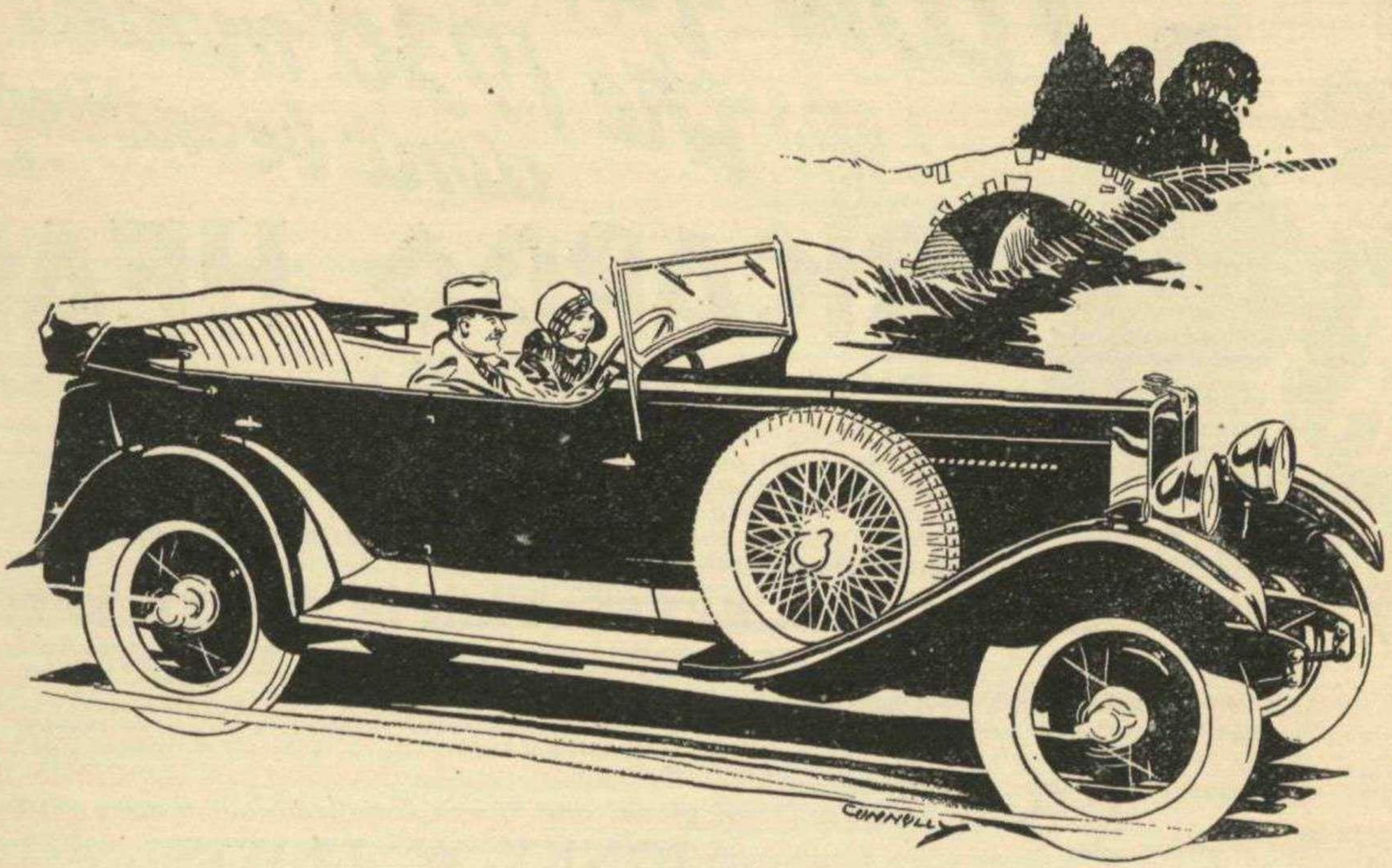
All this is real sport for it represents the advances made in one of the few trades in which Gt. Britain excels. It indicates far better than any collection of muddied oafs that the most dangerous and important sport of all is still safely in the hands of the finest set of men that any country could produce.

I am proud to say I have never been so foolish as to disturb myself over such nonsense as seems to break the heart of those who believe trade to be a crime. The genuine amateur is as difficult to find as a snowball in an exhaust pipe for he soon learns that a knowledge which enables him to compete with success is quite justly worthy of recognition. To-day I do my racing on the bench and through my microscope, but I would still be less interested to know that I could win a race for three legged men under artificial conditions, than by how many seconds, minutes, or hours per lap I fail to reach the time of Lacey & Company Unlimited.

AN EXACTING TEST.

The other day we carried out an interesting experiment with the object of proving a claim put forward by the makers of Jubilee "worm-drive" clips. We took a piece of hose with an inside diameter of 2¼ins. and fitted it to the bottom water joint of a radiator which has 2 in. water pipe, and using a pair of Jubilee clips, tightened them down hard with a screwdriver. Somewhat to our surprise the joint proved perfectly watertight at each end, and although it was done purely as an experiment, we have been too lazy to refit the correct size hose, which we had expected to be necessary for making a sound joint.

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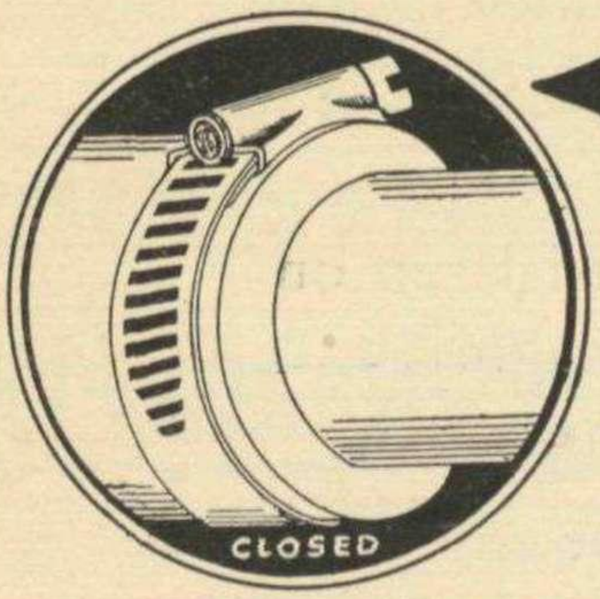
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CLUB NEWS

Junior Car Club—Members of the Junior Car Club take to the air.

TWO of the "Argosy" type air liners used on the London-Continental routes by Imperial Airways, Ltd., were engaged, on Saturday last, in taking Members of the Junior Car Club on sight-seeing cruises over London.

Six flights were carried out in these monster liners (each carrying twenty passengers) during the afternoon, and those who made the trip had the novel experience of seeing London from the air whilst they were travelling in saloon car comfort.

Members of the Club were also conducted around the Air Port during the afternoon, and were introduced to many features that contribute to the high state of efficiency of modern air travel.

In the evening a Dinner and Dance, held in the Aerodrome Hotel, served to wind up what was probably one of the most interesting and instructive visits ever carried out by the Junior Car Club.

On Saturday, November 2nd, the Junior Car Club is holding a Half Day Trial in Surrey. Whilst not of a "destructive" nature, the course will be of a sufficiently exacting nature as to call for some good driving on the part of the competitors, and the indications are that the event will prove as popular as any of its predecessors. The Trial, which starts at 1 p.m., is restricted to Members of the Junior Car Club. In the evening a Dinner and Dance will be held at Burford Bridge Hotel. Full details of the event (together with details of membership for non-members) may be obtained from the General Secretary, Junior Car Club, Empire House, Thurloe Place, S.W.7. (Phone, Kensington 1294).

West Kent Motor Club.

The third Inter-Club social run, held on September 29th was a great success, a large party of members of the Brixton, Sydenham and West Kent clubs making the journey to Ashdown Forest. In the afternoon several competitive events were held, including a T.T. race, a "slow" race and a freak hill climb, after which the party adjourned to the Henry VIII. at Hever for tea.

At a recent committee meeting many suggestive ideas were discussed and as a result an attractive winter programme will be arranged. Included in this will be social evenings, dances, dinners, theatre party, etc.

Liverpool Motor Club.

The re-run of the competition for the Sir Leslie Scott Trophy was certainly a trial. A circuit of 40 miles from Ledsham to Llangollen and back over by-roads and hills had to be covered twice and what with the wind, the rain and the sleet it was wonderful that the finishers numbered thirty. Tales of the thrilling rides up Maes-y-Safn and down the Old Horse-shoe pass will be told for many a long day. Some of the car competitors started off with their hoods up but soon furled them on the moors when there appeared to be distinct possibilities of the wind lifting the vehicles completely off the ground. The results will be awaited with more than usual interest and those who do get awards will most certainly have earned them.

Berkhamsted and District M.C.C.

On September 22nd a combined Treasure Hunt was staged, starting from the Cromwell Hotel, Stevenage; fifteen members took part, and the final clues resulted in a very vigorous two hours' work on the part of Messrs. Gough, Rust and Cubitt, the last-named eventually running the treasure—£1 in threepenny pieces!—to earth.

Cookstown and District M.C.C.

The Committee has decided to secure a new course for next year's road race, the distance of which will probably be increased from 70 to 100 miles. The proposed circuit is much faster than the old one and passes through the main street of the town, while there are several other good "straights."

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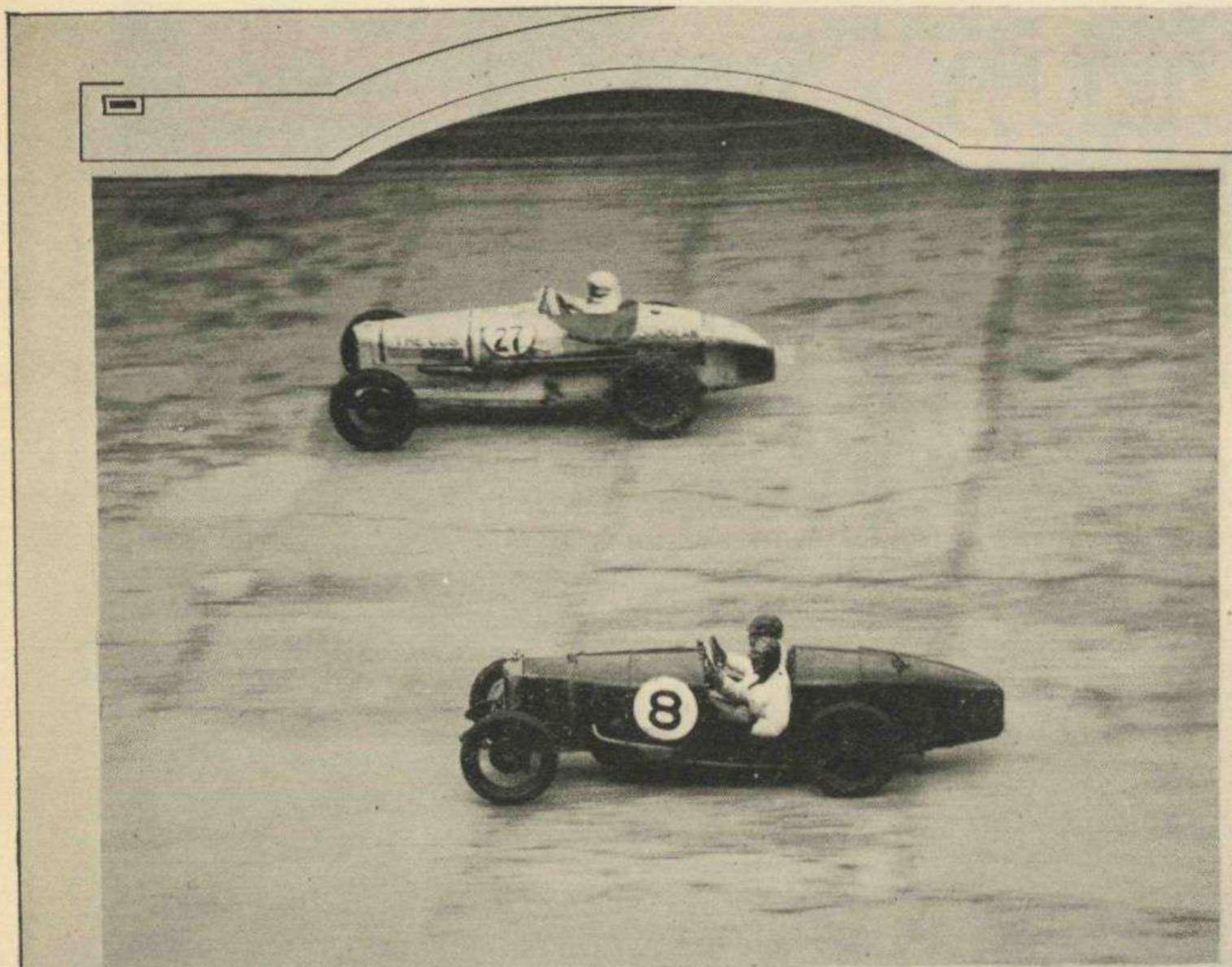
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E. MARTIN (RILEY) AND G. E. T. EYSTON (SUNBEAM) IN THE RECENT 500 MILES RACE AT BROOKLANDS.



THE SCOTT TRIAL. T. CORKISH



MISS EVERETT (BAKER) TAKES TO A DISUSED QUARRY TRAM TRACK IN THE SCOTT TRIAL.

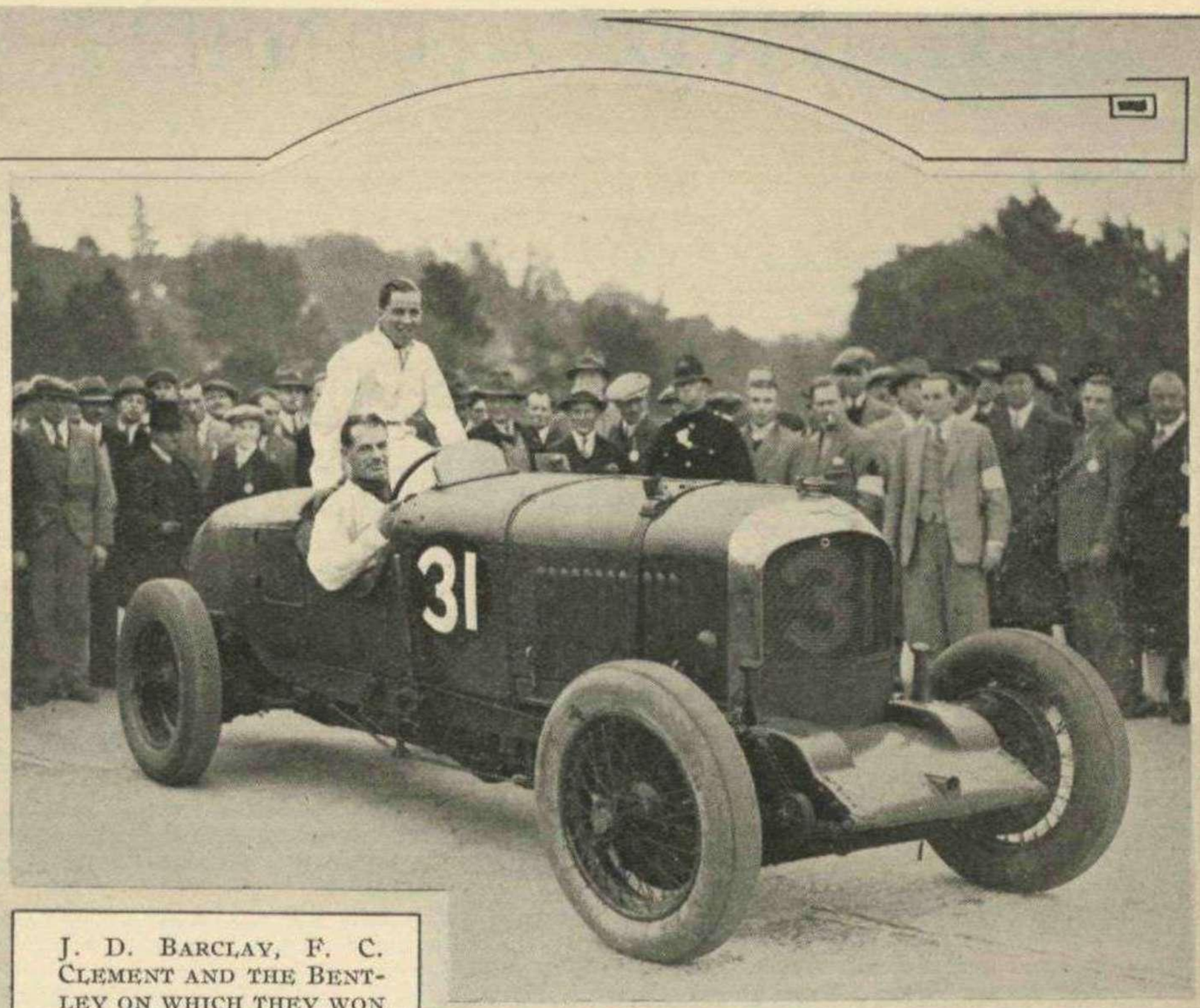




A. C. TITT JUMPING A HURDLE ON A DOUGLAS AT THE WYLYE VALLEY HUNT SHOW AT WARMINSTER.

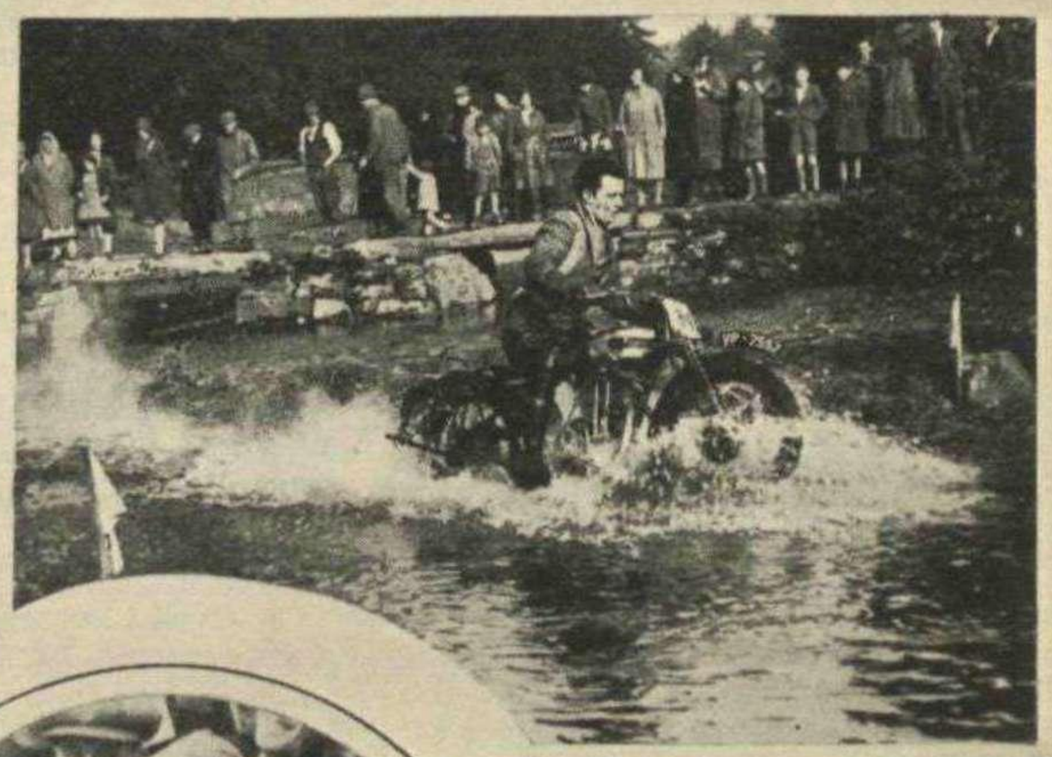


DIFFICULTIES ON THE MOORS.

