

THE AUTOCAR

A Journal published in the interests of the mechanically propelled road carriage.

EDITED BY H. WALTER STANER.

No. 737. VOL. XXIII.]

SATURDAY, DECEMBER 4TH, 1909.

[PRICE 1D.]

The Autocar.

(Published Weekly.)

Registered as a Newspaper for transmission in the United Kingdom.
Entered as second-class matter in the New York (N.Y.) Post Office.

Three Editions every Friday.

The THREEPENNY EDITION, printed on Art Paper.

The PENNY EDITION printed upon thinner paper.

The FOREIGN EDITION, price 3d., printed on thin paper for transmission abroad.

Editorial Office :

COVENTRY.

Publishing Offices :

20, TUDOR STREET, LONDON, E.C., England.

CONTENTS.

	PAGE.
NOTES	911-912
USEFUL HINTS AND TIPS (ILLUSTRATED) .. .	913
"The Autocar League" .. .	914-915
MAIL AND PASSENGER SERVICE IN SOUTH AFRICA (ILLUSTRATED) .. .	916-918
THE NEW LA BUIRE CARS .. .	919
SMALL CAR TALK .. .	920
FACTS CONCERNING GEAR WHEEL TEETH (ILLUSTRATED) .. .	921-924
ON THE ROAD .. .	925-926
INSTITUTION OF AUTOMOBILE ENGINEERS .. .	926
AN INTERNAL COMBUSTION PUMP .. .	927
THE SANKEY ALL-STEEL WHEEL (ILLUSTRATED) .. .	928
ON THE TRACK .. .	929
GRUMBLES (ILLUSTRATED) .. .	930
MOTOR UNION NOTES .. .	931
THE AMANS PNEUMO-SUSPENSION (ILLUSTRATED) .. .	932-933
CHRISTMAS PRESENTS—TOURISTS' MOTOR CAR IN ITALY—A TRAVELLER'S CAR—AN ELECTRIC GARAGE HEATER—NEW SPEED LIMITS—A COMBINATION TYRE LEVER (ILLUSTRATED) .. .	934
CORRESPONDENCE .. .	939-944
A NOVEL DOUBLE-ACTING PETROL ENGINE (ILLUSTRATED) .. .	945
A COMPRESSION INDICATOR (ILLUSTRATED) .. .	946
FLASHES .. .	947-948

Subscription Rates :

British Isles—Home Edition, 16s.; penny (thin paper edition), 6s. 6d.
Abroad (thin paper edition), 22s. 6d. per annum.

Index to Advertisements appears on page 38.

Notes.

A Three Inch Race.

Before the four inch race was held last year there was considerable discussion in the motor world as to the advisability of holding a race for still smaller cars, and there was a very general opinion in favour of a three inch race. However, the outcry against the four inch race by more or less ignorant people, who alleged it was so dangerous that it was almost criminal to run it, was so strong that the Club decided that 1909 should pass without any race being held. We do not propose at the moment to discuss the wisdom of the decision, though there is much to be said in favour of it. It is more interesting to refer to the possibilities of a car race in the Isle of Man next year. The Manx people want it; not merely, as some have suggested,

the hotel and lodging house keepers of Douglas and Ramsey, but the farmers themselves would like a race provided it be held in May. September is inconvenient for them on account of the harvesting operations, but unfortunately there are great obstacles in the way of holding the race so early in the year, because makers generally will find it difficult, if not impossible, to participate. Many makers will be badly behind in their deliveries of cars next May, and they will, quite rightly, feel that no effort on their part or that of the staff should be directed to any other work than that of filling their orders to time. Of course, some of them could participate in the race without any strain upon their resources, as they have sufficient staff to build two or three racing cars, tune them, and drive them without any appreciable effect upon the regular output of their factories. At the same time, the firms which can do this are very few. Quite apart from this objection there is little doubt that the majority of manufacturers are opposed to a race of any sort, as they see in it a great deal of expense and very little profit for any except the winner.

Standard Cars Only.

Hitherto the Isle of Man events have been, to all intents and purposes, makers' races, although a number of amateurs have driven in them, and the evidence available at the moment leads us to suppose that the makers will not welcome any proposition to run a "three inch," or any other, race in the Isle of Man next year. We do not say that all makers will be opposed to it, as we know some are in favour of it, but we think the majority will be averse. It therefore remains to be seen whether the Club will deem it advisable to organise a race in which private owners can participate, and which should be restricted entirely to standard pattern 1910 chassis. Hitherto the Club has not catered very much for amateur competitions, though the bulk of its members are amateurs, and it must be admitted that it has received no very great encouragement to do so by amateur owners, despite the fact that so many of them have expressed their disappointment that the Club should not cater specially for them. Nevertheless, it seems to us that a simply-organised event restricted to amateur owners more or less, as some of the Brooklands events are restricted, is worthy of careful consideration. The great thing is so to organise the event that no great expenditure on the part of the participants is necessary, and the conditions should be as simple as possible. This is much easier to suggest than to carry out, but we do not think it beyond the combined intellects and energies of the Technical and Competition Committees of the R.A.C., though we would venture to suggest to these good gentlemen that, if they attempt to draft regulations for such an event, they should make them as simple and as straightforward as possible; but what rules they do make should be carried out to the letter, particularly with regard to the employment of absolutely standard chassis, which should apply not only to the engine dimensions but also to the number of speeds and gear ratios.

One point to be borne in mind is that it is practically impossible to hold a 3in. race; it must be an 80 mm. race if standard cars are to be used, or a 3½in. race. There are very few 3in. engines made to-day, but there is a very large number of 80 mm. engines, and if "The Autocars of 1910," published in our issue of November 6th, be referred to, it will be found that not one of these engines has an abnormal stroke. It is true that the strokes of the 80 mm. engines vary from 90 mm. to 130 mm., but this is the extreme limit of variation, and the greater proportion of the 80 mm. engines have strokes which run from 110 mm. to 127 mm., a few going up to 130 mm. This greatly simplifies the proposition, as, although it insists upon an arbitrary limitation of the bore, it allows quite a wide latitude in stroke; but at the same time it does not permit of anything which would be at present regarded as abnormal. It is highly probable that a year hence we shall find some 80 mm. engines with considerably over 130 mm. stroke, but there are none at present on the 1910 market.

It may be urged that by limiting the stroke to 130 mm. the technical interest of the race will be reduced to a certain extent, but we do not think there is very much in this objection, because there is no standard car to-day which has any longer stroke, and in a competition of this sort it is the majority for which the Club should cater. There is no question that, other things being equal, an 80 mm. engine with 140 mm. or 150 mm. stroke would be faster on the Manx circuit, but it will be time to legislate for such engines when they have become a part of the standard chassis. The matter may be summed up in the statement that the probabilities are entirely against a sufficient number of makers participating in a 3in. race to make such an event a success. It therefore remains for the Club to decide if it will hold an event for amateur owners, and if it decides to do this, it is for the amateurs themselves to make the event a success or a failure, though, as we have pointed out, this must necessarily depend very largely upon the form which the regulations for the race may take. Unless it be made a genuine amateur event, and unless absolutely standard chassis be insisted upon, it is extremely unlikely that sufficient amateurs will be secured to make the event thoroughly interesting.

Bargain Tyres.

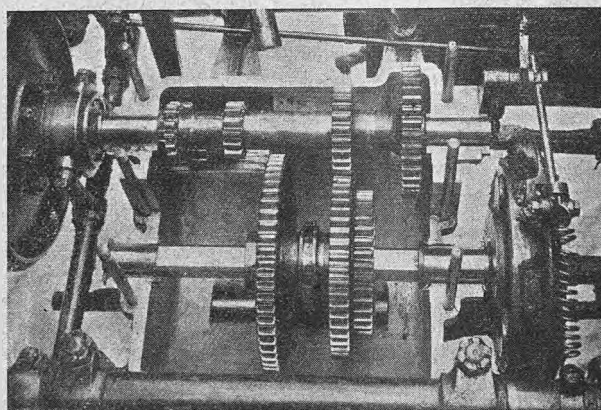
From letters we have received it is evident that some of our readers have been very much disappointed in their experiences in purchasing tyres at prices very much below those of the tyre makers. In some cases the tyres have been admittedly second-hand; in others they have not. There are undoubtedly exceptions to the rule, but speaking broadly there is no question that the motorist is unwise to buy either second-hand tyres or tyres purporting to be new at prices considerably below the current rates.

The trouble is brought about by two things. In the first place tyres are expensive, and naturally the motorist is often anxious to keep down his running costs; and in the other there is a widespread though quite erroneous impression that motor car tyres are sold at fancy prices, and therefore motorists who think this are not in the least surprised if they see a standard pattern tyre advertised at something like half the proper price. Although they have no good grounds for such an opinion, they are more or less convinced that this is about the price tyres ought to be. No

doubt they occasionally secure a bargain, though from what we hear we should say this was a very rare occurrence. More often they buy a tyre which looks all right, but which is found to be almost useless and which bursts after a few miles use. We have inspected some of the so-called new covers very closely, and we are very much inclined to the view that they are actually old covers retreaded and "faked."

Some of the tyres which are sold as new at ridiculously low prices are new in the sense that they have never been used, but they may be quite worthless from the fact that they have been kept so long that the canvas has dried and become rotten. It does not matter how good the rubber of a tyre may be, it will burst in a very short time if the canvas has lost its life, and what for want of a better term we may call its natural moisture. Even the most expert tyre manufacturer cannot always be sure that a tyre sent to him for retreading is worth doing. After he has stripped the old rubber from the casing there is very little to guide him if the casing be free from cut or broken strands.

It is obvious, therefore, that inexperienced firms which buy up old tyres at scrap prices and retread them are likely to err. We might say a great deal more on the subject, but it can all be summed up by saying the motorist should have nothing to do with second-hand tyres or with so-called new tyres at bargain prices. As we have inferred, he may miss a bargain, but it is much more likely he will avoid a great deal of trouble, annoyance, and expense. The best plan is to buy good tyres from a good maker, and when they are sufficiently worn to need retreading they should be sent to the tyre maker, or some good tyre repairer who has a reputation to maintain, and if he say they are not worth retreading his word should be accepted. The owner may think that he is, to say the least of it, rather disagreeable to refuse to retread some particular cover which appeared to be well worth it, but it is necessary to bear in mind that all retreading is more or less of an experiment, and the very best tyre makers of to-day will not guarantee any retread. They say they will do their best and they do it, but they cannot guarantee the results, so that even under the best circumstances it will occasionally be found that a retreaded tyre runs so short a time that it would have been more economical to have scrapped it and bought a new one, but if the motorist is content to accept the tyre makers' report he will not find a mistake is very often made.

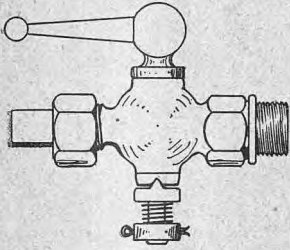


The original gear box of the first car manufactured by Ariel Motors, Ltd., in 1901. Since that time the car, a 10 h.p. two-cylinder, has been in constant use.

Useful Hints and Tips.

Taps Shaking On or Off.

IF an owner be troubled with this dangerous practice, unless he is a good amateur mechanic the best plan is to replace all the cocks on the car that by shaking *on* could either let the petrol run out or the water. Many excellent cylinders have been ruined through a cock opening and letting the water out while running. These kinds of taps are now to be obtained so that they cannot get to the wrong position through vibration. This is done by cutting in the cock at the small end of the tapered hole a V notch or cam, then providing a washer that is pushed up by the usual spring to snap into this notch when the cock is in the running position. The stem of the tap upon which the cam piece slides is, of course, square. *Inter alia*, ordinary plug taps are bad for petrol any way. Petrol should be shut off with a packed screw-down valve—like Messrs. Rotherham's No. 19 for instance.



—C. R. GARRARD.

Steering Gear Repairs.

When the teeth of a detachable sector in a steering gear are worn the defect may be cured without fitting a new one.

First remove the sector and spindle, and try the two halves of the box together on the steering column. If slack, smear a film of vermilion and oil on a surface plate, or, failing that, a thick piece of plate glass. Rub the butts of the box on it, file where marked, and continue until there is no shake when bolted in place on the column. Slackness in the sector spindle bearings is irremediable, as the metal is too thin for boring and bushing.

Next detach the sector, and if it be of hardened steel, heat to redness and bury in unslaked lime until cold, in order to soften it. Should there be any play between the ends of the worm and box, cut a thin washer to suit and fit it on, and the same to remedy lateral movement of the sector spindle if in evidence. There is usually an adjusting screw to bear against the end of the column, but the washer will help.

Then solder a strip of thin brass foil, such as is used for cartridge cases, to the sector where it fits against the boss on the spindle, or if it be a steel sector wrap the strip round the spindle, in either case using as little solder as possible (a tinsmith will make a good job of this). Then bed it carefully with a file against the spindle. The bolt holes will now be slightly out of register by the thickness of the strip, so substitute temporary service bolts of smaller diameter. Bandage the steering wheel to protect it, stand the column wheel downwards on two battens on the floor, and smear the worm lightly with the vermilion colouring. Pass one end of the sector spindle through that half of the box to which it belongs, and coax the middle of the sector, where it is most worn, into gear with the worm. Back the box away from the sector, gear the latter, and try to force the bearings on to the column. If impossible, then, and only then, take a little more off the packing strip until the bearings will slip into place with the middle of the sector hard against the worm.

Then take a $\frac{3}{16}$ in. round or square file, soften in

the fire, and grind or file the teeth from the end. Flatten out the end to about $\frac{1}{2}$ in. broad and $\frac{1}{16}$ in. thick. File up the sides, and then the end to a slight curve, leaving two sharp square edges like the sole of a skate blade. When stood vertically on a flat surface it should touch only in the middle. Finish with a smooth file, heat to redness, slake in water, and set sharp on an oilstone. A flat scraper will then be in your possession.

Now, keeping the bearings hard against the column and with one foot on the steering wheel, force the box round in each direction as far as possible to mark the teeth of the sector. Disengage and scrape the outer marks, but do not touch those in the middle. Should the crests of the worm ride, grind the end of a square file to make another scraper to suit. Continue "offering," marking and scraping until the worm beds firmly and well. Then remove the service bolts one at a time, and, if necessary, file the holes until the permanent bolts will drive in; then bolt up for good and secure the nuts. Continue the scraping and trials until the sector butts against the box at each end of the stroke—usually about a turn and a quarter.

Bolt all together, and, gripping the bracket in the vice, try the gear. It should be a little tight in the middle of the stroke, where most wear occurs, and easier towards the ends. Eccentric adjustments are not of much account, as the teeth must still be hand fitted to compensate for unequal wear.

To harden a steel sector, heat to redness and fill up between the teeth with prussiate of potash, and let it burn in; repeat heat again, and then slake in water.

It need hardly be said that those who have no mechanical aptitude should not attempt a repair of the above nature without skilled assistance.

A Cold Weather Starting Tip.

The following tip may be useful to those of your readers who, like myself, have an engine which is difficult to start in cold weather. Mine is a two-cylinder engine, having an automatic air valve of the mushroom type, controlled by a spring, projecting horizontally from the induction pipe nearly on a level with the top of the jet. Now, I find it necessary for starting in cold weather to open the throttle wide, much wider than the engine requires for running on when once started. The consequence, however, is that this valve immediately comes into operation, thereby allowing cold air to enter and preventing the engine running. I have accordingly cut a small block of wood of such a size (say about 1in. long) as to make a tight fit into the neck of the valve (along the spring), the effect being absolutely to prevent it moving. I find that when this is done, and the carburettor well flooded, the engine will usually start almost at once, even in the coldest weather, whereas formerly I have sometimes worked away at the starting handle for twenty minutes or more without success. As soon as the engine has run for a few seconds the throttle can be partially closed, the ignition advanced, and the block removed, when the engine will continue running in a perfectly normal manner.—C.H.

THE AUTOCAR MAP FOR MOTORISTS.—Invaluable when touring or contemplating a tour. This map is supplied in three styles, i.e.—(1) varnished and with roads marked in red; (2) on suitable materials for marking in the roads traversed or to be traversed; (3) folded in case, suitable for carrying in car. Size of map, 8in. x 11in. Price 8s. 10d., carriage paid, in any one of the three styles, obtainable at the offices of *The Autocar*, 20, Tudor Street, London, E.C.

"The Autocar League."

The Case of Cheshire.