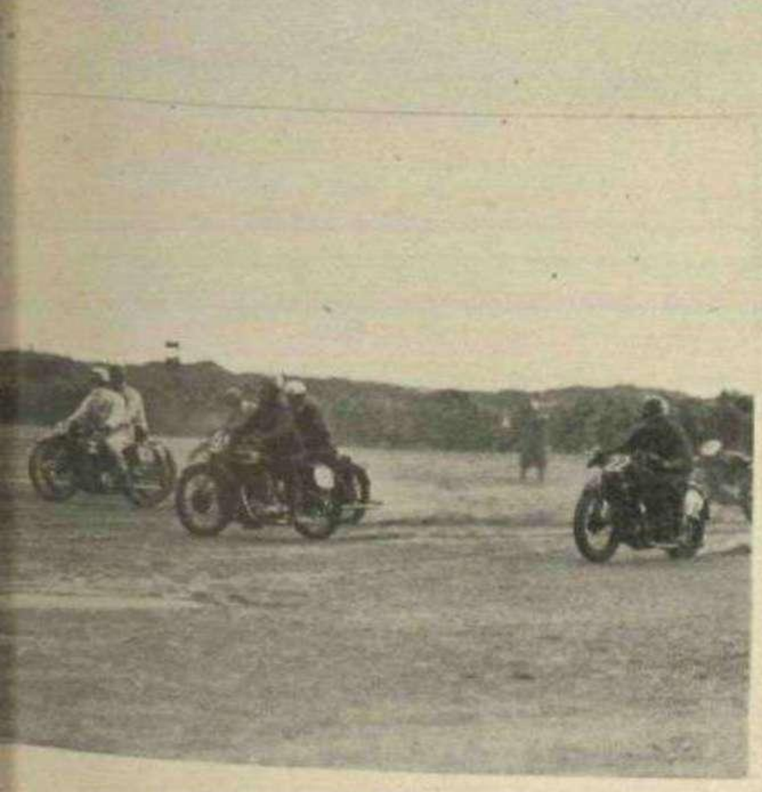


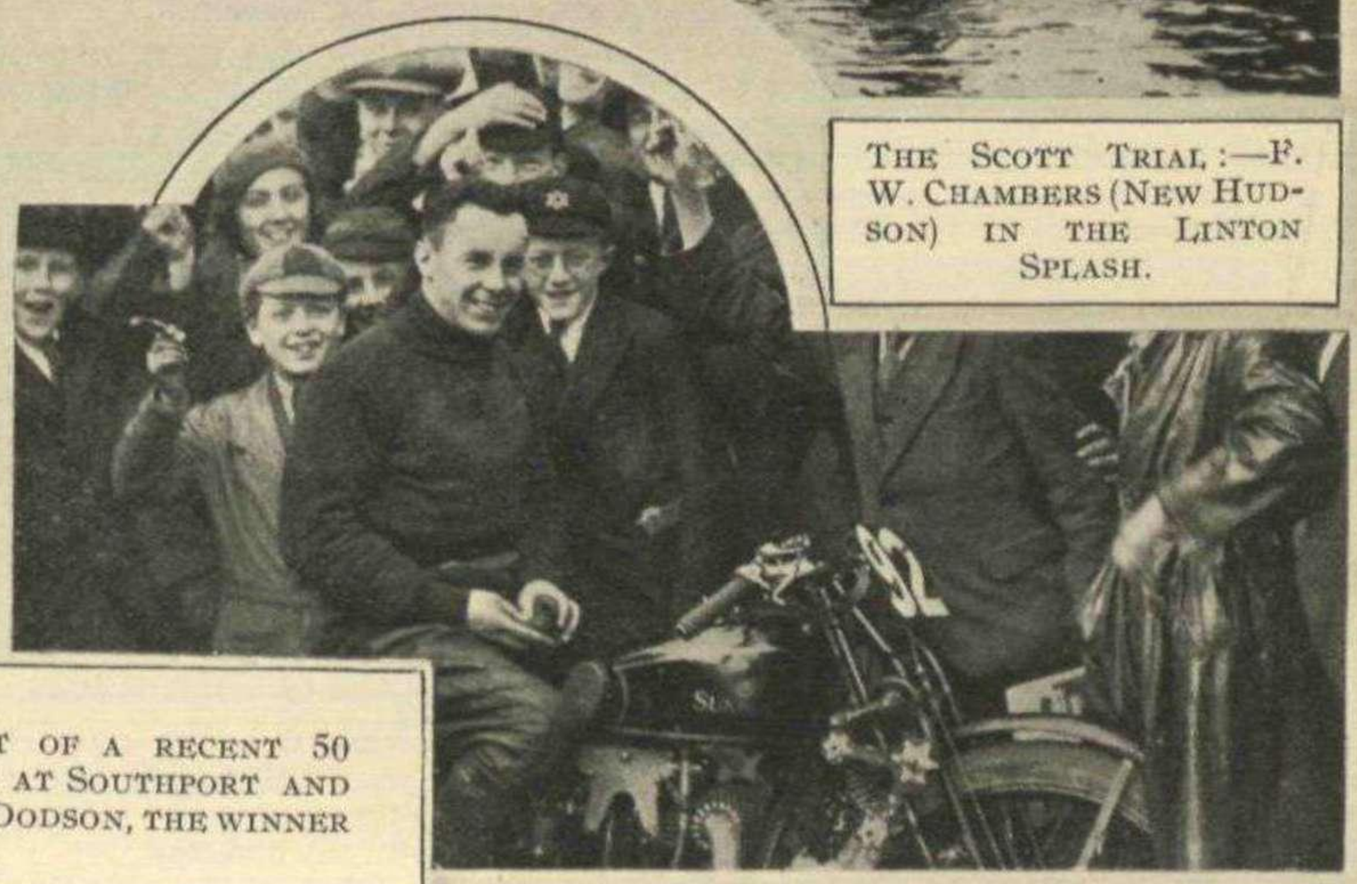
J. D. BARCLAY, F. C. CLEMENT AND THE BENTLEY ON WHICH THEY WON THE B.R.D.C. 500 MILE RACE.

RECENT EVENTS



THE SCOTT TRIAL:—F. W. CHAMBERS (NEW HUDSON) IN THE LINTON SPLASH.





THE START OF A RECENT 50 MILE RACE AT SOUTHPORT AND (RIGHT), C. DODSON, THE WINNER

THE B.R.D.C. 500-MILES RACE.

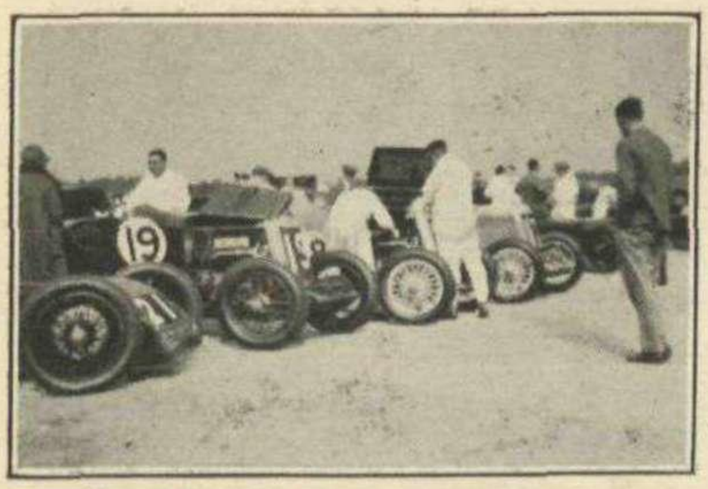
Winning Bentley Averages 107.32 m.p.h.

AUSTIN SEVEN'S FINE EFFORT.

THE British Racing Drivers Club are to be congratulated on the success of their first event. Not only was it the first really long distance purely track race for cars held in this country for many years, but it was also the fastest race of its kind the world has yet seen. Those who prophesied a dull race were disappointed, for the interest was maintained to the end and we were not treated to that most annoying state of affairs when all the fast men break up and the race goes to some unexpected tortoise, who on paper never had a chance.

Jack Barclay and F. C. Clement brought their unsupercharged 4½-litre Bentley into first place at the remarkable speed of 107.32 m.p.h. while the highest speed of the day was achieved by S. C. H. Davis and Clive Dunfee in the Speed Six Bentley who, starting from scratch, came through to second place at 109.4 m.p.h. with Cyril Paul and John Cobb third at 102.48 m.p.h. on the 12 cylinder Sunbeam. Surely a day to satisfy the veriest glutton for speed.

At 10 a.m. the 1100 c.c. class, of which only the Riley and Vernon Ball's Amilcar came up to the class limit, the rest of the class being composed of Austins, departed on their long journey. From the start it was evident that Vernon Balls meant business. Lapping at 95 m.p.h. he soon established a very useful lead



LAST MINUTE PREPARATIONS.

and it began to look as if the bigger cars which were conceding him an hour and 8 minutes would have their work cut out to catch him if he kept going. Later, with 30 minutes start from the scratch men the 1500 c.c. class were off and W. B. Scott on one of the famous Delages forged ahead from the start, with Frazer-Nash hot on his heels.

By the time the whole field was under way it was seen that the fastest car on the track was Birkins' 4½-litre Bentley which was lapping at over 121 m.p.h. and a great scrap ensued between him and Kaye Don on the Sunbeam. However Birkins' great speed did not last, for although the motor was still going well it commenced to spray an ever increasing quantity of oil over the car, the driver and the surrounding landscape with the result that Birkin could no longer see where he was going. As 2 miles a minute motoring without this facility is inclined to be a strain on the nerves, Birkin was forced to waste many valuable minutes at the pits cleaning goggles, windscreen and the slippery steering wheel, and the big 6½-litre Bentley took up the tale, and lap after lap, duels such as are seldom if ever seen in any short distance races in a B.A.R.C. meeting continued with unabated vigour.

At 72 laps Vernon Balls was still leading, with the remainder of the places filled by Austin Sevens, and the Riley fourth, but the big cars were fast catching up and at 90 laps the 2-litre Sunbeam, the "Cub," was in second place and had taken the lead at 108 laps. About this time Jack Barclay gave another of his celebrated imitations of a high speed roundabout by coming off the Members Banking backwards at about 120 m.p.h.

RESULTS.

1. Jack Barclay and F. C. Clement, 4,938 c.c. Bentley, 107.32 m.p.h. (Winner of 5,000 c.c. class.)

2. S. C. H. Davis and Clive Dunfee, 6,600 c.c. Bentley, 109.4 m.p.h. (Winner of unlimited c.c. class.)

3. Cyril Paul and John Cobb, 3,974 c.c. Sunbeam (S), 102.48 m.p.h.

4. L. Headlam and L. G. Callingham, 1,752 c.c. Alfa-Romeo (S), 96.74 m.p.h. (Winner of 3,000 c.c. class.)

5. C. Fiennes and T. E. Rose-Richards, 4,398 c.c. Bentley, 98.80 m.p.h.

6. S. V. Holbrook and E. Poppe, 749 c.c. Austin (S), 80.25 m.p.h. (Winner of 1,100 c.c. class.)

7. R. N. B. Pellew and — Margets, 1,496 c.c. Lea-Francis (S), 89.19 m.p.h. (Winner of 1,500 c.c. class.)

8. E. Martin and J. L. Stapleford, 1,089 c.c. Riley, 80.12 m.p.h.

9. Earl Howe and Sir Ronald Gunter, 1,496 c.c. Lea-Francis (S).

(S) denotes supercharged.

The following did not complete the course but were still running at the expiration of the race:—G. E. Caldicutt, 749 c.c. Austin (S), 155 laps; O. A. Saunders-Davies, 1,496 c.c. Bugatti, 168 laps; John Pole, 16,200 c.c. Mercèdès, 178 laps.

Barclay seems to make a point of this particular evolution, as he achieved a similar feat the last time he appeared at the track. However he appears to bear a charmed life and the episode did not worry him as he continued quite unruffled after changing a tyre. Later he touched the outer edge of the track and nearly "came unstuck," but again he came unscathed out of a sickening skid, and although his consumption of tyres was rather above normal this did not prevent him from getting very decidedly into the lead, and after Kaye Don's retirement it became evident that, barring accidents, he was a certain winner.

Vernon Balls had by this time been forced to retire with a broken valve, but he had at least the consolation of having broken the 200 miles record for his class. As was bound to be the case with such a fast race there were a goodly number of retirements for various reasons, and these included Scott's very fast Delage, which he and Brian Lewis had been driving in turn but which developed consistent boiling. Trouble in the water circulating department was also experienced by Wilkinson's O.M. after a promising start, and the Frazer-Nash had to retire with a broken piston due to having fitted a new one at the last minute before the race and not having an opportunity of running it in.



THE START OF THE 1,500 C.C. CLASS.

The retirement of "Tigress" was due to a broken rear spring and thereafter Kaye Don joined the Sunbeam signalling depot, and assisted in keeping the sister car informed of its position. Birkin's Bentley had a considerable number of pit stops, which unfortunately failed to cure his trouble and the car eventually took matters into its own hands and settled things by catching fire. The terrific speed of the big cars rather overshadowed some very remarkable performances among the slower classes, Headlam's performance in winning the 3-litre class on a 1,752 c.c. Alfa-Romeo at 96.74 m.p.h. being a notable example, while the fact that the winning Austin in its class averaged 80.25 m.p.h. for the 500 miles is something for its makers to be very pleased with.

Let us hope that the B.R.D.C. will give us some more of this sort of thing next year.

The Hutchinson Hundred.

ON the whole we have a definite dislike of handicap races, but the Hutchinson Hundred is an honourable exception.

The B.M.C.R.C. were fortunate in having good weather for this meeting and although the races prior to the Hutchinson Hundred proved that the handicapper was not quite up to his usual form, the Hundred itself provided a very good finish.

To take the short races first—J. D. Potts brought his H.R.D. Jap home a short distance in front of Meeten's Francis Barnett at 81.37 m.p.h. in the 3-wheeler handicap.

The next race, for private owners, provided a poor finish as Eggleton's O.K. Supreme beat the handicappers nearly as badly as he beat the next man home ; however it later appeared that he had been started earlier than his official handicap by mistake, but as his winning margin was considerably greater than this error there was no object in re-running the race.

The third race for solo machines up to 175 c.c. provided a rather dull win for C. A. Lewis whose Baker easily got away from Calvert's P. & P. Blackburne, averaging 67.3 m.p.h.

H. Standing (O.K. Supreme) in the race for riders who have during this season failed to secure a place in any race, made up for any previous errors by winning at 75.34 m.p.h. and in this race the name of M. E. Davenport was added to the list of gold star riders as he lapped at 100.61 m.p.h.

Three o'clock was marked by an angry buzzing, which signified the departure of the limit men in the Hutchinson Hundred, the larger machines soon followed and from then on the afternoon became really interesting. Although the 'babies' were putting up an excellent show, it soon became evident that they would not be able to hold their position from the fast men including Gibson, Collier, Quinn and Hieatt, who were all going great guns. Hieatt unfortunately was compelled to retire after 23 rousing laps, but he at least had the satisfaction of lapping at 104.85 m.p.h., and so qualifying for the gold star. P. Brewster who won this event last year was this time unable to beat his handicap and it remained for Gibson to come home with slightly more than a lap lead at the very creditable speed of 85.33 m.p.h., on his 346 c.c. Sunbeam. His was a well deserved win as there are few more consistent and hard working supporters of Brooklands, and his performance was all the more meritorious as he was riding with a damaged hand, the result of a recent crash.

Quinn's Triumph showed a good turn of speed clocking 93.81 m.p.h. for the distance, but he was unable to catch Gibson. F. L. Hall on a New Imperial averaged 77.45 m.p.h.—a very nice performance for a "250."

An interesting entry was Pickford on an old "square" twin Jap engined side valve machine, apparently of his own construction, who won the special award for the first private owner, and we hope that this example will lead to some more private owners overcoming their shyness and turning out their machines, even though they are not the very latest thing.

Altogether a fitting end to the season. and now "au revoir" Brooklands until 1930.

RESULTS.

Three-lap Passenger Handicap.—1, J. D. Potts (596 H.R.D.-J.A.P.) ; 2, T. G. Meeten (172 Francis-Barnett-Villiers) ; 3, C. W. Johnston (498 Cotton-Blackburne). Speed, 81.37 m.p.h.

Three-lap Private Owners' Handicap.—1, A. L. Eggleton (246 O.K.-Supreme-J.A.P.) ; 2, R. V. Packman (348 Zenith-Blackburne) ; 3, A. Fyfe (349 Velocette). Speed, 75.69 m.p.h.

Three-lap 175 c.c. Handicap.—1, C. A. Lewis (172 Baker-Villiers) ; 2, P. J. Calvert (173 P. and P.-Blackburne) ; 3, R. S. Deller (172 Baker-Villiers). Speed, 67.30 m.p.h.

Three-lap Handicap.—1, H. Standing (246 O.K.-Supreme-J.A.P.) ; 2, J. S. F. Hood (172 S.O.S.-Villiers) ; 3, M. E. Davenport (746 Excelsior-J.A.P.). Speed, 75.34 m.p.h.

"The Hutchinson Hundred."—1, R. Gibson (346 Sunbeam), speed, 85.33 m.p.h. ; 2, A. R. Quinn (495 Triumph), speed 93.81 m.p.h. ; 3, F. L. Hall (246 New Imperial), speed, 77.45 m.p.h. ; **winner of the Grose Cup,** T. G. Meeten (172 Francis-Barnett-Villiers), speed, 62.74 m.p.h. ; **winner of the Private Owners' Award,** B. L. Pickford (976 Pickford-J.A.P.), speed, 68.2 m.p.h. ; **finishers,** S. H. Jones (346 New Imperial) ; P. Brewster (495 Matchless) ; C. W. Johnston (248 Cotton-Blackburne) ; W. J. C. Hewitt (246 Excelsior-J.A.P.) ; S. S. Evans (346 Cotton-J.A.P.) ; R. S. Deller (172 Baker-Villiers) ; P. J. Calvert (173 P. and P.-Blackburne), and P. M. Walters (498 Sunbeam-J.A.P.).

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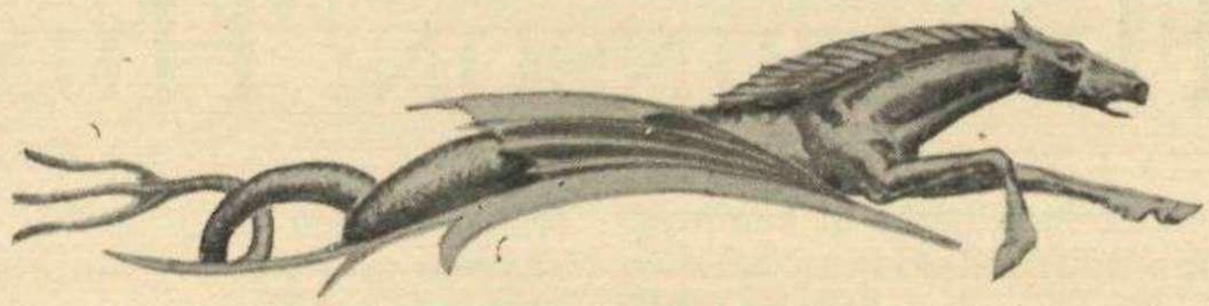
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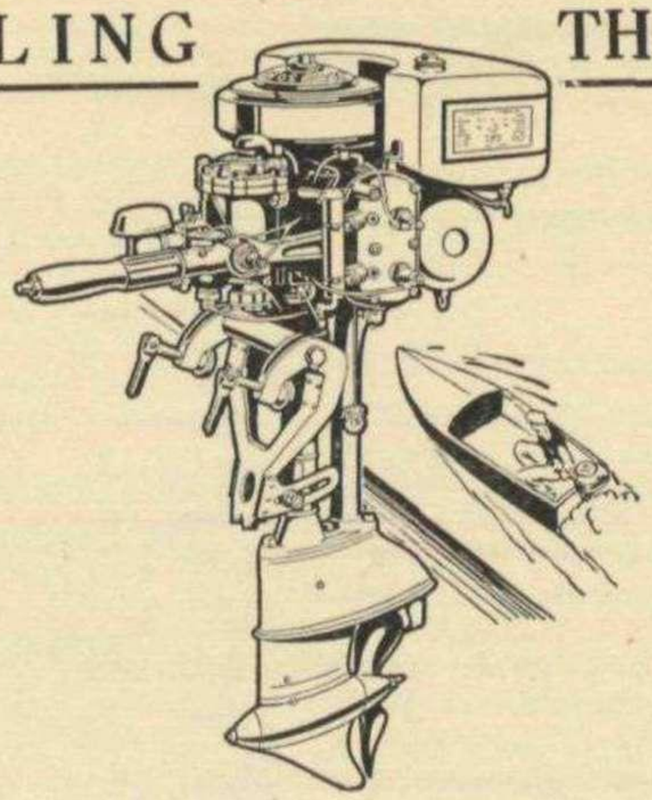
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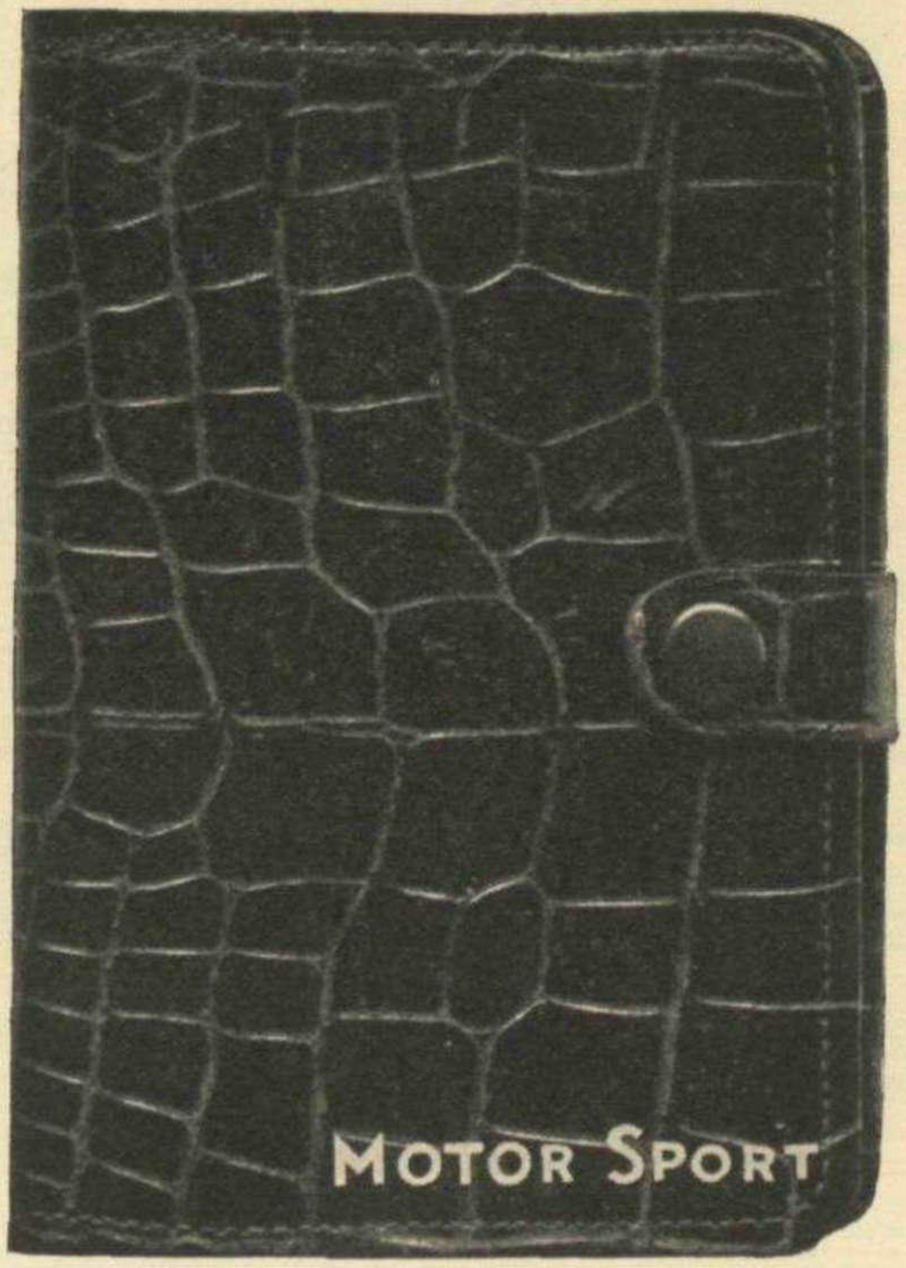
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SPEED BOAT DESIGN

by

R. R. POOLE, B.Sc.,

THE HULL.

IN any kind of boat hull, three main considerations govern the design. First, resistance to motion, which determines the speed obtainable with a given propeller thrust; second, stability and control, both when running straight, and when cornering; and third, mechanical strength. It is proposed in the following article to deal with the first of these problems, and to indicate the various sources of resistance and methods of minimizing them.

There are in general two types of boat; firstly the displacement hull, in which a considerable volume is immersed and in which water is displaced sideways and downwards, flowing in behind as the boat moves forward; and secondly the hydroplane or skimmer, in which advantage is taken of the lift on inclined planes or hydrofoils to cause the boat to skim on the surface, only accelerating sufficient water to obtain the necessary lift and propulsion. All modern speed boats fall in the latter category, as do many heavier craft such as coastal patrol boats, on account of their enormously greater efficiency at high speeds.

A general discussion of the sources of resistance applies equally to both types of boat, but the relative magnitudes of the power losses incurred differ widely in the two cases.

When a body is propelled on the water, the power necessary to drive it is equal to the product of the velocity and the total resistance, the latter quantity depending on the former in a very complex manner. It is practically impossible to obtain a complete quantitative analysis of this resistance, but its qualitative treatment enables a practical design to be evolved, in which the performance can be predicted fairly well with the aid of certain empirical rules.

The total resistance is made up of five distinct terms, most of which are to a certain extent interdependent. These terms are:

(1) Skin-friction on the sliding surface.
(2) Eddy formation round the hull and appendages.
(3) The wake, or following turbulence.
(4) Wave formation.
(5) Air resistance.

And we may proceed to consider them separately.

(1) SKIN FRICTION.

A perfect fluid is defined as one which is totally unable to transmit shearing forces; from which it follows that a thin plate drawn edgewise through a perfect fluid can impart to it no motion. In other words the surface of the plate would be sliding past a stationary wall of fluid, a thin layer of which, say one particle thick, separates the surfaces and acts as a perfect lubricant. Water being by no means a perfect fluid it follows that the layer in contact with the plate will be carried along, and a shearing force will exist between this layer and the next, and so on, to an extent depending on the speed and size of the surface, so that an appreciable body of water is involved in a forward movement. From layer to layer, then, there exists a force and a relative displacement, and hence useless work will be done on the water. In addition to the direct loss of power occasioned by this frictional action, the volume of water participating in the forward motion may be sufficient to alter the effective shape of the body, and appreciably to disturb the streamline motion of flow round it, so giving rise to eddying movements. This occurs particularly in displacement hulls, where the immersed volume is large, and also in the case of the projecting parts on hydroplanes, such as struts and rudders.

The empirical formula:

$P = fAV^2$ is generally used to determine the resistance

SPEED BOAT DESIGN—continued.

'P' in pounds on a short area 'A' square feet travelling at a velocity 'V' feet per second. The constant 'f' depends on the nature of the surface, and is taken as about 0.003 for varnish or bright metal.

This coefficient may be reduced a little by lubricating the surface with some solid lubricant such as soft graphite, though this is not very lasting in its effects. Also if air is introduced in the form of bubbles between the bottom and the water, very considerable reduction in the friction may be obtained. Boats have been constructed with numbers of small holes in rows across the bottom, out of which air was forced, and were found to have a low frictional loss, though the additional weight and power required for the air pump practically nullified the advantage. In a skimmer a fair amount of air is carried underneath both in the forward section and behind the step. An interesting effect was noticed in the case of the Schneider Cup seaplanes, which could not attain full water speed on glassy smooth water while the least ruffling of the surface enabled air to be carried underneath the floats, aiding the "unsticking" process both by increasing the speed and consequent lift, and by reducing the direct adhesion.

On the basis of the above formula, a varnished surface offers a frictional resistance at 30 m.p.h. of a little less than 6 lbs. per square foot, which represents about ½ H.P. at the propeller, or say 1 B.H.P. at the engine. for every square foot of surface in contact with the water.

2. Eddy Formation.

As water flows round an immersed body, the velocity of the streamlines decreases as they expand in behind it, resulting in a rise in pressure head, according to Bernouillis Theorem. If the particles are for any reason unable to give up sufficient kinetic energy to produce this increase of pressure, the surplus energy will dissipate itself in a vortex or spiral motion instead of producing a useful thrust on the after part of the body. For instance, if a submerged object is too abruptly curved in at the stern, the radial acceleration required for a particle to follow round the curve may produce centrifugal forces greater than the pressure head, in which case a partial vacuum will form behind the object. A blunt, square stern will produce this effect if moved fast enough while immersed, and less extreme cases give rise simply to trains of eddies or vortices. It would appear from experiment that if the tangent to the surface is inclined at more than about 16° away from the driection of motion for a speed of 30 m.p.h., eddies are certain to form, and in practice the after fairing of projecting parts is designed so as to present less than this angle, the apex angle (at the trailing edge) being generally under 24° so that the tangent angle does not exceed 12°.

The energy put into a system of eddies or vortices, is proportional to the product of velocity of rotation × size × rate of generation of eddies, but there are no available data relating any of these quantities at the speed and shape of the disturbing body.

As with friction the direct loss is not the only trouble arising from extensive eddying. Turbulence in the vicinity of the screw lowers its efficiency considerably, and the rudder often behaves erratically if placed in a region where irregular eddying occurs, owing to the liability for strings, of eddies suddenly to change their direction or intensity with small changes in the balance or trim of the boat.

Step bottomed boats have to attain a fair speed before they can rise or commence "planing." During the preliminary run violent eddies form behind the square ends of the step and stern, and often the engine has not sufficient power reserve to overcome this initial resistance, so that the boat can never attain the planing speed.

3. The Wake.

This term relates to the turbulent water following immediately behind the boat, which is due mainly to a combination of local eddying and the body of water to which a forward motion has been imparted by skin friction. The displaced streamlines, expanding in behind the boat, tend to confine the zone of disturbance into the familiar tapering wake, the presence of which interferes with the return of energy in the form of following thrust. Generally the wake proper is broken up by the spiral slipstream from the screw, and the foaming spout of water often to be seen following at a distance of a couple of feet from the stern is principally due to the screw, the large rotational eddies from which break through the surface.

It has already been mentioned that it is undesirable to operate the screw in turbulent water. Some advantage, however, can be gained by placing it in water that already has a forward motion, though it is generally difficult to find a part of the following zone which is not in a state of turbulence. The position usually adopted as most efficient is a few inches forward of the square edge of the stern, and as near the bottom of the hull as is consistent with avoiding hydraulic interference, i.e., about 3 inches clearance. In outboard drives the first consideration is to place the disc of the screw well below the bottom, in order to avoid the region of powerful eddies behind the stern edge. Too low a centre of thrust, however, affects the trim, tending to lift the bows, and the stability in rough water is reduced. A fair position is to have the top of the blade circle some three inches below the bottom, as with shaft driven screws.

(4) Wave Making.

When the boat is at rest, the pressure on its sides in every direction in a horizontal plane is the same. When it moves forward water is displaced so as to flow round the immersed parts; in other words particles are accelerated outward from the bow, and kinetic energy is put into the water. From Bernouillis Theorem it follows that this increase of kinetic head must be accompanied by a decrease of potential head or pressure, and since the pressure on the water surface is constant (atmospheric), a fall of level will occur, and the level will be lowest where the velocity of the streamlines is greatest. Evidently this region of low pressure must move with the

SPEED BOAT DESIGN—continued.

boat, and in doing so it will give rise to a system of waves whose origin is at a point a little behind the cutwater, and which diverge at a definite angle to the direction of motion. This angle is known as the obliquity and is designated β.

A corresponding area of high pressure resulting from the deceleration of the streamlines round the stern of the boat will give rise to another independent group of waves, generally, smaller, and originating a little forward of the stern.

It is clear that all the energy put into the water to maintain these groups of diverging waves is entirely lost, since the waves move clear of the boat, carrying their energy with them.

A third system of transverse waves is produced, mainly by the expenditure of energy in accelerating water downwards to obtain the lift. Under certain conditions, dependent to some extent on the depth of the water, this system moves at the same speed as the boat.

It can be shown that the energy in any wave per foot length along its crest is proportional to

Lh^2 foot pounds, where L is the wavelength in feet, and h the height or double amplitude. In the transverse or following group, the rate of generating waves is clearly proportional to $\frac{V}{L}$ and the rate of dissipation of energy is therefore proportional to $Lh^2 \times \frac{V}{L}$ or Vh^2.

Now h=the pressure head and this varies with the square of V, so that we find that the power expended varies as the fifth power of the velocity, other things being equal.

In the case of the diverging waves, it is generally found that the stern group are unimportant compared with those originating at the bow. The power loss due to the latter can be shown to be proportional to :

$h^2V^3 \sin^2\beta \cos\beta$, where β is the obliquity of the system. As before h depends on V^2 and hence the power is proportional to the seventh power of the speed, under the same conditions.

However, in both cases it is possible to reduce h independently by careful design of the hull lines, and owing to the increased lift at high speeds its reduction is partly automatic. In general, the accelerations and displacements of the water should be kept as small as is practicable, this necessitating small angles of incidence in both vertical and horizontal planes, and very gradual curvatures in either direction.

Further, β may be reduced by making the entrance angle very fine and avoiding deep immersion of the vertical sides near the steps. In general β decreases slightly as the speed increases, though in small boats it does not vary greatly either side of 20°.

A small percentage of the energy given to the transverse wave system may be recovered by suitably proportioning the step and the after body, as part of the water sweeping up from behind the step may be arranged to impinge on the bottom of the after body and increase the lift. However, unless the boat is very long not much energy can be saved by this means.

The lift is given approximately by :

$F = .016\ AV^2$ pounds, where A is the total area of the lifting surface in square feet, and V in feet per second, assuming a mean angle of incidence of 5°, an angle found by experiment to be the most efficient. To summarize then, at high speeds less volume is immersed, and the wavemaking loss when planing is relatively small due to independent reduction of the wave height h to a very small value, particularly in the diverging groups.

5. AIR RESISTANCE.

Most of the foregoing losses are reproduced to some extent in the air as well as in the water, and their analysis is considerably more difficult in the case of the elastic fluid. It is generally assumed that the resistance due to the air is negligible at the relatively low speeds attained in small speed-boats, and the acceptance of this erroneous view has led to little progress being made in reducing this resistance. Recent development has yielded such improvement in hydrodynamic design that the air resistance now represents a considerable proportion of the total, and may be regarded as a source of power loss as serious as any of the others.

It has been established that reduction of the wind resistance by as much as 50% at 25 m.p.h., can be accomplished by quite simple fairing over the top of the hull, including the pilot, who must not be left protruding in the air.

Now since the air resistance depends, like water friction, on the square of the speed, it follows that in a head wind of only 10 m.p.h., with a water speed of 25 m.p.h., the head resistance will be double the still-air value, and the power loss nearly three times as great. It is perhaps worthy of note that the only completely faired boat in the 1500 c.c. class of the last Duke of York's Trophy race, was undoubtedly the fastest on the straight course.

The shape offering least resistance is the well known "raindrop" form, having its greatest width about one third of the length from the front. It is of course generally impossible to fit this exact shape to the hull proper, the plan of which is fixed by other considerations, and so a compromise must be made, depending on the actual shape available. The modification having more or less parallel sides, and the side elevation of "raindrop" form, swept down to a horizontal edge at the stern somewhat of the shape of a garden slug, is perhaps the simplest. In addition a smooth fairing, running down the centre from behind the pilot's head, might be extended to mask the outboard engine if this type is used.

Much can be learnt from modern aircraft and racing car practice, and though boat speeds are at present very much lower than those of their counterparts on land or in the air the same principles apply, even though the effects are much smaller.

(*Further articles by Mr. Poole will appear in later issues, so that anyone wishing to build their own craft during the winter will have plenty of useful data to work with*).

OUTBOARD RACING

By

J. H. SHILLAN.

(Mr. Shillan is already well-known to many of our readers as a successful exponent of the Elto outboard motor. He is manager of the Elto concern in this country, whose headquarters are at 24, Harrison Street, W.C.1.)

IT is a common belief today that the Outboard Engine was an invention of the last five years, but this is not so. As far as I have been able to discover, the first Outboard Motor ever manufactured and actually run was made by Mr. C. D. Waterman of Detroit, U.S.A., in the summer of 1904. It was a two-stroke motor, single cylinder, the drive being transmitted from the crankshaft to the driveshaft by a vertical sprocket, the driveshaft remaining absolutely unprotected. No silencer was fitted, and the petrol tank was fitted on to the tiller arm and this was placed high up above the cylinder head of the vertical motor.

This first Outboard Motor as you will gather was a rather crude affair, in fact all the underwater gears were exposed.

In 1905 about a dozen Waterman Outboard Motors, were actually manufactured and sold, this " production " being the means of the formation of the Waterman Marine Motor Co., which was, I believe, the first company ever formed to manufacture outboard motors.

In 1908 Mr. O. Evinrude manufactured his first outboard motor—a single cylinder unit of rather cumbersome proportions—but it was not until 1910 that he commenced to manufacture these on a commercial basis, his first public demonstration being given on the river in Milwaukee on a sweltering hot afternoon in August. The demonstration consisted of Mr. Evinrude in his shirt sleeves rowing a dinghy in the sweltering heat for about ten minutes, then coming back to the raft, putting on the motor, starting it up, and letting this do the work instead.

It seems that the demonstration was a big success, because Mr. Evinrude announced that he had twelve engines in process of manufacture, and within five minutes after the demonstration had finished he had sold the lot to onlookers, the price being about £20 each. This order for twelve motors was the commencement of the Evinrude Motor Co. of which the Principal was Mr. O. Evinrude, who is now President of the Outboard Motors Corporation of America, the head of the Elto Outboard Motor Co.

I see upon examining an advertisement published by the manufacturers of the Waterman Outboard Motor in 1910 that the motor developed 2 h.p., weighed 40 lbs. (I think this was a typographical error and should have been 70 lbs.), that the motor was " not a toy but a good, strong, powerful motor." The advertisement furthermore stated that " the Waterman does not get out of order, and will run on one gallon of petrol for eight hours." The only conclusion I can come to after reading the latter feature of the advertisement is that in 1910 the Petrol Companies were selling some wonderful spirit.

In 1911 the Swedish Archimedes Outboard Motor wa introduced. This was a single cylinder model, but in 1911 the manufacturers introduced the first twin cylinder motor, the weight of which was about 70 lbs.

It was in 1911 that the first outboard motors were introduced in this country, and in that year Mr. Walter D. Fair of Hampton Wick imported some Waterman outboard motors, and Mr. T. G. F. Winser introduced some Evinrude outboard motors. In 1914 Mr. Fair was unable to get further supplies of Waterman outboard motors, and as these were being supplied to the British Navy, the Government urged Mr. Fair to commence manufacturing the Waterman Outboard Motors in this country under their patents, and although the Waterman Co. in America discontinued manufacturing outboard motors some years ago, Mr. Fair has continued manufacturing the Watermota in this country.

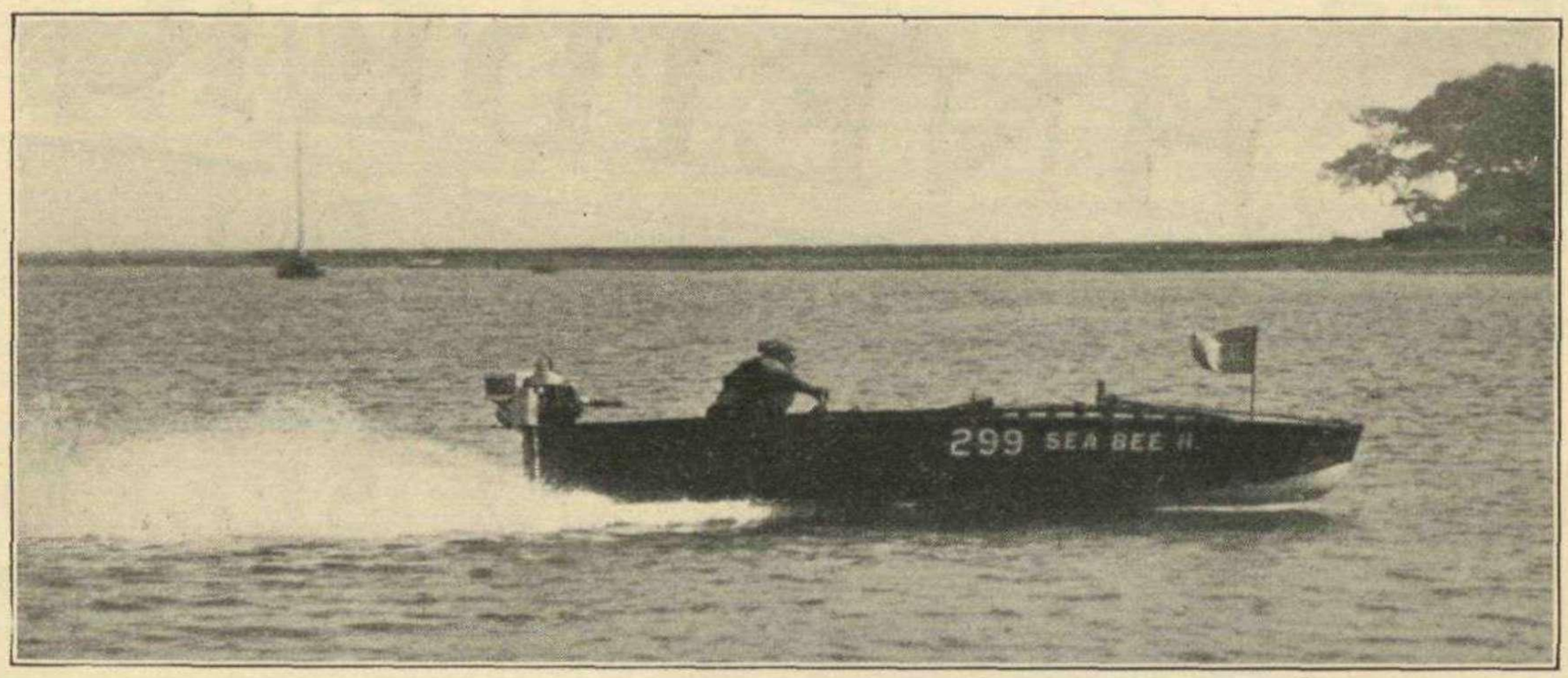
Caille entered the field in 1912, and by 1914 I find that there were actually eight factories producing outboard motors in America, namely:—Waterman, Evinrude, American, Gray, Caille, Farro, Sweet and Wisconsin.

In 1915 the Lockwood Co. commenced to manufacture the Lockwood Ash Motor, all these motors being of the single cylinder type, but in 1916 the Koban Manufacturing Co. of Milwaukee produced the first American twin cylinder outboard motor.

There was practically no advance made in design from 1904 to 1916, that is until the two-cylinder Koban Motor appeared, and then I find that very little advance in design was made from 1916 to 1921, but in that year Mr. O. Evinrude who had six years previously sold out his interest in the Evinrude Motor Co.—returned into the outboard motor manufacturing field, and formed the Elto Outboard Motor Co. In the first year he placed on the market the Silvery Elto Lightweight twin cylinder model. This motor made an instant hit with the public, because it was a motor easy to carry, started easily, and was much quieter than other outboard motors being manufactured at that time. In the latter part of 1921 the Johnson Motor Co. introduced the first outboard engine developing relatively high r.p.m., i.e., 2,800 r.p.m.—their first model being a light twin developing 2½ h.p.