THE AIMS OF THE LEAGUE ARE TO OBTAIN THE SUPPORT OF EVERY MOTORIST IN THE UNITED KINGDOM, SO THAT WHEN MATTERS OF VITAL IMPORTANCE COME UP FOR DISCUSSION A POSTAL REFERENDUM CAN BE TAKEN. THE RESULTS WHEN COMPLETED ARE COMMUNICATED TO THE GOVERNMENT OR OTHER AUTHORITIES CONCERNED, AND ALL THE CLUBS AND MOTOR ORGANISATIONS ARE NOTIFIED. ITS MAIN PURPOSE IS TO PROMOTE UNITY OF ACTION AND PURPOSE IN THE MOTOR WORLD. IT IS IN NO SENSE OPPOSED TO ANY EXISTING MOTORING CLUB OR ASSOCIATION, BUT IT WILL DO ALL IN ITS POWER TO STRENGTHEN THEM AND TO HELP THEM TO TAKE COMMON ACTION IN TIMES OF STRESS.

LAST week we referred to the correspondence which had taken place between the chairman of the Main Roads Committee of the Cheshire County Council, Mr. C. H. Pedley, and the secretary of "The Autocar League." It will be remembered that in the tentative list of counties to which we suggested motorists would be well advised to pay their car and other licences, Cheshire was not included. We regret to say this omission, which was at once made good, was very much misunderstood by the County Council officials and by many of the newspapers circulating in the county. To avoid a continuance of any misunderstanding we wrote to the Chairman of the Main Roads Committee of the Cheshire County Council on October 28th, and published a copy of our letter to him in *The Autocar* of November 6th. Since then the following correspondence has passed between Mr. Pedley and the secretary of the League, which, with Mr. Pedley's consent, we publish.

Dee Lodge, Chester, 8th November, 1909.

The Secretary, Autocar League, 20, Tudor Street,
London, E.C.

Dear Sir,—I regret that owing to circumstances which I need not enter into, your letter of the 28th October has only just come into my hands. However, the delay is perhaps of advantage, inasmuch as it has enabled me to see the issue of *The Autocar* of the 6th inst., containing both the letter and comments on the subject.

The vice-chairman and myself recently spent nine days in motoring over the whole of the Cheshire main roads, and while they are by no means perfect, they are, I think, equalled by few counties and excelled by none. I frequently receive letters from motorists pointing out defects, and am glad to receive them, and do my best to get them remedied, but there is no complaint by road users that our roads generally are not up to the standard. As a member of the police committee, I also know that motorists have no cause to complain of our excellent Chief Constable, Colonel Hamersley, or of the force which he controls.

My objection to your circular on the licence question is, however, not founded on the original omission of Cheshire from your list but on general grounds.

If you advised motorists not to take out their licences in counties where the roads were badly kept, there might be some sense in it because the ratepayers elect the men who control the roads. Again, there might be some justification for it if magistrates were elected periodically by popular vote, and if, when elected, they made the law and directed its administration. But you know, or should know, that you have no such justification. Take the concrete case of the Surrey motorist and ratepayer, "M.P.T.," who writes on page 737 of your last issue. You ask your readers to penalise him because Parliament—possibly against his wish—imposed a speed limit, because the Surrey police, whom he cannot control, are active in prosecuting those who disobey the law, and because Surrey magistrates, whose appointment he can neither make nor revoke, inflict on these offenders harsh penalties. It is unpleasant for you to be inaccurately timed by a Surrey policeman, and unjustly convicted and heavily fined by a Surrey magistrate, but it would also be unpleasant if, at a late hour on a wet dark night in some remote country lane in Surrey you were stranded by ignition trouble. Now I want you to grasp the idea that the Surrey ratepayer, whom you seek to penalise, is no more responsible for the one than the other. This being so, perhaps

you will explain how the advice you give is likely to benefit the motorist in Surrey, unless it be by way of threat to the magistrates that unless they alter their views of justice to accord with yours, they shall, as ratepayers, suffer in pocket.

He would be a foolish offender who, with a view of lightening his sentence, threatened the judge. Still more foolish would he be when, as in your case, the threat is directed to third parties.

Quite apart from the fact that you have appointed yourself a tribunal to decide which are and which are not "clean" counties, I say that the proposal to influence the administration of the law by the payment or non-payment of licence duties to a county is one which cannot be defended, and is, moreover, calculated to injure the interests of motorists, whose cause it is supposed to serve.

Yours faithfully,
C. H. PEDLEY.

"THE AUTOCAR LEAGUE."

12th November, 1909.

C. H. Pedley, Esq., Dee Lodge, Chester.

Dear Sir,—I beg to acknowledge the receipt of your letter of the 8th inst. concerning my circular on the licence question, and I shall be much obliged if you will give me permission to publish your letter at the earliest opportunity.

I feel quite sure that your objection to the circular in question is based upon general grounds, and not upon the original omission of Cheshire from the list of favourable counties. This is made quite evident from the newspaper reports of your remarks.

I propose first to address myself to your instance of the Surrey motorist who fears that he will be penalised by an increase of rates if he carries out our suggestions. Although it may be true that he may penalise himself slightly by transferring the payment of licence fees into another county, there is this point which I think you miss, namely, that there are more ratepayers who are not motorists than those who are, and therefore the motorist is willing to make a small personal sacrifice to draw the attention of the county to the injustice he is suffering. I am quite aware that magistrates do not control and are not responsible for the condition of the roads, and also that they are not elected periodically; but as far as my knowledge and experience of the counties goes, I do not think I am incorrect in stating that county magistrates, county councils, and county police all work together, and are influenced by each other. Further, the county council and the county police are to all intents and purposes one organisation, and the Chief Constable, whose appointment as such is subject to the will of the county council, takes his instructions from the Standing Joint Committee or its equivalent. That is to say, if the magistrates in a county persist as they do in Surrey in unjust decisions with regard to motorists, the county council could, if it liked, always bring about a reform by giving its Chief Constable a hint that he should not take proceedings except in grave cases. The personal influence of county officials on each other can effect reform if the majority of them desire it, e.g., assume that Cheshire had a lot of prejudiced magistrates, but an enlightened county council and chief constable. It is very certain that if the magistrates were dealing unjustly with motorists the county council could and would bring influence to bear upon them to bring about a better state of affairs, though they have no official rights in the matter.

With regard to the offender threatening his judge, I agree as to his foolishness in so doing, but I cannot accept your assumption that motorists in Surrey are offenders, and your simile does not hold good. I have merely suggested that members should pay money to judges who are known and prove themselves to be just, and not make propitiatory

offerings to judges who are known and prove themselves to be unjust. This is not asking him to threaten his judges.

As to your concluding paragraph, I contend that we have as much right to decide as to "clean" or "unclean" counties as we have to decide whether the roads are good or bad, and I should like to know what other body, if any, is more competent to arrive at a fair and unbiassed decision on such points.

I am sorry you are so opposed to my methods, and that I cannot follow the conclusions in your final paragraph. If prejudiced magistrates and police are deaf to the demands of honourable men for honourable administration of the law, in the spirit in which it was made, then it behoves the ratepayers to insist upon reform, and if "The Autocar League" can bring home to them a sense of the wrong their county council are doing them by failing to put a stop to the indiscriminate persecution of motorists, "The Autocar League" is fully justified in the course it is taking in this matter.

Yours faithfully,
THE SECRETARY.

14th November, 1909.

Oakwood Park Hotel, Conway, North Wales.

Dear Sir,—I have been motoring in North Wales, and your letter of the 12th November has reached me here to-day.

I may say in the first place that I write as one favourable to motorists and motorists, but at the same time fully convinced that the policy you are advocating is a mistaken one.

In your letter of the 12th inst. you attempt to justify the policy of penalising the ratepayer for the sins of police and magistrates by stating (1) that county magistrates, county councils, and county police all work together; (2) that county councils and county police are to all intents and purposes one organisation; (3) that the chief constable is appointed by the county council; and (4) that he takes his instructions from the Standing Joint Committee. Every one of these statements is incorrect. Neither the magistrates as such nor the county council as such have anything whatever to do with the police. In Cheshire the magistrates, who number some 500, and the county councillors, who number eighty, each appoint sixteen representatives, who together form the Standing Joint Committee. This committee is the only body responsible for police administration. The duties of this committee are sharply defined by statute, and they have no more power to order the police not to prosecute for offences against the speed limit than they have to order them not to prosecute for burglary. The alleged "control" of the police by the ratepayer amounts therefore to this, that the ratepayers triennially elect a body which appoints one half of a committee which has no power to prevent the police from prosecuting. As to "control" of the magistrates, the ratepayers' power is absolutely nil.