Up to the end of 1922 outboard racing had not taken place at any of the National Regattas in America or in any other part of the world, but in the early part of 1923 both the Mississippi Valley Power Boat Association and the British Motor Boat Club staged outboard races. Both were free-for-all races, the former being held at Oshkish, Wisconsin, and was won by an Elto twin at the phenomenal speed of 9 miles an hour, whilst the B.M.B.C. race was held on the River Thames at Chelsea, and was also won by an Elto light twin at

OUTBOARD RACING—continued.



J. HOLROYD WHO IN HIS SEA HYDROPLANE WITH A JOHNSON MOTOR RECENTLY BROKE THE 12 HOURS RECORD AT 30·3 M.P.H.

the phenomenal speed of 7 miles per hour, but this speed was only achieved through the pilot having scoured practically the whole of the boatyards on the River Thames in search of a suitable craft, and he happened to be rather lucky in securing the loan of a river skiff of about 16ft. in length and 2ft. 6ins. beam. The race was about 4 miles in length, and the winning boat arrived at the winning post about 6 minutes ahead of the second boat. All competitors—except the winner—had resorted to the usual type of ordinary sea dinghy, and so the general impression was that the pilot of the winning boat had "stolen a march" on them.

In 1925 a speed record of 12 miles an hour was established in an outboard race, this speed being beaten in the autumn of 1926 when a speed of 16 miles an hour was registered by an outboard on a single step hydroplane. In 1927 the phenomenal speed of 26 miles an hour was registered as the Outboard Speed Record by Mr. S. V. B. Miller of Seattle, U.S.A., by using one of the experimental Elto Quads and a sea sled type of Hull. In 1928 the fastest speed made was 41.748 miles an hour, this being accomplished by an American, Mr. Eldon Travis, with an Elto Quad outboard motor and a Boyd Martin Bullet Hull.

The latest information I have received is that a speed of over 45 miles per hour was registered at the Mount Dora Regatta in the U.S.A. with one of the 1929 Hi-Speed Super Elto Quad models—and so this increase in speed goes on—and it is not unlikely before the close of the present season we may see a speed of over 40 miles an hour achieved in outboard motor competition.

It was only a few years ago that one heard on all sides statements to the effect that outboard Motors were noisy, unreliable and a pest. This bad impression was due to the performance—or rather lack of performance—of the old single cylinder crude outboard motors of the early days, but outboard motors of today are almost universally either a twin or four cylinder unit, all are reasonably silent, reliable—and in the case of racing motors—surprisingly fast when used on the right type of hull.

Most of the reading matter in the daily and technical Press refers to the racing type of outboard motors, but these constitute but a small proportion of the general outboard motor market. For every one racing model sold today there are at least six of the non-racing models, and these non-racing models are used for multifarious purposes, such as propelling barges, wherries, other similar heavy craft, down to the smallest pointed stern canoe, whilst the models of outboard motors range from the large four cylinder racing models developing over 5,000 r.p.m. and capable of speeds of 45 miles per hour and weighing about a hundredweight, down to the little "Lightweight" "yachtsmen's pocket motor" weighing about 26 pounds.

In addition to the outboard motors being made in America, Gt. Britain, and Sweden, they are also being manufactured in France, Germany and Italy today, but I fail to discover any realy new innovations that have been generally adopted as outboard standard practice and emanating from these countries. Practically all improvements have come from America, although whether this same situation will continue in the future is problematical.

What can be said of the future of the Outboard? I see no reason why their rapidly growing popularity should not continue at the same phenomenal rate as in the last five years. To the average Britisher there is no more pleasant way of spending one's moments of recreation than on the water, either visiting tranquil beauty spots, picnicing, etc., or else being a competitor at the various outboard Regattas being held weekly in various parts of the British Isles, in fact, at the present time outboard racing enthusiasts have the opportunity of choosing at least one meeting each week, and it is not unlikely in the near future they will have the choice of attending several meetings each week.

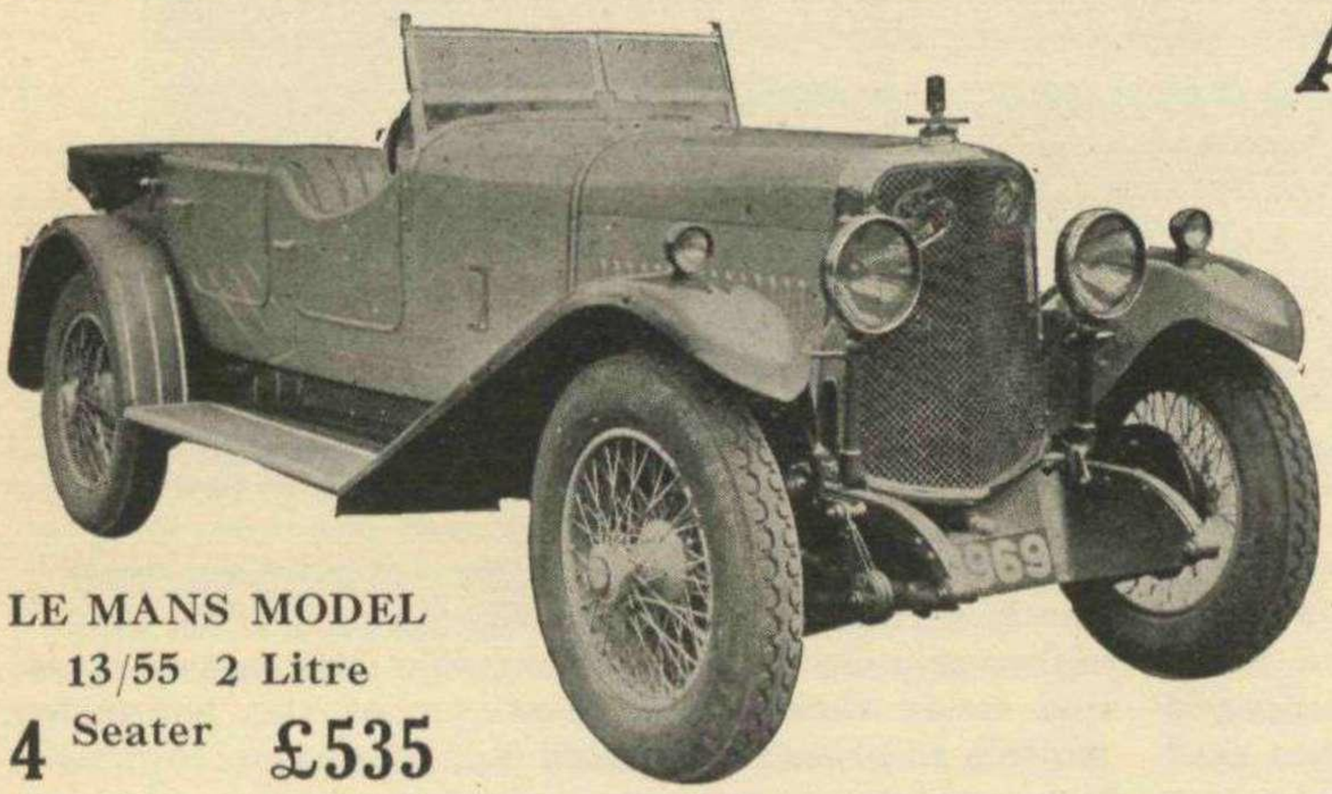
In my humble estimation, the wonderful popularity of outboard motors is due to their small initial cost and low running expense, coupled with the fact that many models are conveniently portable, and for a few pounds a trailer can be purchased which will tow boat and motor behind a motor car almost anywhere at infinitesimal expense in order to engage in this wonderfully fascinating sport.

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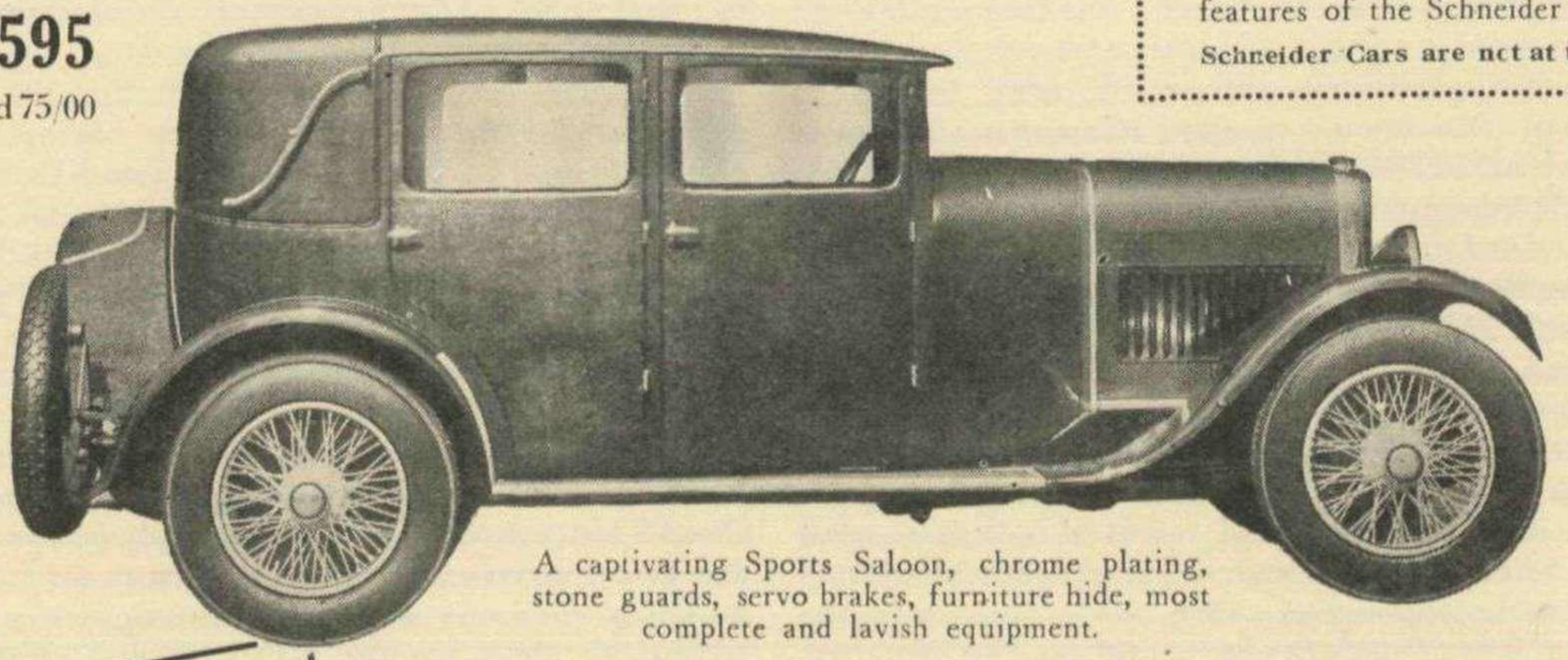
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Sports Cars at Olympia

THERE is no doubt that the vogue of the standard car race has done a great deal to enlarge the choice of genuine sports models available to the enthusiast, and this year at Olympia there is no lack of cars whose sporting propensities are carried deeper than the old trick of putting a sports body and a carefully designed exhaust system on a standard car and saying that it has such and such a performance. Of late there has been ample opportunity for the manufacturer to prove his words, and the result is that there are plenty of the genuine article of every class from the amazing little Austin to cars with ten times its cubic capacity or more. It is of course possible to give details of every car's specification, but it is not purposed to do so here as the man who has a particular interest in any make will want to know much more about it than can be set down here, and after all what are the glorious beings on the stands at the Show really for, if not to satisfy the technical inquirer? Yes we know there are exceptions, like the man we once asked what was the compression ratio on a certain model and after consulting a catalogue he replied, "4.7 to 1 on top!" However the make he represented was not one in which our readers are likely to be interested, and there is likely to be no lack of genuine information.

The Wonderful "Babies."

The smallest class has lately produced some new adherents and the pioneer Austin 7, whose performances this year have surpassed anything that its most optimistic admirers had dared to hope, is now ably challenged by such excellent performers as the M.G. Midget, and the small Triumph and it is a great pity that these, while being so near to the Austin in capacity are just over the 750 mark and are thus barred from competing against it on level terms. Perhaps next year may encourage them to build a "special" for Class H.

It is cheering to note that at last the 1100 c.c. class has ceased to be monopolised by our foreign rivals and the performance of the Riley 9 has shown that British manufacturers are alive to the demand for a real performer in this class though there is no lack of competition from abroad, and the B.N.C. and the G.A.R. are French products which are both marketed in supercharged form, while the Vernon-Derby, Salmson, and Amilcar also represent France with very attractive models.

The 1500 c.c. class is as popular as ever, and while Britain is well represented with the Lea-Francis, Marendaz, Frazer-Nash, Aston-Martin, and Alvis, etc., all of which have been tried in racing on road and track, there is no chance of us being allowed to rest undisturbed in this class when such cars as O.M., Bianchi, Vernon-Derby, the interesting front drive Tracta, the successful Alfa-Romeo, and by no means least, the product of M. Ettore Bugatti, a name synonymous with speed, whose cars "same as you can buy" have held their own against all comers on the most difficult road circuits in the world for the past few years.

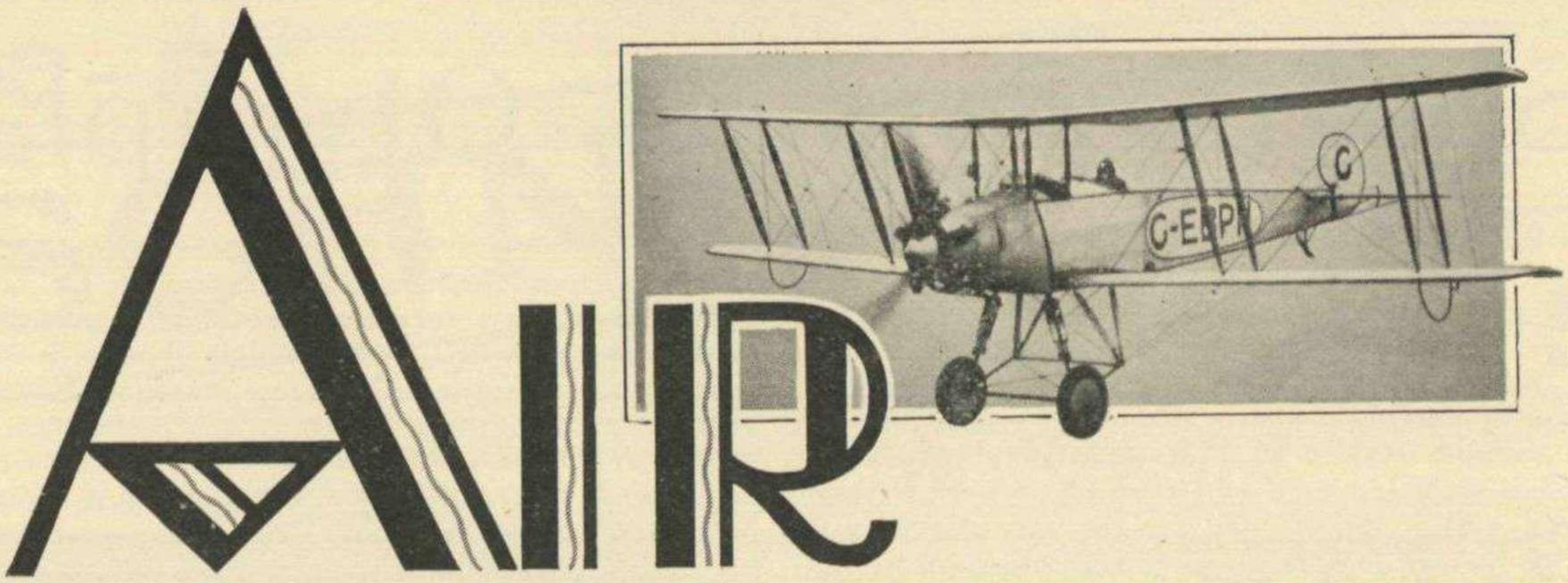
When we come to the larger classes the man to whom the actual purchase price of a vehicle is not of prime importance is in a very happy position as regards choice of models, and when a car is 2-litre or more it becomes possible to carry somewhat more elaborate coach work without its being detrimental to the performance. The sports car with closed bodywork which at one time would have been regarded as a contradiction in terms has definitely come to stay, and except of course where the car is required for actual competition work, it is becoming increasingly popular. At one time the saloon and good roadholding at high speeds were not regarded as compatible, but the lessons learnt from racing of late years have made it possible to build a comfortable saloon which for performance and steadiness at speed and on corners would utterly put to shame the semi-stripped sports model of a few years ago. What could be more shapely and impressive for instance than the Stutz Black Hawk saloon, and any of our readers who have had the opportunity of taking the wheel of one of these cars will have to admit that though America may be chiefly fond of the rather "woolly" family motor car, there is at least one from across the ocean that as a genuine high performance vehicle can hold its own with the best that we can offer.

Among the larger sports cars the name of Bentley immediately stands out and there is no gainsaying the fact that this has been a marvellous year for this make, and has amply justified the policy of supporting every big race for which they have been eligible, and they are to be congratulated on a very pretty finish to the season with their success in the B.R.D.C. 500 Miles race. The range now includes a supercharged edition of the famous 4½-litre model, though we cannot but regret that the 3-litre is not also among their models.

The Biggest "Merc."

No review, however hasty, of sporting cars is complete without some mention of the 38/250 h.p. Mercédès, and its overwhelming victory in the Ulster T.T. this year under conditions which might be considered anything but favourable to the big car, and when competing against the cream of the British motor industry, shows that we should indeed hesitate before telling ourselves that British cars are the best. Good they certainly are, but the fact that other countries can produce, on occasion, something that can make them acknowledge defeat should make them even better.

We have perhaps rather neglected the intermediate classes in jumping from the small to the very large and there are several names such as Crossley and Lagonda whose names have been built up on reliability, and who, when associating themselves with fast motors give confidence to the buyer who, while wanting good performance likes to feel that the speed at his disposal is not going to mean the possibility of mechanical failure if used as it should be.



An Article by Capt. Neville Stack, A.F.C.

Chief Pilot of National Flying Services.

FROM the earliest days of history, whether of Eastern or Western civilisations, man has looked into the sky and aspired to join the birds in annihilating time and distance.

Western legends tell of Bladud, King of Britain, who is supposed to have achieved gliding flight at Bath: of that Scottish monk who leaped from Stirling Castle with his arm-supported wings and broke his thigh in a manure-heap; more exact records lead one through the lighter-than-air flights of the Montgolfier balloons (which were actually used for observation purposes at the Battle of Fleurus in 1794), to the experiments of Caley, Lilienthal and Pilcher, until the internal combustion engine was made sufficiently light to put the first historic Wright machine into the air.

A man, self-taught, could fly! Limited in his evolutions, cramped by the unknown, he yet had one foot upon the ladder of mastery.

Through the years that followed men with belief in the future laboured without hope of reward to bring their craft nearer perfection, and there is something almost mediaeval in the trust of those first pupils who sat at the feet of the pioneers who knew so little more than the learners.

In Great Britain the first schools were in the Isle of Sheppey and upon Salisbury Plain; a complete course of instruction was a matter of months, perhaps of years, for only upon the days when a cigarette's smoke rose straight into a cloudless air did instructor and pupil venture off the ground.

The usual type of those days placed pupil and instructor side by side in the crazy structure, and "dual" was a matter of the shouted word and example: finally, when he was sufficiently proficient, the learner took his life in his hands and flew alone, bearing in mind the parting injunction to avoid the "fatal sideslip"—today's normal method of losing surplus height on landing an aeroplane.

So affairs went on until 1913: some learnt to fly, others met their death, but in the year preceding the war came the first machine which was a great advance on previous ones and seemed to fill the bill as an instructional machine on account of its great controllability and stability—the Type 504 Avro.

This machine merits more space than can here be given to it, for upon it more men have learned to fly than upon any other type, and its lineal descendant, the 504 L, is the standard initial training machine for our own and other Air Forces.

It was designed by a pioneer in British aviation, Mr. A. V. Roe, and engined with the Gnome-Rhone Monosoupape, which at that period gave it a phenomenal performance; its low landing speed and comparatively reliable engine (even though its fuel and oil consumption were tremendous), made it for those days safe and a giver of confidence to the learner.

At the commencement of the War 1914-1918 it was in use as a bomber and fighter, but after a few months it was replaced by machines with a higher performance: but it was not to disappear from the Service flying schools until 1927.

With the advent of this first machine that was really adapted for training purposes came the first systemized syllabus: the war cut it down, for the need for pilots was urgent. Day after day brought its tale of pilot-wastage and in a ceaseless stream the new personnel passed from the tried Avro to the fighter and bomber types.

Machines crashed were of no account in those days: the factories which worked day and night produced them in thousands but pilot making was a slower affair. Somehow, anyhow, they were produced, and the war-time pilot was magnificent of his kind.

Two or three hours dual from 'resting' veterans, and they "went solo": a couple of hours in the Avro and they flew Service types, often machines with all the vices which have been eliminated from the modern aeroplane. Many a pilot went to the Front with but five or six hours of solo flying to his credit and learnt his fighting tactics in a school which had the flaming gun of a Fokker as its Chief Instructor.

Those who survived the methods of those crowded days became magnificent pilots: but the end of the war gave breathing space for the development of a system

AIR—continued.

which produced airmen of no less skill. The post-war Service airman not unseldom astonishes the war pilot who comes to see the Hendon Pageant.

Civil flying hung fire for a time : that it would develop was inevitable, but the war type machine was fabulously expensive to run except for the wealthy.

Great newspapers offered prizes for the economical aeroplane ; diligent research workers experimented with wing-sections and fuselage-forms to open the road. Various small machines of excellent characteristics appeared, but none quite fulfilled the ideal : as in the early days, the power-unit was the barrier.

Then came the Cirrus-engined Moth : in it the sword was truly beaten into the ploughshare, for the Moth was designed by one of the most famous British war-plane designers, Captain Geoffrey de Havilland, and its Cirrus engine was designed and built from the great mass of surplus war-time engine parts, by the A.D.C. Aircraft Co., Ltd.

Safe and cheap flying was born with the first Moth : almost at once light areoplane clubs came into being and to all was open the opportunity of learning to fly—made possible by the remarkable reliability, low running and maintenance costs of the little Cirrus engine. This combination of the Cirrus and Moth marked a great step forward in the advancement of Civil Aviation.

Today the vast majority learn to fly through the medium of a flying club : schools, quite apart from clubs, exist, but they do not receive the State grants which lower the cost in the latter.

A young man of good education may get all the flying he wants on Service type machines if he is lucky enough to obtain a commission in the Auxiliary Air Force. He is certain to get some of the best tuition available without being at all out of pocket.

The de Havilland Moth was the forerunner of many machines of a similar weight and performance, differing only in fairly minor respects. Most of them have the same characteristics and differ little in their flying.

It should take an average learner about eight hours of dual instruction before he is fit to fly alone.

The first hour should be devoted to "joy-riding" pure and simple, and the pupil becomes accustomed to the unfamiliar element and has no distractions when he comes to take control.

As a preliminary to actual instruction in the air he or she is shown the movement of controls on the ground : then follows the demonstration of their effect in the air. Straight and level flying is not as a rule a difficulty : usually that arises with the turns.

Learning to fly may be best compared with learning to ride a bicycle. In an aeroplane the tendency to skid outward on a turn is minimised by a leaning towards the centre of the curve, just as with a bicycle : the turn is, flying parlance, banked. Should the angle of tilt be exaggerated, gravity causes both the bicycle and the aeroplane to fall : if the angle of tilt is insufficient, both the bicycle and the aeroplane skid outwards.

All these difficulties disappear when a sense of balance is acquired. It is the aim of every instructor to induce this sense of balance in the air—air sense—in his pupil. Some get it quickly, others seem almost hopeless : but



(2) The D.H. "Moth," which Needs no Introduction to Our Readers. It is here seen in its Latest Form, Powered with the D.H. "Gypsy" Engine.

AIR—continued.

the slow learner is not infrequently the best pilot in the end.

One of the chief assets to the instructor is that the very nature of the controls of an aeroplane adapt themselves to natural movement. The rudder-bar and the control column pushed to the left produce a turn banked to that side: the column pulled back raises the nose, and pushed forward, depresses it.

Consequently, the teacher in the newest school of flying thought says to his pupil in the air "Push down your nose" or "Pull up that right wing" instead of using the old formulae of "Push the stick forward to lower the nose" or "More left stick to raise the right wing."

Natural movement, once soundly instilled, is the best foundation for that co-ordination of brain and hand which pulls one out of tight corners.

So the pupil goes through all the phases—climbing, stalling, gliding, sideslipping and the rest: landings seem to present almost insuperable difficulties that evaporate with the first ideal "three-pointer." Spins, the cause of most crashes, are explained and the pupil learns to extricate himself: and the first solo follows a test by a pilot other than the instructor.

Some five hours solo flying, and the pupil is fit to pass his or her tests for the 'A' licence which confers a virtual freedom of the air.

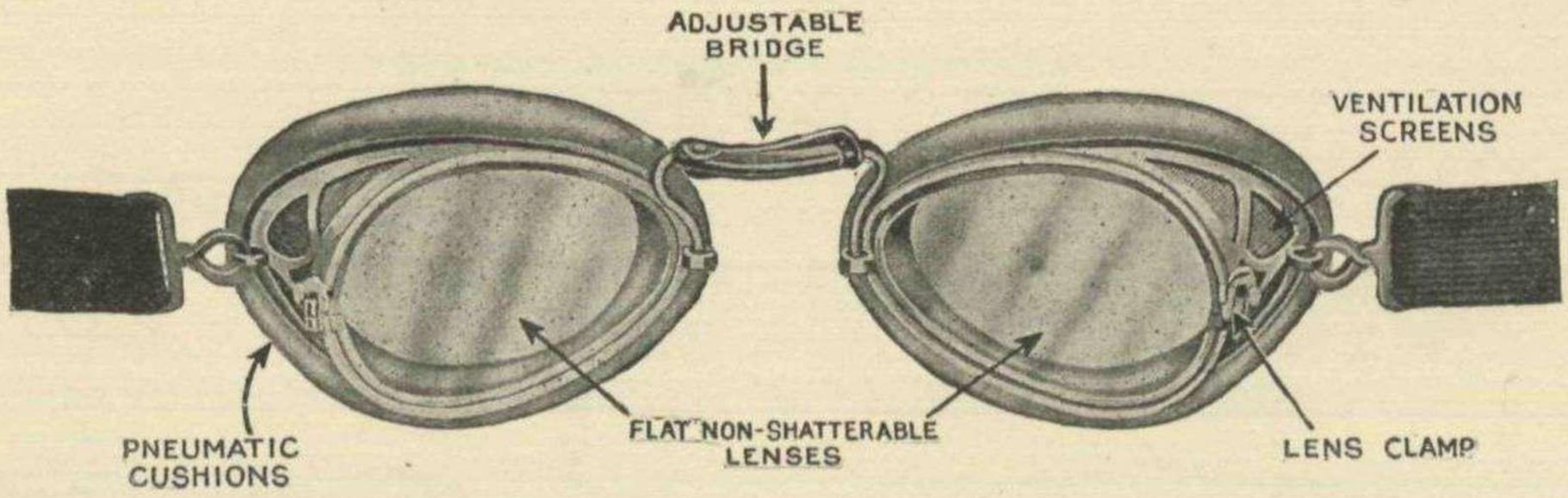
The joining of a club, tuition and the rest should cost a maximum of £35—not an excessive sum when the amounts spent in learning tennis, golf or bridge from professionals are considered.

Thereafter the fledged pilot can aspire to ownership—rather an expensive hobby as yet, or hire—which is cheap enough when one considers that it is possible to hire a machine through National Flying Service at £1 1s. per hour, fuel, oil and insurance included—a rate equivalent to 3¼d. per mile for two persons. At the moment the owner-pilot needs to be a man of some means, for he is in the position of a motorist who finds the market surfeited with Bentleys, expensive to buy and maintain, whereas his income calls for an Austin Seven.

The Bentleys of the air will always have their place for school-work and the like, but next year, I venture to prophesy, will see the Austin Seven of the air within the reach of all.

(There are many amateurs who are now building or contemplating building machines, which correspond to Captain Stacks idea of the Austin Seven of the air, and as the result of their efforts will be of the greatest interest to our readers, we shall publish from time to time details of such craft, for which we are convinced there is a great future. We therefore invite any of our readers who are engaged on any work of this sort to send us any details, which they consider likely to be of interest to others interested in the *really* light plane.)

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SLIPSTREAMS

By

"RUDDER-BAR."

Up The Lane.

Anyone visiting Stag Lane aerodrome at almost any time cannot fail to be impressed by the extraordinary atmosphere of activity which prevails there. Above, there is a constant stream of incoming and outgoing aircraft—the Club's yellow "Moths," the red 9.J's. and "Moths" of the De Havilland school, and a mixed assembly of privately-owned machines. And the D.H. factory itself is a veritable hive industry from whence emerge (so I am told) fifteen "Moths" every week. Where do they all go to?—Well, up to date there are 153 private-owners of machines in this country and 115 of these are "Mothers." Their numbers are growing steadily every month, and besides this, the D.H.60 ("Moth") is in world-wide demand so that a goodly proportion of each week's output is shipped abroad.

To those interested in civil aviation generally and private flying in particular it is refreshing to ponder on the progress made at Stag Lane during the past ten years. I can remember calling in there just after the War when the premises of the now famous Edgware firm consisted of about one wooden workshop and two Bessenau hangars. The only machine I saw on that occasion was an ex. R.A.F. "9" standing in pathetic solitude. in the centre of the 'drome. Times have changed.

The Tiger Moth.

As the little "Tiger Moth" has not been active for a considerable time, I inquired recently as to its health and gathered the lamentable news that it is to be written off. It seems that her manufacturers have no further use for her services and, as she carries no Airworthiness Certificate, she is not for disposal. At one time, I believe, Captain Hope intended to purchase her, but, of course without a C. of A. she would be of little use.

It is perplexing to ordinary people to find that a reputable a firm as De Havilland's should be refused a certificate by the autocrats at Kingsway and Farnboro', and much as one may appreciate the fact that without the A.I.D. commercial aviation in England might not have so good a name for immunity from accidents due to structural failures, there are times when the strictness of the Air Ministry is not very far removed from grand-motherly interference.

I cannot see, for instance, why a private owner should run the risk of forfeiting the C. of A. of his machine by carrying out overhauls and repairs himself, if he does not possess a Ground Engineer's licence. Neither can I see why a private person should be subjected to so much red tape should he attempt the courageous and intriguing task of building his own craft. But there it is.

The £17 Plane.

Mention of privately-constructed aeroplanes reminds me that I made a pilgrimage recently to Abingdon to view the remarkable effort of Mr. Buckle, who gained some fame in the daily Press some time ago with his monoplane constructed of scrap at a cost of £17. Unfortunately I was unable to see the machine, owing to the absence of the owner and due to the fact that its resting place in a field some three miles out of Abingdon was kept a close secret. I gathered quite an interesting amount of information, however, from an acquaintance of Mr. Buckle regarding it. The fuselage, empennage and undercarriage are home made; the wings (believed to be off a "Snipe") were purchased bare and covered and doped by Mr. Buckle; the engine is a 40-45 h.p. 6-cylinder Anzani. What the horse power loading and wing loading are I was unable to ascertain, but according to reports it has quite a respectable performance. On its first flight, I was told, it took off after a very short run, climbed to 1,500 feet in good style and handled as all good aeroplanes should. I wished I could have seen it. A home-made 'plane is something of a novelty nowadays, though in the early days it was the usual thing for a man to design and build his own machine and then teach himself to fly in it!

Germany and Gliders.

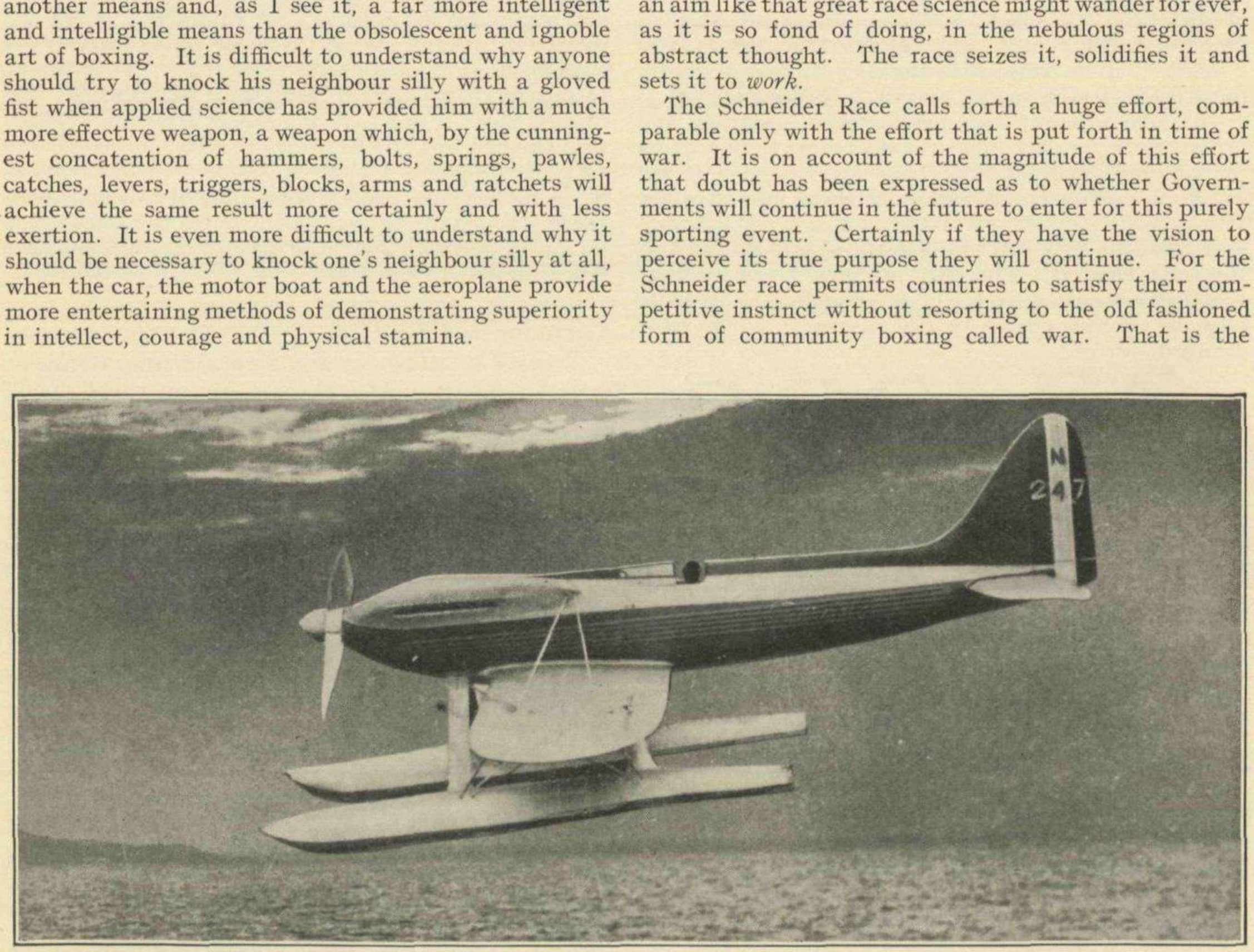
A friend of mine, recently returned from Germany, is enthusiastic about the glider movement which is now in such a vigorous state in that country, and is surprised that nothing of the revived art of motorless flight is seen or heard of in England. The fact is, of course, that the light aeroplane long ago totally eclipsed the glider as a sporting aerial vehicle for obvious reasons. You have to have the right wind, the right locality and the right machine before you can achieve anything more than a glorified tobaggan-slide with a glider and you cannot go from A to B whenever you want to. Nevertheless, I share the views of my friend that gliding, or sail-planing as it is called in some quarters, has certain advantages of its own. The machines themselves are low in first cost and their upkeep is negligible. Therefore its cheapness is a big feature. Again, one is not called upon to register a glider, nor is it necessary to obtain a C. of A. for it as it is a not a powered aircraft, and any immunity from legislation is always attractive. As for sail-planing itself, I am told by one who has indulged in it to some little extent that it is excellent sport. I can quite believe it and I should imagine that jockeying a plane sans moetur over undulating country in an attempt to reach some predetermined destination must be quite invigorating. The Germans, of couse, are pre-eminent in sail-planing and have established and hold a number of records. One pilot, for example, has flown a distance of no less than forty-four miles, another remained "upstairs" for 14 hours, 7 minutes, and a third rose to 2,500 feet above his starting point. All of which, it must be agreed, is quite remarkable.

The Future of Air Racing

BY

MAJOR OLIVER STEWART, M.C., A.F.C.

WHEN two carefully prepared youths, divested of nearly all their clothing, advance towards one another and forthwith attempt to bash each other into a state of bloody insensibility, the spectators applaud. It is a legitimate method of satisfying the competitive instinct. Man is eternally desirous of proving his superiority over his companions, and boxing is one means of allowing him to do so. Air racing is another means and, as I see it, a far more intelligent and intelligible means than the obsolescent and ignoble art of boxing. It is difficult to understand why anyone should try to knock his neighbour silly with a gloved fist when applied science has provided him with a much more effective weapon, a weapon which, by the cunningest concatention of hammers, bolts, springs, pawles, catches, levers, triggers, blocks, arms and ratchets will achieve the same result more certainly and with less exertion. It is even more difficult to understand why it should be necessary to knock one's neighbour silly at all, when the car, the motor boat and the aeroplane provide more entertaining methods of demonstrating superiority in intellect, courage and physical stamina.



THE FASTEST MAN-MADE CRAFT YET. THE SUPERMARINE ROLLS-ROYCE S.6. WINNER OF THE SCHNEIDER TROPHY AT 328 MILES PER HOUR AND THE HOLDER OF THE WORLD'S SPEED RECORD OF 357.7 MILES PER HOUR.

The antique blood-and-brawn sports must give way before the modern mechanical sports. And among these mechanical sports air racing takes a prominent place and in the future it should play a part of increasing importance. The Schneider Trophy race is the greatest sporting contest of any kind that has yet been staged; more money, more time and a greater variety of knowledge is expended upon it than upon any other contest. Governments take part and pit their resources against one another. The entire accumulated aeronautical knowledge and experience of the participating nations is brought to a head when the starting gun goes; without an aim like that great race science might wander for ever, as it is so fond of doing, in the nebulous regions of abstract thought. The race seizes it, solidifies it and sets it to *work*.

The Schneider Race calls forth a huge effort, comparable only with the effort that is put forth in time of war. It is on account of the magnitude of this effort that doubt has been expressed as to whether Governments will continue in the future to enter for this purely sporting event. Certainly if they have the vision to perceive its true purpose they will continue. For the Schneider race permits countries to satisfy their competitive instinct without resorting to the old fashioned form of community boxing called war. That is the great task which in years to come air racing must fulfil. *It must provide a humanitarian outlet for the combative instinct.*

I see in air racing, amplified and extended by motor

THE FUTURE OF AIR RACING—continued.

car, motor cycle and motor boat racing, nothing less than a substitute for war. Terrific and furiously fought mechanical contests, closely related as they are to everyday life in this age of machinery, provide the "moral equivalent of war" postulated by William James.

This year Waghorn won the Schneider Trophy at 328 m.p.h., an advance of 47 m.p.h. on the 1927 speed. The curve of probability gives an average speed of more than 355 m.p.h. for 1931. Peer still further into the future and you will see astonishing vehicles, polished *cases* with vast engines in their noses, rushing round the course at the speed of sound. You may observe many startling changes in these racers of the future. They are, for instance, less noisy. The winning machine this year made less noise than the 1927 machines. The geared airscrew has something to do with this increased silence, and it seems highly probable that the variable pitch airscrew which will be used if not in 1931 then soon afterwards, will still further reduce noise. The engines will be cooled with ethyline glycol or some similar substance, for already the wings and fuselage are too small to carry all the radiator surfaces which are needed when water is the cooling medium. These are normal developments. There may be abnormal ones, for such have been adumbrated both here and in Italy.

For example, a suggestion has been made by the National Physical Laboratory that the Cierva autogiro or windmill aircraft might be specially suitable for racing because its speed range is greater than that of a ordinary aeroplane. It would therefore be possible to raise its wing loading and top speed without making the landing speed unpractically high. Again, floats may eventually be suppressed altogether in racing seaplanes. The Italian Piaggio by most ingenious design succeeds in doing without floats, although this machine has still to prove its worth. Two or more engines may be used, as in the Savoia-Marchetti with it two Isotta Fraschini engines mounted in tandem.