Your argument is summarised up by your correspondent, Mr. T. B. Blake, on page 785 of your last issue, where he hopes your policy will have "the effect of convincing the general body of ratepayers in the county that it is distinctly not worth their while to permit the authorities to persecute careful and considerate motorists." That the "general body of ratepayers" have the slightest choice in the matter is an utter delusion which you and Mr. Blake seem to share. If no motorist took out a licence in, say, Surrey, I do not think it would affect the rates by one-tenth of a penny in the pound, and if you think to make motorists of the general body of ratepayers by pinpricks of this kind you are mistaken. What you will do is to deepen existing animosity to motorists, and to create it where it at present does not exist. As to the magistrates, your policy towards them is to say: "If you don't mend your judicial ways, your pockets shall suffer." I agree that to most of the magistrates this tenth of a penny is not a serious threat, but it is a threat all the same. In dealing with the majority of Englishmen a threat is not likely to produce the desired effect.

Yours faithfully,
C. H. PEDLEY.

First of all we must thank the Chairman of the Main Roads Committee for the courteous manner in which he has met us in this matter, and for the interest which he has taken in it. We are only sorry we have not succeeded in convincing him that, above all things, the suggestion that motorists should pay their money to counties which treat them fairly is no sort of threat to the magistrates. It is only necessary for us to repeat that the plan is not one of threatening, but rather one of expressing appreciation for fair treat-

ment. Without access to the county accounts we are unable to say whether the payment or non-payment of motor, man servant, game, dog, gun, and other licences is a matter of indifference to a county or not. We scarcely think it is, as one county at least—Surrey—is apparently circularising residents in the county urging them to pay their licences to the county, and even Cheshire has complained of the non-payment of licences by residents within its borders, who in some cases have paid their money elsewhere.

With regard to Mr. Pedley's assertion that the statements contained in our letter of November 12th are incorrect, we think it is only necessary to point out that the differences between Mr. Pedley and the secretary of the League are simply that Mr. Pedley takes the strictly literal view of the case, whereas the secretary of the League does not regard the letter of the law so much as the actual facts. Only one sentence in the secretary's letter requires explanation, and that is the statement that the county magistrates, county councils, and county police all work together and are influenced by each other. They certainly are influenced by each other, but they do not work together in any sense which may be taken to their discredit. They work together, or should work together, for a common aim, and while we admit at once that their functions are separate, it must be borne in mind that the influence upon each other of the three sets of officials, the magistrates, the county council, and the police, is very real. It is true that the Standing Joint Committee cannot instruct its superintendents or chief constable not to prosecute, but it is always at liberty to express its opinion about any action on the part of the police and it does so, and such expression of opinion is not lost upon the police authorities. The magistrates are equally unable to instruct the police as to what they shall and shall not do, as Mr. Pedley points out, but they influence them none the less for all that, as the anti-motorist bench will accept evidence unworthy the name against motorists whereas the fair-minded bench will not do this. Therefore in the second case the police have to be very much more careful to obtain convictions. Nothing which has been said has shown our original statement to be wrong that the attitude of a county towards motorists is not that of any one set of officials but to all intents and purposes all, or at any rate a majority of them. The idea of paying the licences into the counties which treat motorists fairly is not to punish the anti-motor counties, nor yet primarily to benefit those counties in which justice is impartially administered, as it is in the county of Cheshire, though incidentally it does this, but to make use of the only means that motorists possess of calling attention to the insufferable injustice and tyranny to which they are subjected by the authorities in certain counties. It is not the motorists' fault, but their misfortune, that the weapon they use is a weak one; the point is that it is the only one at their command, and they are justified in making use of it.

How to Join the League.

There is no subscription to "The Autocar League." All that is necessary for anyone to do who wishes to join is that he should send us his name and address, the horse-power and make of his car, and also express his willingness to vote by postcard or letter on any important matter concerning the welfare of automobilism whenever he may be called upon to do so. We need hardly say the name and address will not be divulged under any circumstances whatever, and will only be used to communicate with him on matters concerning "The Autocar League."

Mail and Passenger Service in South Africa.

By Ernest J. Longinotto.

MUCH discussion has taken place of late as to the kind of car required for various Colonies, and principally for South Africa, one writer stating that the roads here are mere tracks, and absolutely unsuitable for motor traffic.

Having travelled over practically the whole of the Transvaal, Orange River, and Cape Colony by motor during the last six years, I determined to write this article, firstly, to show that, although considerable difficulties are to be met with and hardships to be encountered, it is still quite possible to travel to any part of the above named colonies on even a small powered car.

I first started to interview various prospective customers in the Northern Transvaal, and left Johannesburg for this purpose on an 8 h.p. De Dion, travelling first to Pretoria. At Pretoria, which is forty-five miles from Johannesburg, it rained in torrents. My next call was at the Premier Diamond Mine. Here at that time no road was made, and, having to take to the veldt, which is composed in this district of a sort of pot clay, my progress was extremely slow. Many people on hearing the car was a single-cylinder, were prejudiced at once, having formed the impression that unless a car was at least 20 h.p. it was unsuitable for our requirements, although my car had gone through its trial in fine style.

I spent some time in and round this district, but finally returned to Johannesburg, my trip having been a failure.

In March, 1905, I decided to demonstrate what this little single-cylinder was capable of doing by starting a passenger and Royal Mail service between Krugersdorp, Rustenburg, and Pretoria.

Krugersdorp was to be the headquarters, and I advertised to run to Rustenburg and back each day, including Sundays—a journey of 108 miles.

The following morning a start was to be made. However, luck was against me, as it rained heavily. At 6 a.m. sharp I pulled up at the hotel in hope of some passengers, but was disappointed, as all the people went by the coach, which, with eight mules, was then leaving for Rustenburg. It was necessary for me to find a guide, as I had never travelled on this road before. After some delay I found a guide, who afterwards proved to be a good companion.

We left Krugersdorp about 7.30 a.m. (one and a half hours late) *via* Queen's Battery to Blaauwbank, where we stopped for coffee, and found the coach had just arrived, and was changing its first lot of mules. We had gained one and a half hours on it in twenty miles.

On the road to Blaauwbank there is nothing but plain sailing in fine weather, but in wet the Magalies River is often in flood, and as there is no bridge, it has to be forded.

After leaving the hotel there is a small "spruit" (watercourse) about 3ft. wide and 1ft. deep, which at times of heavy rains turns into an absolute river. After this is passed there is a short, steep climb, and then on the right the road passes Hartley's tobacco factory. About a mile further on is a stretch of black bog turf (which on my first trip was dry, and was then a fairly good road), Boschfontein, and Wagonpad spruit. Here there is an hotel and store and post cart stable.

The spruit itself is very stony and rough, but the worst piece is crossing the Hex River, which has great boulders in it, and I had the greatest worry on my first few trips to save my gear box, which was very low. This drift (crossing) is now done away with, and a bridge is built. The road is fairly good from here to Commissee Drift with the exception of one steep drift about a third of the way, which is extremely steep, and at the bottom of which are several boulders; hence one has no opportunity of rushing it. On my first trip I failed to climb it with an empty car until my third attempt. Commissee Drift at that time was also bad.

After this the road goes right over the Magaliesberg Range at Oliphants Nek, but, the road being excellent, the climb is easy. Directly the top of the pass is reached the country, climate, and road alter. The view is simply delightful, showing on the Krugersdorp side the comparatively barren veldt and on the Rustenburg side semi-tropical plants, fine farms, with their orange plantations, etc., and even at that hour it was already very warm, and the overcoat I had worn up to here had to be



The Royal Mail car leaving Krugersdorp with a big load.

dispensed with.

The road into Rustenburg from here is ideal—a distance of eight miles. The total distance is fifty-four miles, which was covered in about four hours, the coach taking nine hours.

Rustenburg, which was then only connected to the rail by the nine-hour post cart journey, is quite a small farming village, but boasts of two hotels in the market square. I put up at the Grand, as the Transvaal were agents for the post coach.