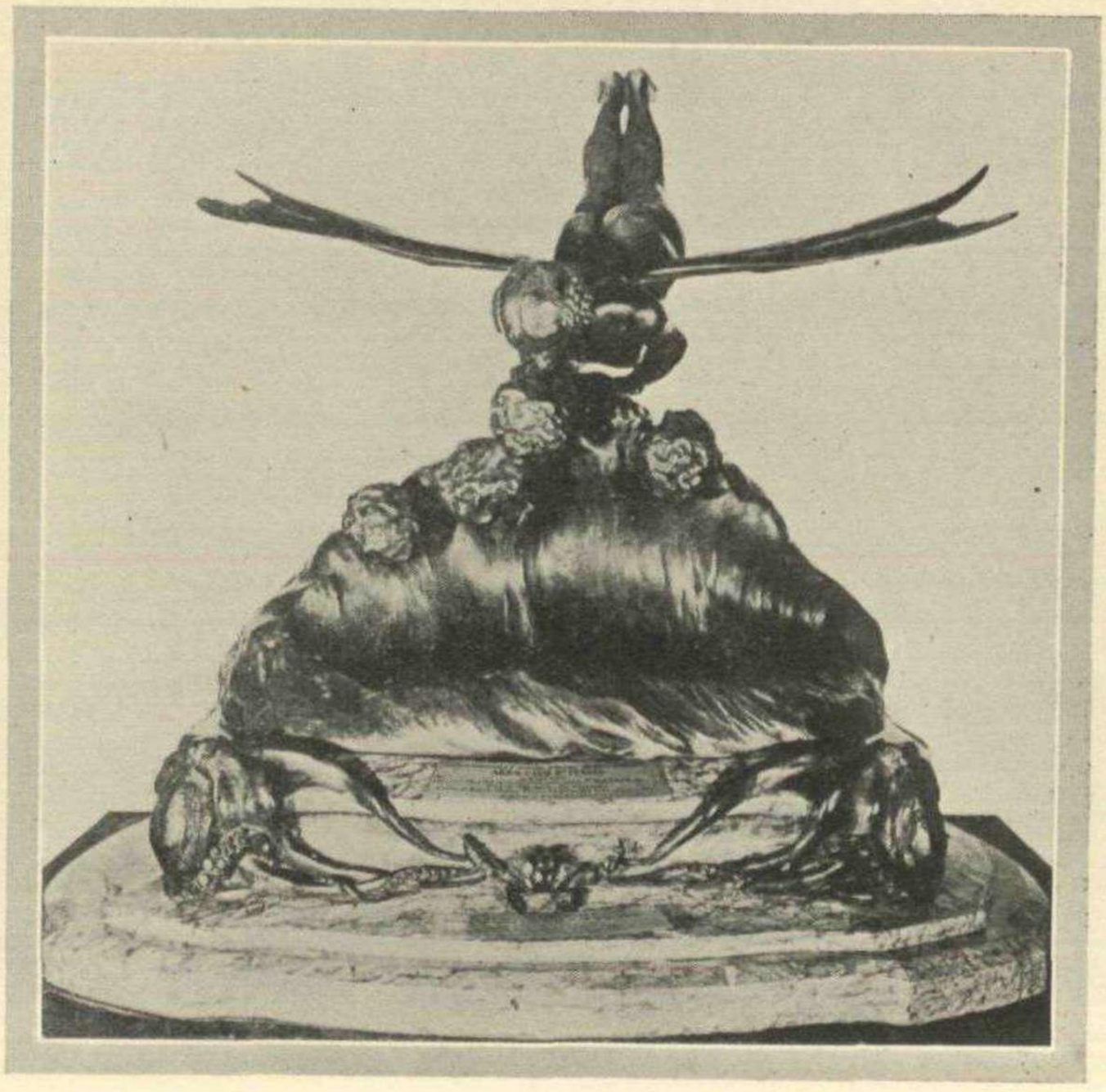
In all these directions, smaller radiators, variable pitch airscrews, higher wing loadings, suppression of floats, and multiplication of power units, progress may be looked for in air racing machines. In the actual organisation of air racing there is likely to be parallel progress. At present the King's Cup is the only British air race of any note. Special events for high speed light aeroplanes built on the lines of the Tiger Moth may be expected as well as "sports" aeroplane races like the stock car races now so popular. Cross country races round Britain will alternate with races round short triangular or quadrangular courses. And I hope that someone will soon institute a 12 or 24 hours air race like the Le Mans car event. It is likely that 1930 or 1931 will see a revival of the Aerial Derby, an unrestricted high speed event for land machines, although it seems that some limit on landing speeds would be necessary.

But all these, interesting though they are, are purely local events, and the apex of air racing is reached only in a great unrestricted speed contest like the international Schneider Trophy race. This is the last word in mechanical sport. And besides providing one of the grandest imaginable spectacles, it fulfils a valuable humanitarian purpose. There is important work for a great international air race to do, and it is essential, if the future of such events is to be assured, that their true purpose should be understood and that they should receive enthusiastic public support.



FL.-LT. WAGHORN, WINNER OF THE COVETED SCHNEIDER TROPHY.

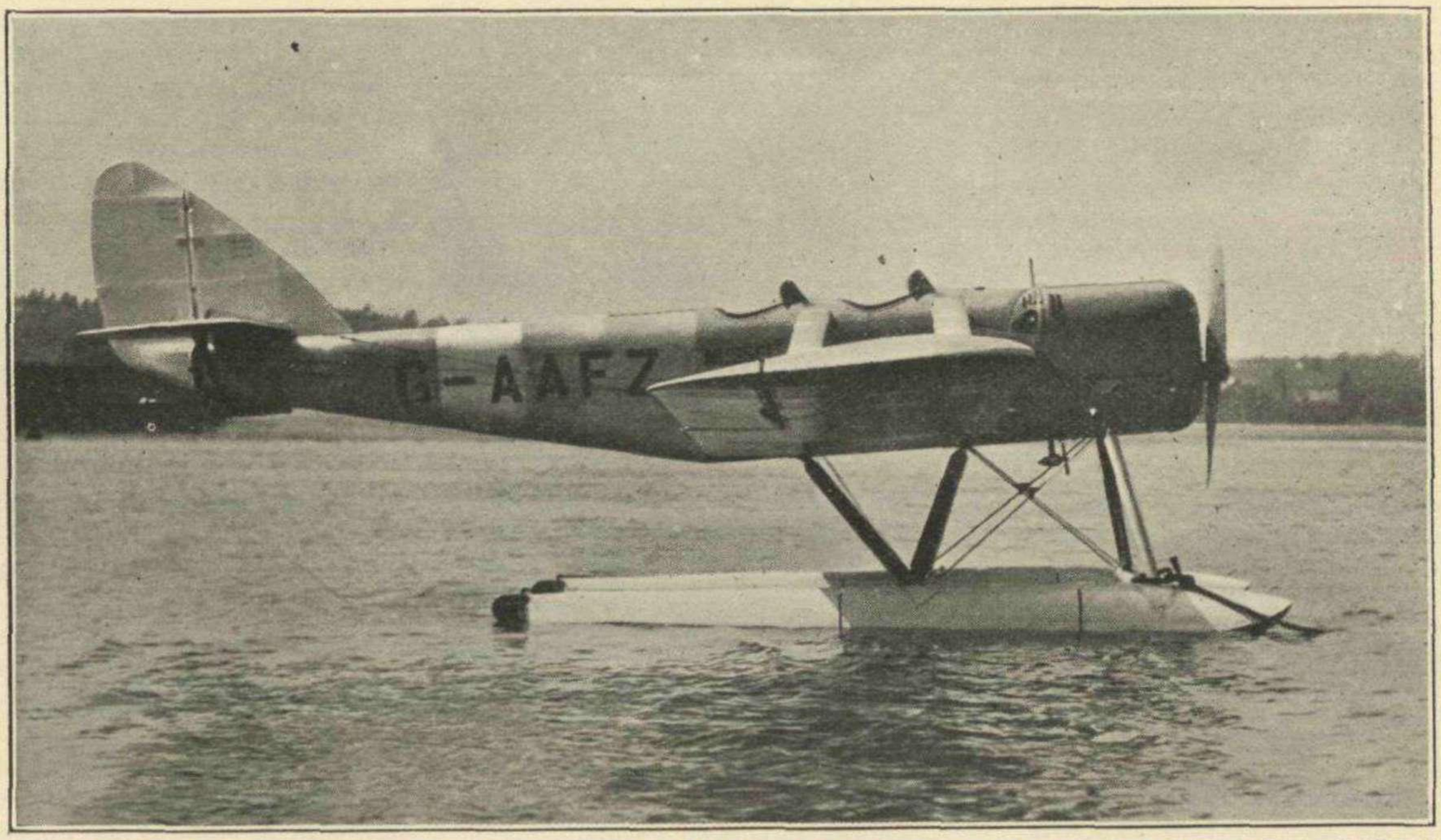
(*Below*) A VIEW OF THE TROPHY SHOWING THE GRACEFUL DESIGN.



The Development of the Light 'Plane

BY

G. G. O. MANTON.



THE SHORT "MUSSEL" LIGHT SEAPLANE, WHICH IS DISTINCTIVE AMONG LIGHT-PLANES IN BEING "ALL-METAL" EXCEPT FOR THE WING COVERING.

JUST over six years ago a stir was caused in the aviation world when an aeroplane was successfully flown, powered with an engine of only 400 c.c. capacity. The machine in question was known as the "Wren," and its diminutive power unit was an ordinary A.B.C., taken from a motor cycle. Up to the time of its appearance the prevailing opinion was that no machine was safe or practical unless powered with a motor of at least 45 h.p. and consequently when the "Wren" not only flew, but flew wonderfully well a mild sensation resulted.

Civil flying was in a very anaemic state in 1922-1923 and private aviation, owing to public apathy and lack of suitable machines, was practically non-existent. The advent of an aeroplane of so simple a construction as the "Wren," which called for no very great skill or expense to keep in trim and to run, was bound to arouse considerable attention and there were few of us who have been interested or associated with aviation during the last decade who were not intrigued with the possibilities which such a machine offered.

Thus, it was that other machines of similar type were evolved by the majority of our leading manufacturers so that when a competition was organised in October, 1923 no less than twenty-eight "pip-squeaks" of the air figured in the list of entries. All these planes were of the single-seater type, and, due to the rules of the competition, none was powered with an engine of more than 750 c.c. capacity. It should be mentioned that in every case motor cycle power units were adopted and considering that they were never designed for aero work, the results obtained were noteworthy. During the six days occupied by the competition, for instance, Bert Hinkler covered 1,000 miles on an Avro monoplane and had no trouble whatsoever. His engine was a 750 c.c. Douglas which drove a geared-down chain-driven propeller. There were others, of course, who were not so fortunate and there were a good many "bursts," but the Avro was not the only craft to put up a good show. A prize was offered for the highest average speed over the 12½ miles course, and this was secured by the Parnall "Pixie," a particularly attractive little machine also fitted with a Douglas engine, and Captain Macmillan, her pilot managed to lap at 76 m.p.h. in weather which was far from ideal. Other outstanding performances were made in respect of petrol consumption and altitude, notably by the "Wren," which tied with a Blackburne-engined A.N.E.C. monoplane in averaging 87 m.p.g., while the latter also secured the height award by a climb to 14,400 feet. Altogether the results of the contest proved conclusively that it was possible to build an aeroplane of no more than 10 h.p. which would carry its pilot quite easily and the next step was to produce a two-seater on similar lines, and in due course a number

THE DEVELOPMENT OF THE LIGHT 'PLANE—continued.

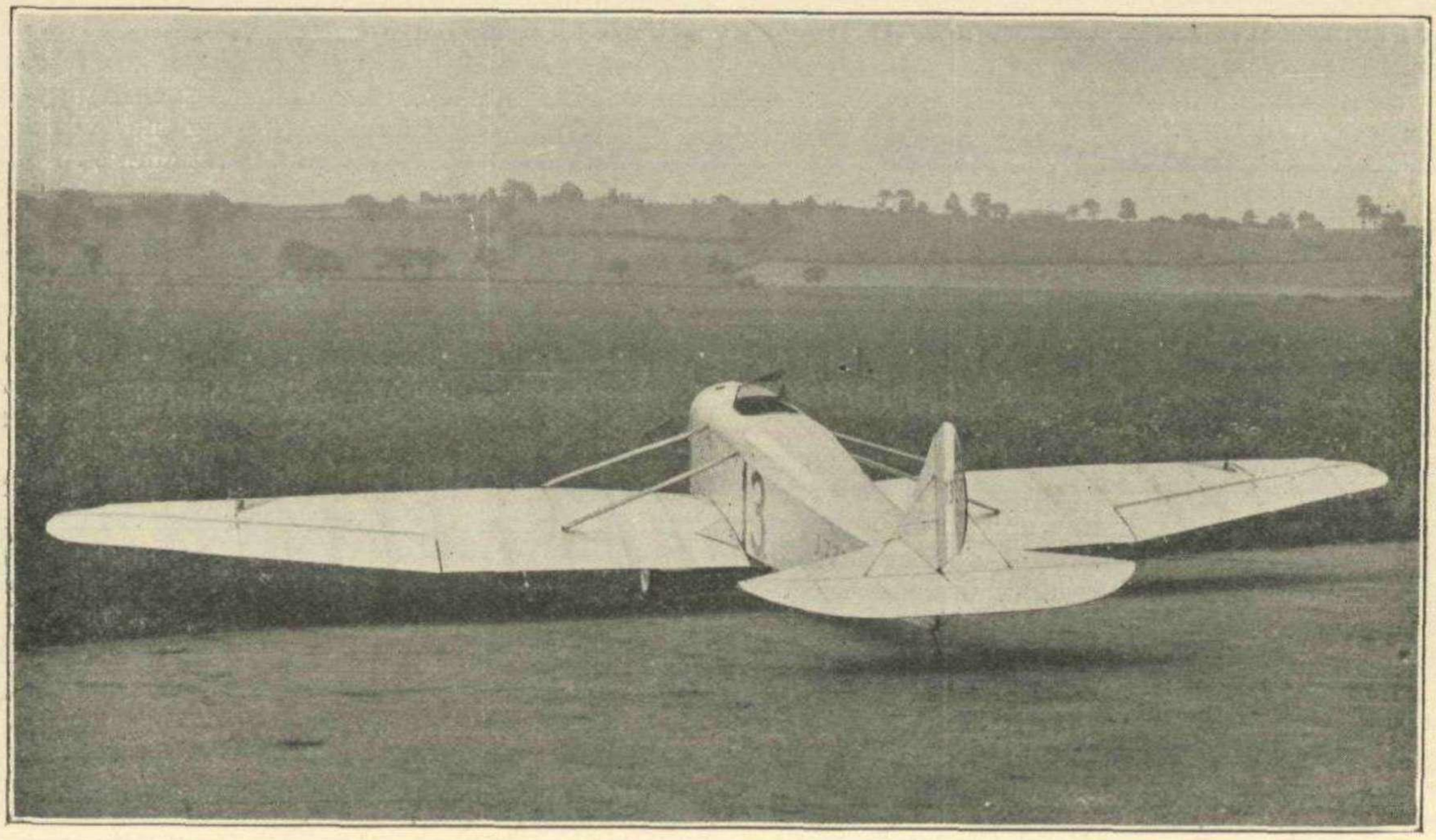
appeared in another competition held at Lympne aerodrome in the following year. In this contest it was deemed advisable to raise the stipulated engine size to a maximum of 1,100 c.c. capacity. Motor cycle engines were again in evidence, but to a lesser degree, owing to the introduction of a new flat-twin aero engine—the Bristol "Cherub."

The "Cherub" showed itself to be an exceptionally fine little motor; it was reliable, powerful (it developed 32 h.p. at 3,200 r.p.m.), and weighed slightly over 90 lbs., and it was significant that the more important prizes were carried off by machines which were "Cherub" engined.

The principal award went to the Beardmore "Wee Bee," a machine of the high-wing monoplane type, which with full load had a speed range of from 39 m.p.h. to 71 m.p.h. and another winner (for greatest distance covered) was the C.L.A.2 biplane. This plane was of particular interest, as it was of private construction, having been built by the staff at Cranwell R.A.F. college to the design of its pilot, Lieut Comper. It covered a distance of 762 miles and its actual flying time was 17 hours, 53 minutes. Incidentally the latter has now left the Air Force and is engaged in the manufacture of a light 2-seater monoplane bearing his name.

On the whole the 1924 competition was enlightening, but somewhat disappointing, for though the performances of the winning machines were good, there were a good many retirements, and the consensus of opinion was that while a reasonably efficient single-seater plane might be built with an engine of about 10 h.p., a two-seater of very little higher power could not be made to function satisfactorily.

In the meantime the De Havilland Co., had been quietly at work on the first of their now famous "Moth." Here was a machine essentially for the private owner, for with its folding wings, which solved the housing problem, dual-control, robust 4-cylinder air-cooled 27-60 "Cirrus" engine it was easy to handle, cheap in upkeep and capable of serious touring work. From its inception it was a great success and, it is safe to say, that it not only set the fashion in light aeroplanes but laid the foundations of the movement as we know it to-day. Again the trend of design changed, and the Avro "Avian", the Blackburn "Bluebird," the Westland "Widgeon," the Simmonds "Spartan" appeared in due course as healthy rivals to the "Moth." With each succeeding year improvements are added to these fine little machines; the power of the engines is being raised, the cockpits made more luxurious and detail refinements added, so that to fly in them is to experience a de luxe form of travel. How quickly and to what extent their development will be made in years to come only the future can tell, but is certain that the light plane has been a potent factor in the ushering in of the air age. Nevertheless, great as one's admiration must be for the present day light aeroplane, there remains a certain feeling of regret that its success brought about the abandonment of those little single-seaters of six years ago. A few of them, in the hands of private owners, are still going strong and there are many who envy them in possessing them, for these diminuitive craft make a definite appeal to the sportsman. However, there are indications that the single-seater low-powered sports plane will shortly make its "come-back"—the Glenny-Henderson is perhaps the precursor—and it is certain that it will be welcomed.



(3) A 7-H.P. SINGLE-SEATER 'PLANE OF 1923, THE PARNALL "PIXIE" WITH BLACKBURNE ENGINE.

Big End Bearing Design

BY

W. S. BRAIDWOOD, B.A.

IT is interesting to observe that throughout the development of the racing motor-cycle engine, designers keep on reaching a stage in the obtaining of increased power, where one particular component of the engine appears to set a limit to the power and speed possible with a given cubic capacity. Eventually each source of trouble is eradicated by experiment and research, only to reveal that when one component is made to stand up to the work, some other part, not previously considered a difficult point in design, becomes in its turn the limiting factor to power output.

At one time pistons were a constant source of trouble, at another exhaust valves were thought to be the greatest trouble in the design of a fast engine and so on, but throughout the evolution of the high speed engine, especially in the motor-cycle world, there has been one thing which has always been a potential source of trouble, and that is the big-end bearing. This has always been a source of anxiety when the other troubles have been solved, and at the present time we may safely say that this component is causing more engine failures in racing than any other, and it is therefore a good opportunity to consider the chief causes of big-end failures and to see what steps can be taken to reduce their possibility.

The big-end bearing is unlike any other in an engine in that it combines an extremely high rate of revolutions and heavy alternating loads with a rapidly varying angular velocity. Also its actual motion is not only that of a journal rotating in a bearing, but the bearing itself, instead of being stationary as in a main bearing, is describing a circle with a diameter equal to the stroke of the engine, and therefore has to cope with an extra load due to centrifugal force.

It is therefore this point and its varying angular velocity that are the cause of its being a problem all on its own in the bearing line, and they are the cause of nearly all the big-end trouble incurred.

The actual size of the bearing is limited chiefly by the fact that the crankshaft must be compact and as rigid as possible, and it is for this reason that nearly every motor-cycle engine of to-day has a roller big end, in view of the very high loads which this type of bearing can carry on a small area. However, the fact that trouble is still experienced in many designs goes to prove that the mere employment of a roller bearing of sufficient size to deal with the maximum loads involved does not constitute a way out of the difficulty, and we will therefore consider what happens to a simple roller bearing at high speed.

It will be simpler to take the two causes of trouble separately, so we will first take the effect of the centrifugal force. The first effect of this is of course the obvious increase in the bearing load due to the centrifugal force on the lower end of the connecting rod, and for this reason this part must be kept as light as possible consistent with rigidity. The second and more important effect is that of the centrifugal force on the rollers themselves. This force tends to pack the rollers together on the outside of the bearing, and the force is such at high speeds as to break down the oil film between the rollers and the consequent rise in temperature softens the case hardening of the rollers and causes failure of the bearing.

The usual course now adopted to prevent this rubbing is to carry the rollers in a cage of steel or bronze so that they are kept separate and can only rub against the cage in which they are a running fit and therefore avoid the intensity of pressure resulting from line contact with the roller adjacent. Also, if the cage is constructed of some material which makes a good bearing for hardened steel, wear of the rollers should be practically confined to that caused by the actual bearing load on the big end. Of course, the cage itself is subject to the same centrifugal force as the rollers, and therefore it must be sufficiently strong and rigid to avoid being broken up by the combined effect of its own mass and that of the rollers it contains. Although breakage of the cages is by no means unknown, in the more successful designs it is extremely rare, and we must look further for the cause of the continued trouble which is still being experienced with big-ends.

The caging of the rollers in a bearing, however, has no effect on the unfortunate circumstance that a big-end bearing has a continually varying angular velocity. In other words, although the engine may be maintaining a constant speed, and the average angular velocity or revs. per minute may not change, such happy state of affairs does not obtain in the big-end, whose actual angular velocity varies from a maximum to a minimum and again to its maximum every revolution of the engine, owing to the varying angularity of the connecting rod. If the con-rod was of the infinitely long variety so often postulated in text-books this would not be so, as there would never be any angularity, but owing to considerations of space the con-rod of the motor-cycle engine is not only not infinitely long, but is actually shorter than in almost any other form of reciprocating engine.

At T.D.C. the angular velocity of the bearing about its journal is equal to the angular velocity of the crankshaft plus the angular velocity of the con-rod, and at B.D.C. it equals the difference of these angular velocities.

Let us consider the case of an engine in which the length of the con-rod is 3 times the radius of the crank, a case which is much nearer the truth in many designs than it ought to be. If the engine is running at a constant speed the linear velocity of the crank-pin is a constant which we will call V feet per second, and the radius of the crank R. Then the length of the con-rod will be 3R.

BIG END BEARING DESIGN—continued.

Thus the angular velocity of the crankshaft is V/R radians per second, and that of the con-rod V/3R radians per second.

At T.D.C. the angular velocity of the bearing therefore equals V/R plus V/3R or 1.33 V/R radians per second.

At B.D.C. it is V/R minus V/3R or 0.66 V/R radians per second. From this it will be seen that the angular velocity of the bearing at T.D.C. is twice that at B.D.C. This means that if the rollers are to roll on the journal and the outer race they have got to be accelerated to twice their angular velocity in half a revolution of the engine, or in one two-hundredth of a second at 6,000 r.p.m. However, owing to the moment of inertia of the roller it refuses to do so, and the result is that it skids instead of rolling, and eventually causes failure.

This trouble has been partially met in various designs by decreasing the moment of inertia of the roller by decreasing its diameter, this trend having led to the "bundle of needles" type of big-end, either caged or not, which is used in a number of designs at present.

However, all these ingenious adaptions of the roller bearing are merely admissions that the roller bearing is inherently unsuitable for a big-end, and it becomes increasingly obvious that a plain bearing fulfils the requirements to a far greater degree than any other type. The reasons advanced against the use of plain big-ends in motor-cycles is that they need more thorough lubrication than rollers, and that there is not room in a motor-cycle engine for a large enough plain bearing to carry the loads incurred at racing speeds. The former reason is a relic of the past, as now most engines have dry sump lubrication in which the whole of the oil supply is fed through the big-end under pressure to keep the skidding rollers cool enough to avoid failure, and a momentary stoppage of the oil supply is quite sufficient to wreck the bearing, and therefore the plain bearing is no longer at a disadvantage on this score.

The second reason carries more weight, and the writer agrees that the ordinary car type of white metal big-end would not be suitable owing to its liability to failure by crushing and also to its considerable weight. However, there is a good choice of stronger materials, and an aluminium bronze, consisting of 88 per cent. aluminium and 12 per cent. copper makes an excellent bearing for hardened steel shafts, being very light and a very good conductor of heat.

In high speed bearings the actual maximum pressure is not of great moment as long as it is not so great as to crush the material, and the important thing is the load factor, that is the product of load and speed.

Under good conditions of forced lubrication, and with good facilities for getting the heat away from the bearing, load factors as high as 20,000 lb. ft. per second can be, and have been used.

Furthermore, in the case of very high rubbing speeds load factors can be increased by as much as 50 per cent. where floating bushes are employed between the members. In this case the rubbing speed between each face is halved and a larger quantity of oil can be circulated through the bearing. This gives an allowable load factor of 30,000 lb. ft. per second, and there is certainly room to design a bearing well within this figure without appreciably changing any other part of the engine as now used in motor-cycles. The bearing would consist in its essentials of the present type of crankpin and connecting rod with a plain bush substituted for the present assembly of rollers.

It would suffer from none of the disadvantages of the roller big-end which we discussed at the outset, and it would have the added advantages of simplicity, silence, and extreme cheapness compared with the present type of bearing, which last item at least ought to appeal to the manufacturer, and it will be interesting to see who will be the first with sufficient courage to flout the present fashion and take what appears the obvious and correct course.

Improvement in Battery Design

THE latest advance in Battery construction is an example of the TUNGSTONE Accumulator Co.'s product, the "TUNGANITE" series of Batteries.

This firm is well known for the Metal Cell type of Battery which is of unit construction, allowing the plates to be easily withdrawn for examination or replatal, without the messy job of pitch sealng or tiresome lead burning. These advantages have now been incorporated in an improved type of composition container.

The Batteries are marketed at a popular price which brings the combined benefits of low first costs and lower maintenance to the purchaser of moderate means.

A great advantage of this Battery is in the use of a new proved Acid resisting Metal—Batterium—for all metal parts other than lead parts of the Battery. This alloy was invented by the TUNGSTONE ACCUMULATOR Co., who are to be congratulated on their enterprise and sucess.

Many motorists are no doubt also interested in House Lighting Batteries and a very attractive catalogue listing this and other types of PLANTE Batteries is obtainable from the TUNGSTONE Co. free of post on receipt of enquiry.

WHAT OF 1930?

By J. A.

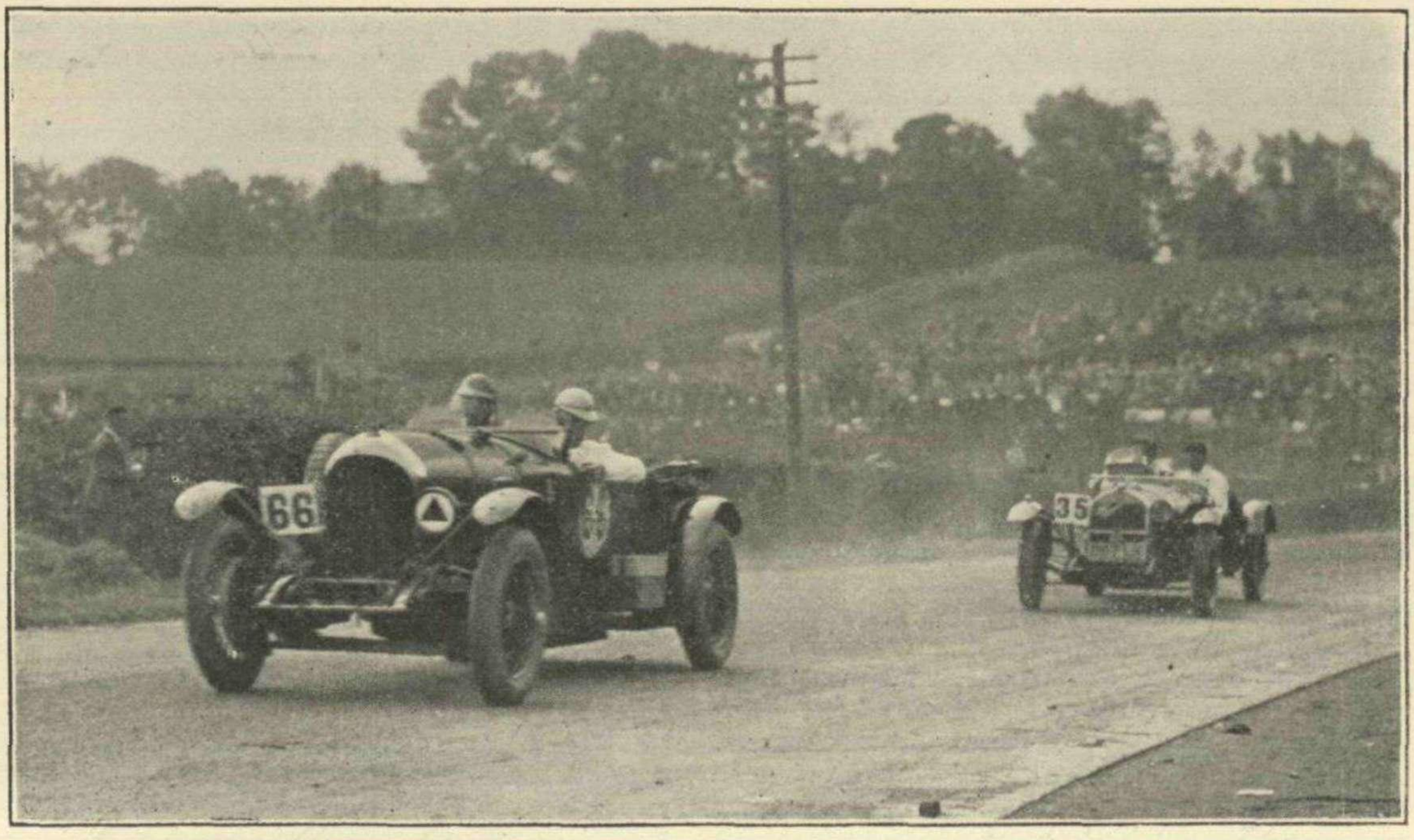
A review of the present troubles in the racing world and some possible solutions.

NOW that the shouting has died away, and works managers have a respite from the quite unreasonable importunity of racing departments, and Mr. and Mrs. Brown of Lower Clapton have lost their anxiety for the success of this or that marque ("Just like ours dear—only rather different"), it is perhaps allowable to reflect upon the future of automobile road-racing at any rate under the aegis of the R.A.C. the position to-day seems clear enough: class racing is dead, hill climbs and speed trials almost so, and the so-called touring car race alone retains its vitality. Indeed the absence of rival competitions combined with an active press campaign have given a very remarkable prestige to this last survival of racing on four wheels.

The Grand Prix de France died a natural death two years ago with the withdrawal of the Delage equipage from competitions, and with it class racing is to all intents at an end. The post-war tendency to reduce engine capacity proved in vain. Public interest in the purely racing-car lessened, entries fell in number and in the last year Bugatti and Delage fought out a great battle on five fields. There were other entries but they were in the nature of "white hopes": the next year Bugatti had no challenger. That class racing still exists in Italy proves that it is still a practical proposition but it is outside the scope of this article to discuss the possibilities of its renewal in Northern Europe.

An unfortunate accident on the most classic of hills, Kop, brought down the official ban on hill climbs and speed trials. Shelsey Walsh remains, and is a healthy reminder of the genuine sport to be obtained in these competitions, where the cunning hands and hard work of a mechanic counts for a lot, and the dreams of the advertising manager for precisely nothing. I see from my morning paper there is a plan afoot to build a monster straight speedway in the East Coast. It is an out-of-the-way spot and I personally can find little interest in going extremely fast for a few kilometres (not that I have not the greatest admiration for the skill and courage of these who travel at these speeds). But hill climbs and speed trials were events where the amateur (i.e. "not-so expert") had a sporting chance of annexing a place and while welcoming this speedway it would give me even greater pleasure to learn that some one had bought a strip of the Chilterns to build a New Kop.

Thus it is that to-day we are left with the touring car race, represented as far as this article is concerned by the races at Le Mans, Phoenix Park and Ards; most of what I have to say concerns the last of these, "our" race. They all receive large trade support, publicity and public attention. Motorists in general are interested in a race for cars not dissimilar to those they buy or would like to buy, and the races seem to develop a type of car suited to the needs of the sporting fraternity.



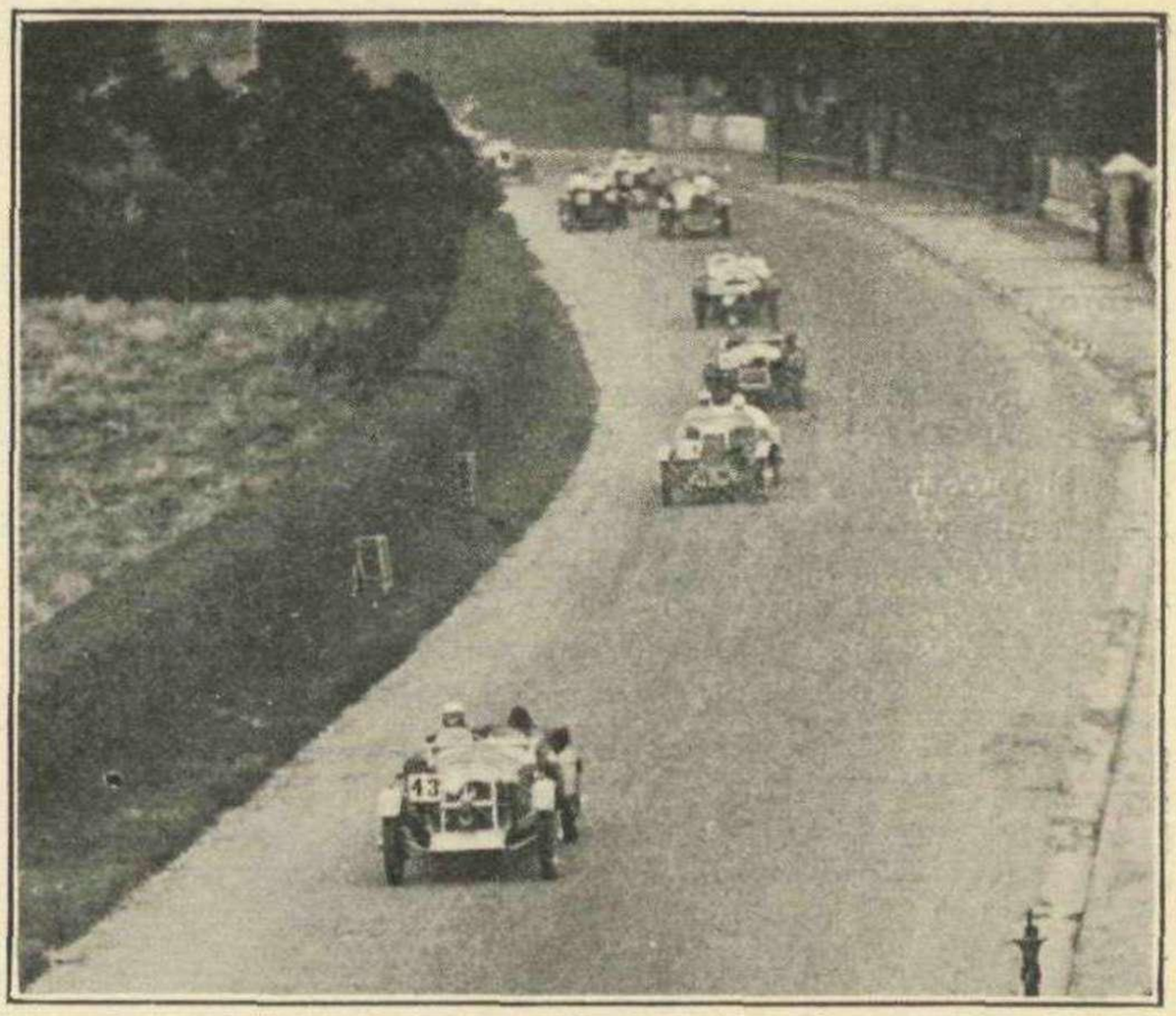
DAVID AND GOLIATH: AN ALFA-ROMEO—BENTLEY DUEL IN THE R.A.C. T.T. RACE.

WHAT OF 1930?—continued.

Superchargers are becoming more common and road holding is improving: the show will give examples of both directly attributable to racing experience. In short the touring car race is following in the footsteps of the Motor-Cycle Tourist Trophy races twenty years ago. It is however common knowledge that there is much dissatisfaction with the products of the motor-cycle races to-day: under the present rules it is bound to be so. Such a position will I believe be reached in the touring car race within a very few years.

The race at Le Mans is to-day almost a certainty for the fastest car, given a certain modicum of reliability and road worthiness. Those at Phoenix Park and Ards are handicaps in which the smaller cars can and do score successes. May I surmise that Mercédès-Benz, Alfa-Romeo and Austin will gain almost equally from their performances in the latter race? But that the biggest and fastest car in the race, backed by experience and thorough organisation won a convincing victory omens ill for the future of the sport. The weather and the course both favoured the small car which, furthermore, received a very liberal handicap. Such a victory can only have one result—to stimulate manufacturers to market larger and faster sports cars of ten or more litres capacity purely with a view to racing. They will win and the smaller cars will drop out of the entry lists: even next year I forsee a smaller entry, for there is a market for the two litre sports car whether it races or not. These races of the giants will be thrilling to a degree but touring car races they will not be. The winning car will have a very limited market, public interest will flag, and the races will go the way of the classic class races.

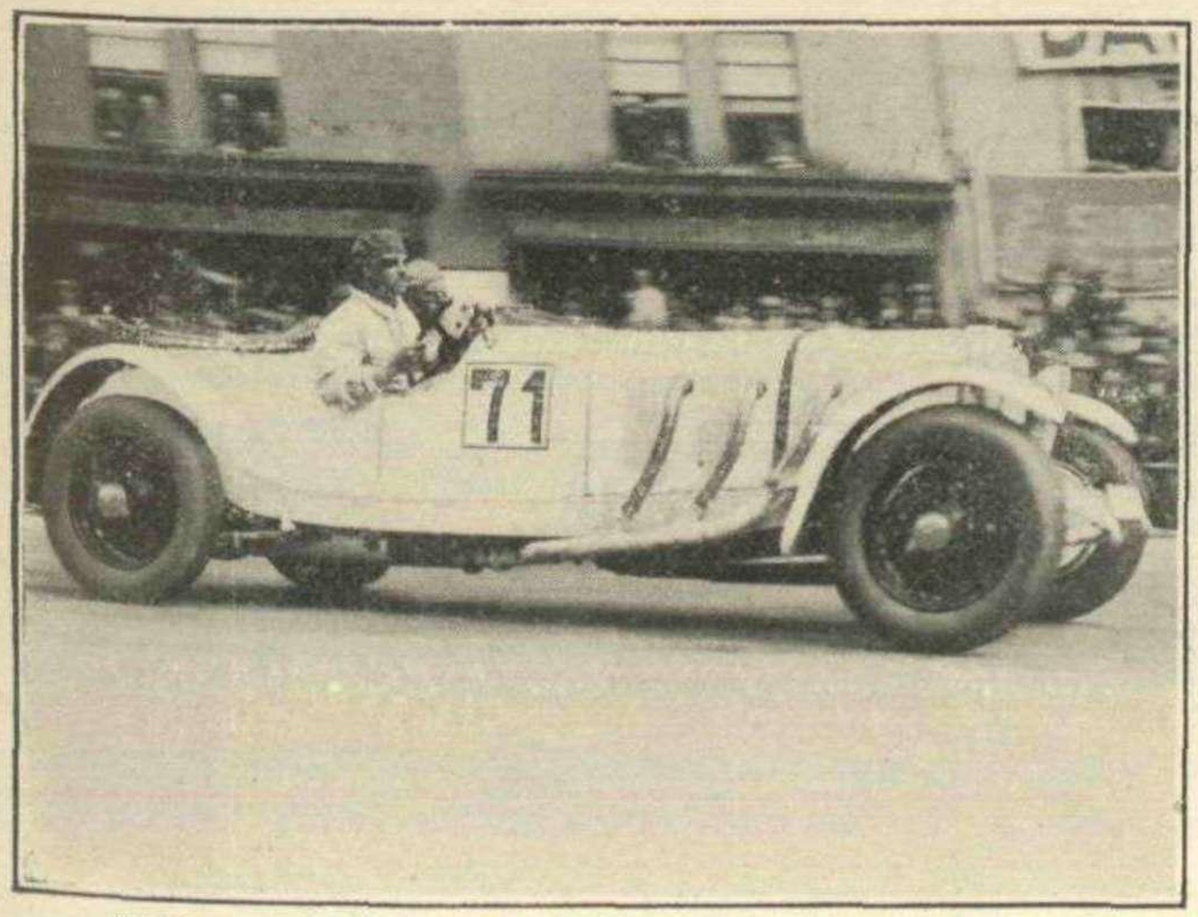
The system of handicapping must be altered. It is too crude to allow of accurate grading of cars varying so much in size. I believe the solution lies in percentage-time handicapping, as used in yacht racing. It would mean in all probability the abolition of the mass start: (no one who saw the race in Ulster will object to removal of what many of us have always thought an unnecessarily dangerous feature): it will make the race harder to follow. But only the very clever ones (who are usually wrong) can "read" the motor-cycle T.T. races unless they are at the stands, and pandering to the spectators is the surest way of ruining any contest. It is worth remarking that any attempt to popularise motor racing by introducing "thrills" is doing the greatest disservice to the industry and the sport.



THE DANGEROUS MASSED START.

If a remedy is to be found it must be found soon. I confess at the outset that I can see no immediate and certain way out of the impasse but there are certain obvious measures which must be considered. The races might be run as class races pure and simple. A study of the advertisements in the press after this year's race might lead the ignorant to believe that every single entrant was placed in the R.A.C. Tourist Trophy. There are too many classes and to limit the number would raise countless difficulties: furthermore there would be not one winner but six or seven winners which enormously lessens the value of any race. Rather let the race be a handicap, but divided into two sections (as at Phoenix Park), 750c.c.—2 Litres, and 2 litres—8 litres. I name an upper limit advisedly because, while admitting it against the principle of the races as now run, I believe it is a size (Class B) which includes the great majority of practical touring cars.