The excitement that prevailed on my arrival and the disparaging remarks made as to my prospects of success were intense. I think most critics prophesied my ultimate collapse, saying no motor would ever do the trip from Krugersdorp and back daily, as I had undertaken to do.

As there was no one sufficiently plucky to take the return trip with me excepting my guide, we left again on the return journey at 1.30 p.m. The drizzle of the morning had now turned to a heavy downpour, and after we passed Commissee Drift we met the coach on its way to Rustenburg. The black bog turf at Hartley's was now almost impassable. How-

ever, after an hour's hard work my guide and I managed to get through, only to meet with a further obstacle in the form of a small spruit near the factory. However, we soon got out of this, and drove on till in sight of Blaankbank Hotel. The spruit here, which was 3ft. wide in the morning, was now like a lake and several feet deep. As there was absolutely no way round, we were compelled to drive right in, only to get stuck in the middle. Fortunately, several kaffirs happened to be handy, and with the aid of a rope they pulled me out, not before all my floorboards had floated down the stream.

After this the steep incline of Blaankbank Hill had to be faced, which the car took well until we got nearly on top, where for about 100 yards the road is formed of ledges of rock about six inches high, which was like going up a flight of stone steps. This baffled the car for the time being, and only with great difficulty were we able to make the ascent, which when accomplished did not prove our last trouble.

The Magalies River, which acts as a drainage for all the small spruits previously mentioned, still had to be crossed. This proved even more difficult than the lake at Blaankbank.

On sticking in the middle with the bonnet under water, a Dutchman approached the bank and shouted to us to leave the car and get to the bank, or we would be drowned, as the river was coming down. By this time several trees had passed us, having been torn up and washed down in the stream; one just missed the back of the tonneau. On persuasion the farmer kindly lent us three of his "boys," and by putting our first gear in and the engine on half compression, pushing the car, and forcing the starting handle round we managed to get it far enough on the bank to be out of danger of damage.

Some time was lost before we got going again, and arrived at Krugersdorp at 7.30 p.m., and were received with cheers on arriving at the hotel.

For a week after my first trip I journeyed practically without passengers. The rain continued, though not so heavily, and as time went on conditions improved. The hills that worried me at first became hardly noticeable. I seldom took more than three hours for the fifty-four miles.

I continued on this route until I obtained the mail service contract to Pretoria (from Rustenburg), which slightly altered my timetable.

On Fridays I left Krugersdorp at 9 a.m. for Rustenburg, then left with H.M. mail at 4 p.m. on my road to Pretoria, arriving at Wolhuters Kop (forty miles) at 8 p.m. (limit time), having called at Herkstroem on my way. I stayed at this post office till 4 a.m., and then left *via* Commando Nek for Pretoria, where I was due at 8 a.m. on Saturday mornings (limit P.O. time), thirty-four miles.

On Sundays I returned, leaving Pretoria at 6 a.m., due at Rustenburg at 2 p.m., leaving at 3 p.m., and arriving at Krugersdorp at 7 p.m. on Sunday (124 miles).

The Pretoria Road does not require much description. It is made up of black turf, sand drifts, and Commando Nek, which is rather steep for a heavy load. There are also Magalies and Hex Rivers, both of which are very bad indeed. This road, not being much used, gets in a shocking condition. The Krugersdorp Road I now considered quite a good road in comparison.

My first trip with the mail was adventurous, because added to the usual worry of the road was the fact that I was bound to arrive in time under a penalty of £1 for each hour, or part of an hour, after schedule.

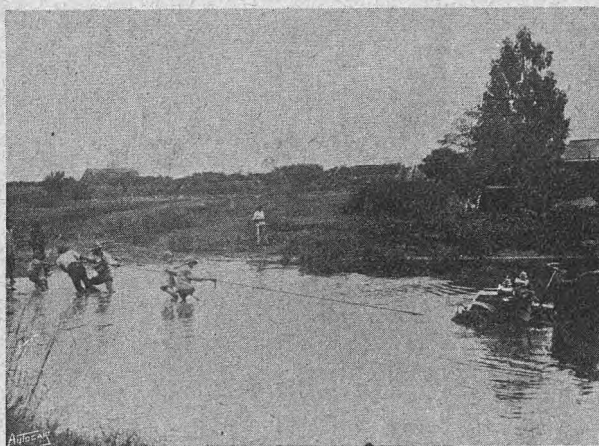
I again arranged with a guide to show me the road to Pretoria, where we had to leave on the following morning with the mail.

Arriving on Sunday at the post office yard in Pretoria at 6 a.m., we found the whole place shut up. Not being able to find any official, I began to hammer at the doors, and finally received an answer. The clerk in charge came out, and when I naturally complained at the delay he informed me that the fault was mine, and that it was customary for the mail coach driver to call him just before six.

We soon got our bags—twelve mail sacks and some small private bags—which more than filled the tonneau. This tremendous load made me nervous, but not half so nervous as the clerk did when he read out the names of the places where the bags had to be delivered, as half the places neither my guide nor I had heard of, and felt sure were not on the road. On telling the clerk this he said he did not know where they were, but he believed some bags had to be given to runners, and two were to be hung on a tree, but which tree he

did not know. Although late, we arrived at our first post office (twenty miles out) up to time. It is a South African Constabulary post called Reitfontein West. We were pleased to find that two of the unknown bags were to be delivered here, viz., Mzilikatze Nek and Wit Klip, but great was my surprise when their own bag (Reitfontein West) could not be found. We took all the bags out, but this was missing. The fine of £1 per hour for late arrival at Rustenburg now began to worry me. The only course was to return to Pretoria in search of the missing bag. As the S.A.C. man would not take the responsibility of the charge of my other bags, I was bound to load up again and return with my heavy load.

We tore downhill as fast as the gradient and my small engine would allow, disregarding stony sluits or bumps, and got right back to the post office yard before we found our missing bag, which had dropped off in the yard before we left. This rush we continued back to Reitfontein, through the Magalies River to Humphrie's Store. Just beyond this is where the bags have to be hung on a tree for some farmers near by to send for them, then from here we drove to Wolhuters Kop, and finally through Sterksroom. How many times I looked at my watch during



Crossing Blaankbank spruit. Note.—The floor boards are gone, having floated down the stream.

this journey I cannot tell, but my hand ached trying to force my spark a little further advanced in the imaginary hope of getting one extra revolution per minute out of my engine, but it continued the same beat and maintained its regular pace. At Sterkstroom I had forty minutes to do eighteen miles. The road now favoured me up to Hex River. Here we had a moment's delay to get up the drift; then the next two miles of sand nearly made me give up. Second and first speed are dreadfully slow when minutes count. However, just as two o'clock was striking the mail flag was pulled up at the post office to denote my arrival, and my way bill was signed as punctual.

This mail and passenger service continued for seven months and a half till the railway came to Rustenburg. In all I calculate my car ran over 21,000 miles without mechanical breakdowns.

Owing to my heavy loads, I was compelled to fit 105 mm. tyres in place of 90 mm. for my back wheels. Tyres were my chief trouble; I tried all makes, but it is impossible to state which stood best.

During this service I had many curious adventures. Once I carried four large sacks of gold collected for hut taxes from the kaffirs in the Rustenburg district, sent in by one of the banks. This is the heaviest load I have carried, and at the time I considered it most risky to send so valuable a freight with only a young bank clerk in charge of it. He however, assured me not to worry about it, but if held up, to let it go, as it was insured. We landed it safely in Krugersdorp that night. The following night, however, on returning home through the plantation at the junction of the Rustenburg and Mafeking roads a wire was stretched across the road just at the height of the steering wheel. Fortunately, it broke, but I have always thought it was put up by some one either to damage my car, or possibly they thought I had my valuable cargo that night.

The Pretoria Road was also exciting about this time. A kaffir who had become possessed of a rifle took up his position on Commando Nek, robbing transport riders of clothes, food, etc. One Dutchman he shot through the cheek. This poor victim I met on the road a few minutes after he had been shot (4.10 a.m.), and I informed and carried the police in search of his would-be murderer.

Sometimes in the early morning on top of this pass the cold was so intense that repeatedly I had to stop my car and warm my hands on my engine.