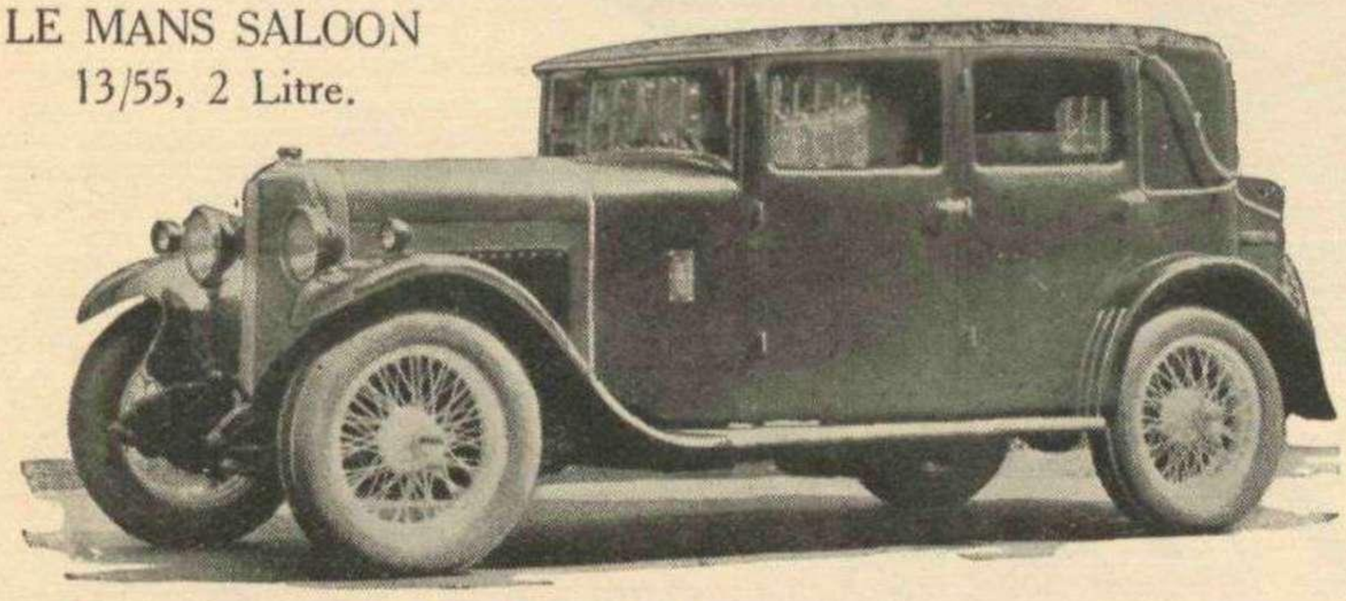
The Ards course has come in for a lot of criticism. I suspect the ideal course exists only in the imagination. To make it narrow and give the smaller fry a greater chance is to confuse motor racing with suicide. To make it a circular arterial road (like Nurburg ring) is to put too great a premium on mere speed and remove road conditions. Perhaps it is best to state the desideratum. It must be normal road with unbanked corners and allowing in places a speed of at least 110 m.p.h., it must if possible include a real climb and



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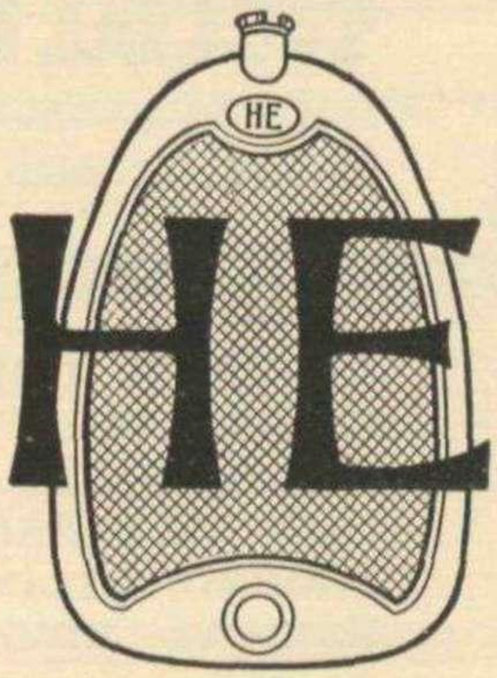
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The Way of Things

Thank You !

JUDGING by the large number of letters we have received from all parts of the world, the revival of MOTOR SPORT in its new form has been a very popular event. The number printed and circulated of our November issue was three times as great as ever before, but in spite of this we have heard of cases where readers had difficulty in obtaining their copies and we have had to print a greater number for this month. We hope the fare provided will come up to the required standard of interest and we invite criticism and suggestions on any point which may occur to you.

The Show.

The motorcycle has been, and in our opinion always will be, essentially a sporting vehicle. Motorcycle racing and competitions provide sport second to none to those who go in for them seriously ; and to those who crave more variety and new fields for exploration, they provide a stepping stone to the car or light plane. A very large proportion of the greatest names in motor racing to-day, started their career and learnt the tricks of the trade on two wheels, and it is safe to say that in many cases, had it not been for the motorcycle which first showed them the infinite scope of mechanical sport, many of those names would not now be known to us.

For those who regard motorcycling sport as the greatest of all sports, and they are legion, there is now a finer choice of machines for the purpose than there has ever been in the past. It is now possible for the private owner to purchase a machine which has, built into every component, the valuable experience gained by competing in the great races and reliability trials, and at a price lower than ever before. We therefore tender our heartiest congratulations to the motor cycling industry on its position of being the one industry in which Great Britain has established beyond question of doubt her superiority over every other nation, and trust that through the sporting side of the movement, it may maintain its place against anything that our foreign rivals can produce.

The R.A.C.T.T.

There has been a great deal of talk lately about the most suitable venue for this event in the future, and many courses have been suggested. It seems only natural that in these discussions the claims of the Isle of Man have been so strong as to warrant earnest consideration, and we are surprised that having once considered this as a suitable place there should be any doubt as to the course. The issue appears to be confused by the supposed necessity for keeping the lap extremely short, for the benefit of the spectators and for greater ease of handicapping.

Handicapping if necessary should be on a time basis and as for the spectators, it is only natural that a large crowd will collect to watch such an interesting event, but we venture to suggest that this is incidental. The event is a race first and a spectacle second, and as soon as we lose sight of this fact so soon will motor racing degenerate to the level of the gladiatorial combats of the Romans, and its greatest value, that of improving the breed, will be lost. A road race must reproduce road conditions, and there can be no course which does this better than that now used for the A.C.U. Tourist Trophy. It has been said that this would require widening in places to make it suitable, but as this has also been said of all the suggested courses in the island, it appears no disadvantage, and work on it is now being carried out. In the past, cars much larger and less controllable than those of the present did battle over it, through the blinding dust of the old narrow roads, and the spirit of the pioneers of motor-racing haunts every inch of the wonderful mountain course.

However we live in a practical world where sentiment is not taken as a valid argument, and in this case there is no need that it should be. The fact remains that this thirty-eight mile lap on the island in the Irish Sea, with its wonderful surface, its suitability for high speeds, its infinite variety of twists and turns, its gruelling climbs and swooping descents, is still the finest road circuit in the world.

WHAT OF 1930?—continued.

descent: it must avoid freak features like hump backed bridges and roads on the edge of a precipice. There is no such in these islands to my knowledge and yet that which most nearly approaches it is the classic Isle of Man circuit. A large part of the course must be widened and some bridges (noticeably Ballaugh and Ballig) improved but I believe all this is practicable, furthermore there are sentimental grounds for returning to the island where the Gordon-Bennet Trials of 1904 were held and where the Bentley which of recent years has upheld British prestige abroad, won its spurs in 1922. I believe the Manxmen would welcome the races.

Let the races be known as the Senior and Junior Tourist Trophy races (again a leaf from the motor-cyclists book) and they will command almost equal prestige. Let them be held annually and let the R.A.C. be not unwilling to modify the rules as they see fit, to accord with the advances in automobile engineering, always with a view to encouraging progress rather than standardisation. (This applies especially to any limit on capacity). This is but a brief survey and cannot consider every possibility, but had the Auto Cycle Union shown a more progressive spirit in dealing with their races their present difficulties need not have arisen. Now that we have our car race on British soil, let it be such a model to the world as our motor-cycle races were in their earlier days: the sporting spirit is here in abundance and needs only wise and firm guidance.

ANTI-KNOCK FUELS.

(A plea for their distribution to the "ordinary motorist.")

WITH the advent of the modern high efficiency engine, motorists find that neat petrol sometimes provokes knocking. Until the petrol companies made a move to produce a better petrol, owners of high compression machines have had to use either Ethyl petrol or petrol benzol mixture.

Ethyl petrol was produced by adding to No. 1 spirit a substance known as Tetra Ethyl lead, a product of coal tar distillation. The addition of a very small quantity of this ingredient has the required effect, and increased power and improved consumption is to be obtained without harshness. Unfortunately, the public found out that the tar product was of a highly poisonous nature, and hesitated to buy the new spirit. Experiment has shown that the proportion of the poison is so small that no ill effects are experienced even by mechanics constantly filling petrol tanks with it. Motorists, and especially motor-cyclists, must be disappointed at the disappearance of this fuel, which made the running of sports machines much easier.

The other fuel favoured by the sports brigade is a mixture of petrol and benzol. The writer was once informed by a member of a firm marketing ready made mixture, that the spirituous nature of one constituent and the oily nature of the other made it impossible for the ordinary user to obtain a homogenous mixture merely by emptying the fuels into the tank in the right proportion.

The writer had always thought this a tall story, but has lately been running a Rudge Whitworth with a compression of 6.8—1., using a 50/50 mixture. He has noticed quite definitely an improvement in running after refilling the tank, and a corresponding roughness when the heavier benzol had been used, and the lighter petrol remains. No report of this effect has ever been mentioned to the writer's knowledge, and it would be interesting to know whether the fuel used in road races has been thoroughly mixed, and if not, whether this has any detrimental effect on the running.

The commercial mixtures at present available are supposed to contain about 10% benzol, and this is very beneficial for ordinary high compression engines. Unfortunately those of us who run unorthodox motors with finicky engines find that this fuel is not quite "soft" enough and we have to fall back on the Ethyl which is not always easily obtainable, or rely on our home made mixture. Those of us who endeavour to go quickly in competitions almost invariably avail ourselves of the product of Hammersmith Distilleries, but Discol is not at present available for ordinary use. There is a commercial grade but the trouble is not the fact that a grade is not made, but that it is not marketed. If this fuel were obtainable on the road it seems that the sales would amply justify the enterprise of any firm which tried this experiment. After all it is a home product and should be encouraged.

Who will be the first firm to step into the breach?

An improved Ricardo Head now available.

There are probably a considerable number of our readers who have obtained a very marked increase in the performance of their cars by fitting a Ricardo head in place of the standard product. Those who are considering hotting up standard jobs will certainly be interested in the latest type of Ricardo head, which is now turned out both in aluminium and cast iron for all Morris 4-cylinder models, and the aluminium edition is also available for Austin Sevens and Twelves and for some of the Fiat range, at very reasonable prices by Sidney Lewis, who manufactures them under licence.

Having proved by our own experience the improved performance with the older model of this cylinder head we are looking forward to giving the results of some tests we are carrying out with the latest "shock absorber" type head as it is styled, and will be in a position to give fuller details of this in a subsequent issue of MOTOR SPORT.

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ERNEST OSBORNE, LTD., offer SCHNEIDER 10h.p. 1927 English fabric sports coupé, very attractive car, £150. 17-18 Rathbone Place, Oxford Street, W.1. (Tottenham Court Rd. Tube.) Museum 9865-9866.

1925 Super Sports 12 h.p. Ballot 2 str. Specially built Targa Florio Race but never raced. Taxed year, perfect condition. £100. Phone : Paddington 4835.

VADUM CO., used SALMSON specialists, offer :—

1927 Sports fabric-bodied streamline 3-seater, unusually attractive appearance, f.w.b., shock absorbers, starter, Vee screens, complete all-weather equipment, excellent balloons, bargain, 89 guineas ; other bargains include 1925 Grand Prix, 49 guineas ; 1925 sports, taxed, 35 guineas ; 1927 Grand Prix fabric coupé, 89 guineas ; 1925 model twin-camshaft 4-seater, 39 guineas ; 1927 skiff sports, 67 guineas ; 1927 model Grand Prix, streamline fabric body, 89 guineas ; 1926 model Grand Prix 59 guineas ; 1926 (December) sports, 49 guineas ; 1925 twin-camshaft 4-speed 3-seater, 59 guineas ; convenient deferred terms, exchanges. 352 High Rd., Willesden Green, N.W.10. Willesden 2469.

£125 14-40 h.p. special sports SUNBEAM, 4-seater, very fast, vacuum-servo brakes, new tyres, in splendid condition. Modern Cars, Ltd., 196-8 Gt. Portland St., W.1. Museum 2947 8, 0263 Deferred terms from £10 per month. Part exchange.

1927 15 h.p. 6-cylinder sports aluminium 4-seater, in very fine condition, £295. T. H. Stainton and Co., Ltd., 44-45 Sussex Place, South Kensington, S.W.7. 'Phone, Kensington 6611-2.

AUSTIN 7 Chummy 1928, big lamps, 6 wheels. Many extras. Very good condition, one owner. £72. Reynolds, Kempsford, Silverdale Rd., Bushey, Herts.

RILEY 9 Monaco Saloon, Blue, 1928. Perfect. Owner gone abroad. £185. Box M.85.

DOUBLE 12, 4½ Litre Invicta re-conditioned throughout, one of the finest short chassis on the road. This car will be sold complete with racing and touring equipment, and is exceedingly fast. Price £700 or near offer. Apply Huskinson & Fane, Ltd., 11, Curzon Street, W.1. Telephone, Grosvenor 3016.

1926 FRASER NASH 2-seater, Black, 70 m.p.h., very good condition throughout. Price £95. App. Box M86.

1926 LEA-FRANCIS 12-40 Tourer Marroon· Engine gives excellent performance. Bargain, £80. Box C69.

1926 Special short chassis speed model, fitted very attractive 4-door fabric saloon body, condition throughout exceptional. 90 m.p.h., £650. Schneider Automobiles, 138 Long Acre.

100 M.P.H. special sports 3-litre BENTLEY 2-seater, 1925, in excellent condition, £375 ; terms, C.M. (Motors), Ltd., 23, Stourcliffe St., turning between 74-76 Edgware Rd. Paddington 3553.

FRAZER-NASH CARS, London Rd ('phone Kingston 6220), have the following second-hand, cars for disposal :—1928 Boulogne, special engine, 3-seater, 4 speeds, 12-gallon rear tank, multiplex Hartfords, 12-volt lighting and starting, many extras, £295; 1926 super sports special 4-seater, £170 ; 1928 model super sports 3-seater, cellulosed black, £195 ; 1927 Boulogne, special engine, aluminium 3-seater, rear tank Autopulse feed, 12-volt lighting and starting, £205.

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1929 M.G. shop-soiled fabric saloon, 14.40 h.p., unregistered carrying makers' full and usual guarantee, beautifully finished two-tone blue wire wheels, leather upholstery, staggered wind-screen, roof vents, roof light, grained woodwork, string spoke steering, illuminated instrument panel, dash vent, mascot, every possible fitment, one only, exceptionally good opportunity, great reduction, £385 accepted (open till 8.30 p.m. every day, week-ends included) Hire-purchase if desired ; distance no object. Write, 'phone or call. The Exchange Specialists, Bambers, 33, Liverpool Rd , near Birkdale Station, Southport. 'Phone, Birkdale 66161 (8 lines).

BARTLETT for sports cars. 27a Pembridge Villas, Notting Hill Gate. Park 0523.

BARTLETT or Guaranteed Sports Cars.—Bugatti 1928 1,500 c.c. Grand Prix, specially tuned 100 m.p.h., full equipment, £295 ; Bugatti 1928 straight Eight modified Grand Prix Jarvis 2-seater, £250; special offer, 1927 type 40 h.p. Bugatti 4-seater, choice of 2 at £165 and £155 ; largest stock of sports cars in Great Britain. Open Sunday morning.—27a, Pembridge Villas, Notting Hill Gate.

£59 AMILCAR, 8 h.p., 1925, first registered 1927, petit sports streamline 2-seater, detachable wire wheels, excellent tyres, clock, speedo., starter, shock absorbers, V screen, many extras and equipment, quickly detachable wings, finished in red, wheels to match, tip-top mechanically, very fast, attractive ; exchanges, terms ; 100 others under £100. Benmotors, 128, East Hill, Wandsworth, S.W.18. Battersea 2425-6.

BARKER BENNETTS, the used BENTLEY specialists, offer :—

1925 Speed model, 3-litre, twin carburetters, sports body by Van den Plas, new tyres, taxed for year. Price £375. Barker Bennett & Co., 4, Upper Wimpole Mews, Devonshire St., W.1. Welbeck 4119.

THE following second-hand BENTLEYS :—

1927 6½-litre 6-cylinder open 4-seater, with scuttle body by Park Ward, repainted, £950.

1927 3-litre speed model sporting 2-seater by Van den Plas, £525.

1925 3-litre speed model sporting 4-seater by Van den Plas, repainted £400.

ALL the above cars later than 1925 will be sold with the remainder of the five years' guarantee transferred by Bentley Motors, Ltd.

GAFFIKIN WILKINSON AND CO., LTD., 17a, Hanover Square, W.1. Tel., Mayfair 3425 (3 lines).

ROVER 6-cyl. 16 h.p. Regal Sportsman's Coupe 6 wire wheels, bumpers, Triplex glass, Dewandre brakes, small mileage, excellent condition. Listed at £455. £310.

ROVER 6-cyl. 16 h.p. Sportsman's Coupé, wire wheels, used only for a few demonstration runs. Condition as new. £325.
Auto Buyers (1922) Ltd., 27, Francis St., London, W.C.1. 'Phone, Museum 4362-3-4-5-6.

SPORTS CARS
(continued).

110 GUINEAS. 80 m.p.h. Monthlery Sports A.C., *6-cylinder, late 1926, streamlined* body., f.w.b. Denmans, 132-3, Long Acre, W.C. Open week-ends. Temple Bar 8135-6-7.

SALOON, overhead-camshaft sports body, 4-door streamlined SALMSON, late 1927, very smart, 120 guineas. Denmans, 132-3, Long Acre, W.C. Open week-ends, Temple Bar 8135-6-7.

40 GUINEAS. 1926 SALMSON 2-seater, in excellent order and condition. Denmans, 132-3 Long Acre, W.C. Open week-ends. Temple Bar 8135.

150 GUINEAS. 1927 4-seater M.G. sports, £20 worth of extras, overhauled. Denmans 132-3 Long Acre, W.C. Open week-ends. Templ: Bar 8135.

80 GUINEAS. 1928 G.E. Cup Model AUSTIN 7 very smart and in wonderful order. Denmans 132-3 Long Acre, W.C. Open week-ends.

1927-8 6-cylinder A.C. sports 4-seater Continental model, Montlhery engine. finished blue antique leather upholstery, all-weather equipment, wire wheels, capable of 80 m.p.h. cost £800 our price £175. Jack Olding and Co., Ltd., 8-10, North Audley St., W.1. 'Phone, Mayfair 5242-3. And 19, Brick St., W.1. 'Phone, Grosvenor 2780-1.

1927 Model ALVIS, 12-50 h.p. (overhead valve) 2-3-seater, standard Alvis coachwork, finished royal blue, upholstered leather to match, fitted with 2 doors, black leatherette head, rigid all-weather equipment, 4-wheel brakes, mid-pressure tyres, spare wheel and tyre, sunken double dickey seat, luggage carrier, 4 speeds and reverse gears, electric horns, dynamo lighting, 5 lamps, starter, dashlight, speedometer, clock, auto-screen wiper, mascot, shock absorbers, spring gaiters, coachwork unmarked mechanical condition perfectly maintained, first-class proposition, £215 accepted. Open till 8.30 p.m. every day, week-ends included. Hire-purchase if desired ; distance no object. Write, 'phone or call, The Exchange Specialists, Bamber's, 33, Liverpool Rd., near Birkdale Station, Southport. 'Phone, Birkdale 66161 (8 lines).

PARTICULARLY handsome sportsman's coupé, 30 h.p. MINERVA chassis, with handsome 2-4-seater, coachwork by Harrington, luxuriously equipped, silver-plated fittings, 2 spare wheels, taxed year, original cost about £1,600, accept 295 guineas, instalments or exchange considered. Sutton, 21, Brown St., W.1. *Paddington 8749.*

MOTOR CYCLES.

ARIEL 1928 5 h.p. o.h.v. Sports, excellent condition, Lucas Magdyno lighting, horn ; 35 guineas, or £9/4 down and take delivery, balance by 18 monthly instalments of £1/14/4.

Your used Sports Car will appeal to our readers——

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MOTOR CYCLES
(continued).

A.J.S. 1927 3.50 h.p. o.h.v. Sports, excellent condition, Astra dynamo lighting, horn pillion seat and rests ; 30 guineas cash, or £7/17/6 down and take delivery, balance by 18 monthly instalments of £1/9/5.

JAMES 1929 1.72 h.p. Super Sports, excellent condition, electric lighting, horn, tax paid, and insured to May ; 29 guineas cash, or £7/12/3 down and take delivery, balance by 18 monthly instalments of £1/8/5.—Wauchope's, 9, Shoe Lane, London, E.C.4.

498 c.c. A.J.S. actual 1926 T.T. machine. Engine completely rebuilt with double oil pump and pressure-fed big end. All wearing parts renewed including new racing specialloid piston in reground barrel. 3½ gallon twin tanks and sprint tank. Spares include cylinder head, barrel, valves, complete range of engine sprockets, and 2 spare wheels. Also T.T. sidecar chassis with spare wheel. 95 m.p.h. in sprint tune, perfectly flexible on the road. £40 the lot. Box .85. MOTOR SPORT.

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SCORED CYLINDERS. Scores in cylinder bores can be filled in by Barimar Metallurgical (Patented) Process, to fit existing pistons and returned in two days under money-back guarantee, at low cost.—BARIMAR, Ltd. (Scientific Welding Engineers), 14-18, Lamb's Conduit Street, London, W.C.1. Branches in Birmingham, Manchester Leeds, Newcastle-on-Tyne and Glasgow.

MISCELLANEOUS.

BINKS 2-jet Mousetrap, complete with twist grip control. New, cost £5. Accept £2 10s. Box 0100.

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