Possibly the most amusing incident of all was the breakdown of the coach on Oliphants Nek. It was seldom now that the coach had many passengers. I got nearly all; but there were always a few who would not take the car, and stuck to the old mode of transport, especially as its fare was reduced from £5 return to 30s., my price still remaining, as I started, £5.

On the top of the mountain the front axle of the coach broke, so I volunteered to take its passengers, and arrived in Rustenburg in triumph. This gave my supporters subject for a good laugh at the coach proprietor, but he took it in good part, and we worked amicably to the end.

The only official report is one from the *South African Mines*, taken after the car had run three months. Of course, prices quoted are South African prices—tyres, etc., being very dear.

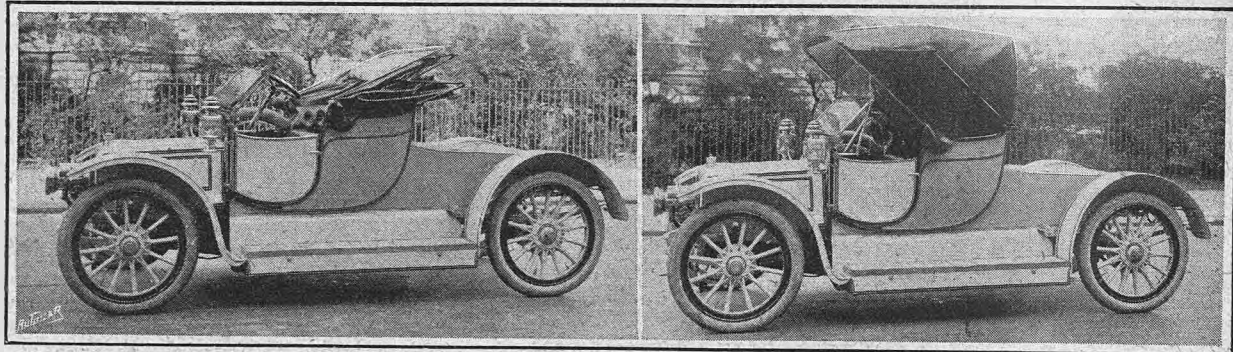
Report: *South African Mines*, speaking of small touring cars, says:

"Perhaps the best testimonial they could have is the fact that one of them is used, and has already run 12,000 miles, on the Krugersdorp-Rustenburg mail service, and is also being used for the mail service between Rustenburg and Pretoria. The car has always run up to time. Its cost for a mileage of 12,000 miles works out as follows:

Petrol, grease, lubricants per mile	...	...	1½d.
Tyres (760 x 90) per mile	...	...	2½d.
Repairs to machinery and carriage body part per mile	...	...	1d.
Total per mile	...	...	5d.

"It is only fair to suppose that the expenses of a car in private use would be very much lower. On the other hand, an allowance should be made for depreciation. The mail car frequently carries four and five passengers, with luggage, as well as mails, and the road it traverses with such punctuality is one of the worst in the country."

After the mail service was finished, for some considerable time I made trips around Kimberley and the battlefields, all the roads about there being very good; sand and rivers being the chief drawbacks. Some interesting war monuments are to be found in this district. My experience proves that the roads in South Africa are not too bad, even for passenger and mail work, with a small single-cylinder car.

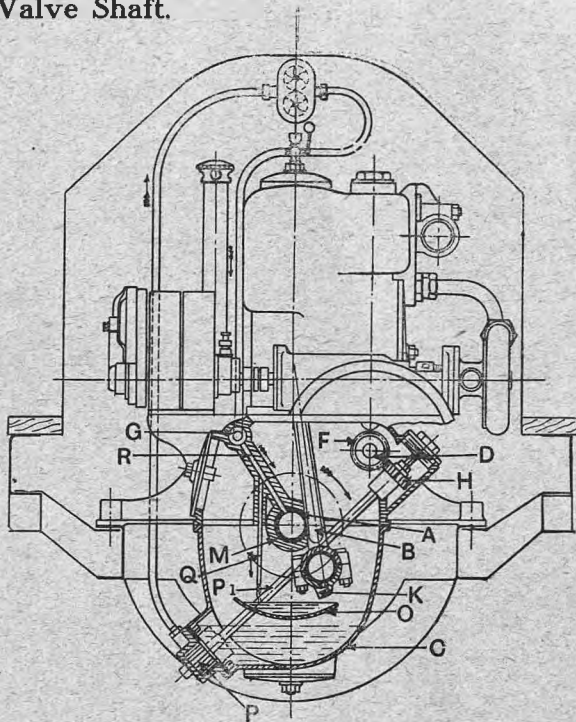


An elegant two-seated body built by J. Rothschild et Fils, Ltd., and fitted to a 10-14 h.p. Panhard chassis to the order of Mr. Norman Vorley. The car is finished in French grey, with black mouldings. Steel shields are fitted between the front wings and the bonnet, and between the running boards and the chassis, giving a very clean appearance to the car. The wheels are provided with the new Stepney wheel flanged rims, which, it will be noted, are practically indistinguishable from the ordinary rim.

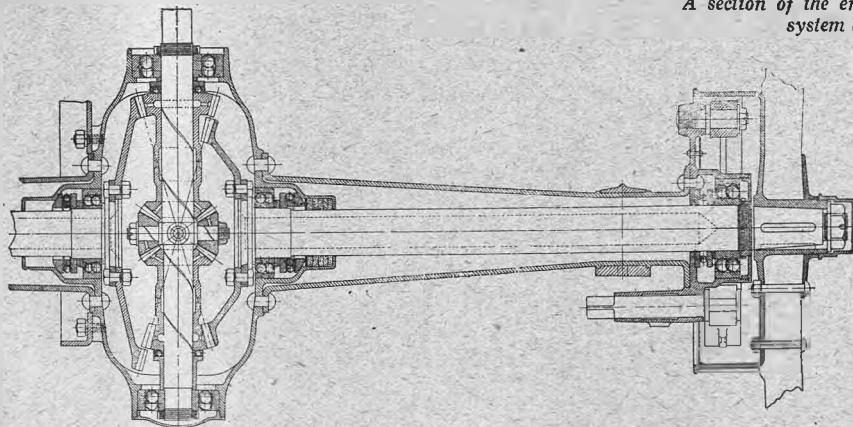
The New La Buire Cars.

A Chain-driven Valve Shaft.

THE 30 h.p. and 15 h.p. La Buire for 1910 will have the new silent La Buire engine, with a new lubrication system. The engines will be chiefly remarkable for the disappearance of distribution gear, the drive of the camshaft being by a silent chain from the crankshaft, thus avoiding all the noise which arises when toothed gearing is employed for this purpose. The lubrication system is very clearly shown in the accompanying diagram. The lower portion of the crank chamber C has been lengthened and forms the oil tank. A toothed wheel pump P is placed in the lower part of the crank chamber, and is driven by skew gearing F H off the camshaft D by the shaft P₁ seen running diagonally across the crank chamber. The pump draws the oil from the sump and delivers it by the leads to the control and collector, from which all the crankshaft bearings are fed by channels R formed in the walls of the crank chamber. Beneath each connecting rod is placed a catch pit or channel O, into which oil runs from the feed pipe Q. The big ends are provided with scoops K, and leads to the crank pin bearings, by which means these bearings are lubricated. A two-way cock for filling or emptying is provided at the side of the crank chamber. A tell-tale is interposed in the oil circuit, and is situated on the dashboard. It is of a particularly simple but effective



A section of the engine showing the peculiar lubricating system by means of a gear pump.



A horizontal section of the centre, and half of the back axle of the La Buire car, showing the double bevel drive, by means of which it is possible to obtain an arched back axle.

type, there being absolutely nothing in its construction which is liable to derangement.

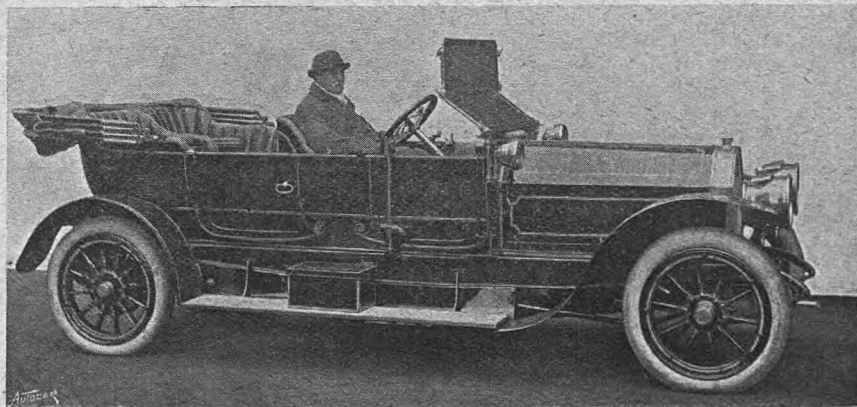
The diagram of the engine, besides illustrating the oil circulation, shows the method of mounting the high-tension magneto and the water pump. The low-tension contacts of the latter are within view and easily accessible immediately the bonnet is lifted, as they are well above frame level.

This company were showing at Olympia a La Buire car carrying a torpedo body upon which the longitudinal position of the front seats is adjustable within limits. This front seat can also be slid back and lifted right

out of the car, thus giving simple access to the mechanism.

The 30 h.p. La Buire will otherwise be found much as last year save for the improved back axle, which we illustrate herewith. This well-thought-out design includes ball thrust bearings at every point where these are at all necessary. The hollow driving-shafts are a novel feature.

In the two entirely new models, the 8 h.p. and 15 h.p., both brakes will be pedal applied, although the side brakes can be made to operate through a lever when desired.



A La Buire car with Lord Vernon at the wheel. This body is an interesting one, as the door design is unique. The front seat can be adjusted to suit the driver's length of leg.

Small Car Talk. By Runabout.

A New Black-plating Process.

ONE of the most interesting exhibits at Olympia from my point of view consisted of a pair of shiny-black headlights prominently placed on Messrs. Brown Bros.' counter in the Gallery. I pounced on them like a hawk, and the attendant informed me that they were produced by a new process which he termed "black-plating," and that its finish was heat-proof, waterproof, and rustproof, its cost being equivalent to nickel. I fancy that a grey painted body would stand having all the usual plated parts blackened, and yet look as smart as if they were brass or nickel, and this process should be very suitable. I have tested it with water, and moisture simply had the effect of making it look a trifle more shiny. The polish was part and parcel of the metal, while we may take it for granted that a firm of this standing would not produce lamps finished by a process susceptible to heat. No doubt it is some form of oxidation, such as has been applied to gun metals. I thought of having my present brass plating submitted to this process, but as the fee for applying it to existing headlamps is about twenty per cent. of the original cost of the lamp, and I have radiator, five lamps, hooters, etc., to be treated, I am hanging back till my car needs repainting. In the meantime a few owner-drivers in search of a weather-proof finish may be glad to have their attention drawn to this black plating.

Improvements in the Small Car.

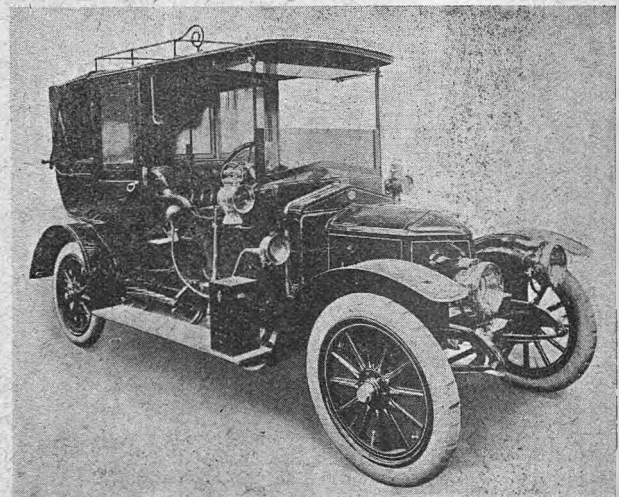
I see a "Suburban Motorist" falls foul of my ideas on some desirable items in small car specification. It is a trifle unlucky for him that his letter should appear in show week, and that the show should prove the vastly increasing popularity of most of the items he dislikes—thermo-cooling, detachable wheels, wire wheels, and so on; while the leather clutch holds its own on many of the very best cars, and the automatic lubrication is still regarded as ample for many first-class one and two-cylinder cars. It is the badge of minorities to suffer, and I fear Olympia must have been as gall and wormwood to "Suburban Motorist." I fancy, however, that he makes a slight confusion between "small" and "light" cars. My concern is with the former, owned for the most part by men who are their own drivers, and very often their own repairers as well. Simplicity and reliability are our main demands. Our chorus is "let us have as little as possible to go wrong, and when it does go wrong, let it be so simple that we can easily put it right." Hence many of us prefer to lumber up our vehicles with a couple of spare wheels for our summer tour—we have no Jenkins to wrestle with refractory covers while we smoke under some broad adjacent deodar. We prefer a plain leather clutch, even if it has to be dressed occasionally, because we dislike unearthing a baker's dozen of steel plates from the centre of a six foot "unit," and we dislike paying a hireling to do it for us even more. We do not want complicated lubricating systems; because our pauci-cylinder cars don't need them, and we have no one to clean them out periodically. We prefer a drip to a simple force pump, because little and often is better than alternating between starvation and gluttony every ten miles. And as to wire wheels—*de gustibus non disputandum*—a very large number of people prefer their appearance to that of a wooden wheel, and if they can look well anywhere, they look better in proportion to the lightness of the car.

Defects of the Scuttle Dash.

We are already learning that the scuttle dash has its weaknesses; any dashboard device that requires manipulation is rendered inaccessible by a scuttle, and any device that requires inspection is under many circumstances invisible. As a matter of fact, these defects would exist quite apart from the scuttle on many a sporting design, because the steering is raked so steeply that it places the driver some distance away from the dash. Such fitments as clocks and speedometers may conveniently be mounted on the front lip of the scuttle—this is the plan I follow. The force pump for lubrication and any sight gauges present more awkward problems. I have to make a very long reach to get at my oil pump, and I have to use a small electric light at night for the sight gauges. But if I were designing such a car myself, I should use a pedal control for the force pump, and I should mount the sight gauges on a wooden curtain hanging down vertically an inch or so inside the scuttle, instead of in its farthest dim recesses on the dashboard proper.

Electric Side Lamps.

I consider side lamps are only needed under a few circumstances, *e.g.*, just to get home at the approach of dusk, to show approaching traffic on country roads the width of the car, and in town traffic. For all these purposes electricity with its handy switch is ideal, the side lamps being switched off under most night driving conditions. But in choosing such a lamp one precaution is necessary. There are some on the market provided with the most crude and unmechanical plugs for securing the wire from the accumulators. The wires on my own lamps, for instance, are soldered into narrow brass tubes, which are a driving fit in fibre sockets. It is an awkward business to refit the wire anyhow after a breakage, and unless it is very delicately and accurately managed the plug will not screw on to the lamp body afterwards. Before I buy another pair of electric side lamps I shall carefully inspect them with special reference to this particular point, and shall certainly insist upon having those of a design which will not give trouble in this respect.



The new Deasy J.D.S. car complete, showing its distinctive appearance from the front of the vehicle.

Facts Concerning Gear Wheel Teeth.

By A. Marsden, M. Inst.A.E., A.M.In.Mech.E.

CONSIDERING the very important position occupied by the change speed gear in the power transmission scheme of the modern petrol car, it is remarkable that, with the exception of a few designers and engineers generally, the great majority of car users appear to have but a very crude notion

tion to each other, according to well-known laws. Formerly it was the custom in engineering work to use roughly cast wheels, which were allowed to run and grind themselves together into some semblance of smoothness, or perhaps in a few special cases the teeth would be filed up by hand, templates being used to guide the workman in obtaining the correct shape. Nowadays, however, to meet the excellence required for motor car work, and, in fact, high class machinery in general, the spaces between the teeth are cut out of the solid blanks either by very accurately shaped milling cutters or in specially designed machine—methods which enable very fine results to be obtained.

To illustrate the need for perfect accuracy in the shapes of the teeth fig. 2 is given. This represents a portion of two equal sized wheels which are in gear, but for the sake of clearness only one tooth on each wheel is given. Both teeth are formed without any pretence to accuracy on purpose to show that, although the driving wheel may be revolving at a perfectly steady rate, the driven wheel will be revolving unsteadily, with consequent "chattering" and noise.

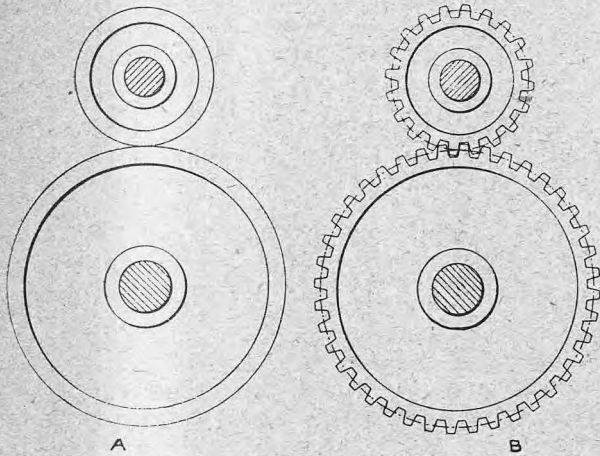


Fig. 1.

of how beautifully made and designed a series of details it is which goes to make up the mechanism constituting the change speed gear of a well-made modern car.

To the majority of people the teeth of the wheels inside the gear box are just pieces of metal projecting from the rim of each wheel, and the projections on one wheel simply intermesh with the spaces of a wheel on another shaft, so that one wheel may make the other revolve.

This, although a perfectly correct definition so far as it goes, is an exceedingly crude manner of describing a mechanism which when properly designed and constructed cannot be surpassed by any other combination of parts for beauty of operation.

In fig. 1 we have at A the elementary means of transmitting rotary motion by means of circular discs in contact, the relative motions of the shafts being as 2 is to 1. Now as the power which may be transmitted by this means will depend upon the pressure with which the surfaces are pressed together, it will be evident that if it is desired to transmit large powers with relatively small discs much slipping will take place unless the pressures are very heavy. B in fig. 1 shows how the friction wheel drive is converted into a positive drive by means of toothed wheels, and as the speed ratio between the two shafts is kept the same in B as in A, it will be seen that the diameters of the friction discs of A still act as a basis for toothed wheels, except that they are now purely imaginary, and are known as the pitch circle diameters. The actual outside diameter of each wheel is necessarily larger than the pitch diameter, owing to the teeth of one wheel having to intermesh with the spaces on the other wheel. The diameters of the equivalent friction wheels are, however, always taken as a basis for the calculation of toothed wheels. The next thing to note is that for silence and smoothness when running together it is necessary for the teeth to be not only most accurately "pitched" or spaced, but they must also have the working faces correctly formed in rela-

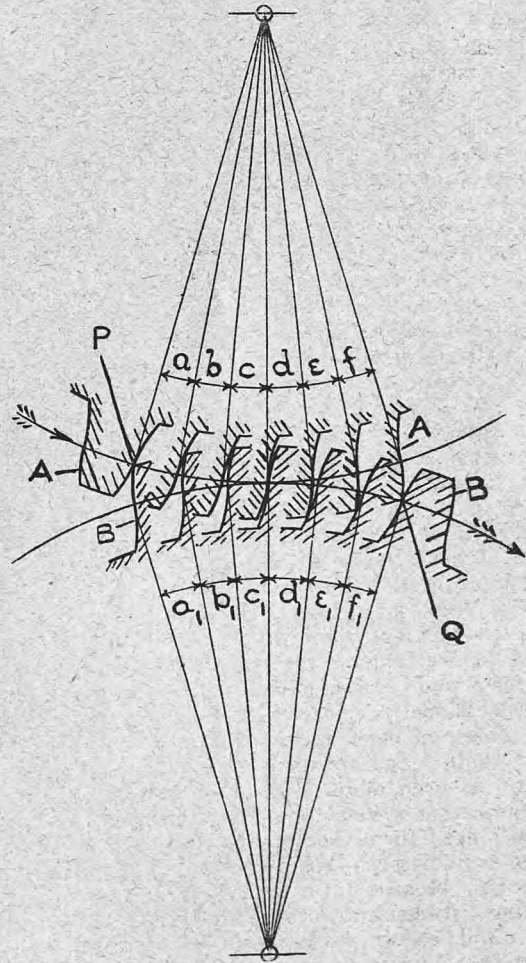


Fig. 2.

Taking A as the driving tooth and B as the driven tooth, it will be seen that while A moves through equal angles a, b, c, d, e, f , B moves through the very obviously unequal angles $a_1, b_1, c_1, d_1, e_1, f_1$, and as

this would also be the case with all the other teeth, it will be evident that while A revolves with regularity B revolves spasmodically. It is often stated that correctly formed teeth should roll on each other, and that there should be no rubbing or sliding movement whatever—a statement often made by people who ought to know better. That such a proceeding is impossible

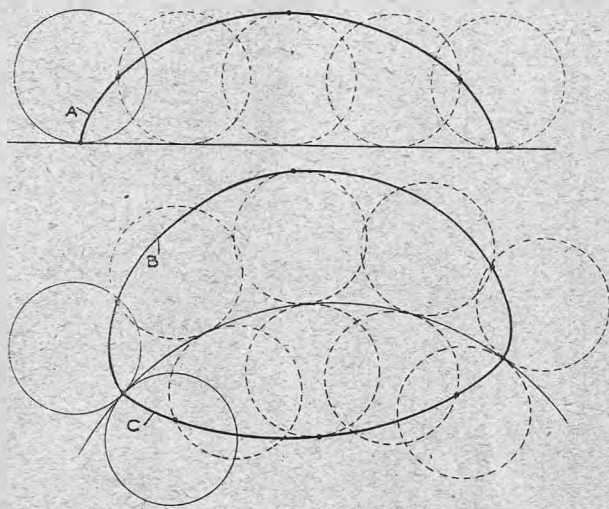


Fig. 3.

may be easily seen from inspection of fig. 2, where the teeth on first meeting touch at P_1 , whence they partly roll and partly slide into full mesh at the centre line, then reverse the process until they leave contact at the point Q.

This proves that pure rolling contact, however desirable of attainment it may be, is not what takes place in toothed gearing. The action may be described as a combination of sliding and rolling; therefore the

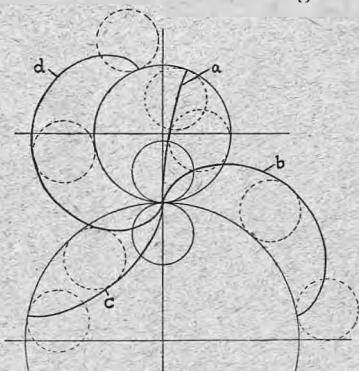


Fig. 4.

these give to the teeth shapes which class them as cycloidal or involute. Cycloidal curves are illustrated in fig. 3; A being a cycloidal curve which is generated by a point on the circumference of a small circle rolled along a straight line; B is the curve described by rolling the circle on the outside of another circle, and is called an epicycloidal curve; while C is the curve generated by rolling the small circle on the inside of the larger circle, and is called a hypocycloidal curve. All the curves thus produced come under the general term of cycloids, the epicycloid is used to give the "face" of the teeth, which is the part outside the pitch circle; the hypocycloid is used to give the "flank" of the teeth, which is the part inside the pitch circle; while the cycloid curve proper is used to give the teeth a "rack" both above and below the pitch line. When speaking of the working faces of teeth

better finished the surfaces of the teeth are the less the loss from friction, and the more accurately formed they are the less the losses from unequal transmission. There are two methods in general use for obtaining the shapes of teeth to give the most desirable results, and

generally, the whole depth of face and flank is meant.

Fig. 4 illustrates how portions of these curves are utilised to give the correct forms to the teeth of wheels. With the small generating or rolling circles in the positions shown it will be seen that they are equally ready to generate any one of the curves *a*, *b*, *c*, *d*, according to which of the pitch circles they are rolled along, and whether inside or outside the circle. If we imagine the two large circles which represent the pitch circles to be rolling together as friction wheels without slipping, and the generating circles to revolve without moving their centres, we shall find that the upper generating circle would describe curves *a* and *b* at the same time, while the lower generating circle would describe the curves *c* and *d*, thus proving that if tooth outlines are made to portions of these curves the rotation of the driven wheel will be as regular as the driving wheel.

Fig. 5 represents teeth formed in accordance with the principle shown in figs. 3 and 4. It will be seen that contact commences at a point on the flank of the driver, and practically the end of the driven, and that as the wheels revolve this contact point travels toward the intersection of centre lines and circles (called the

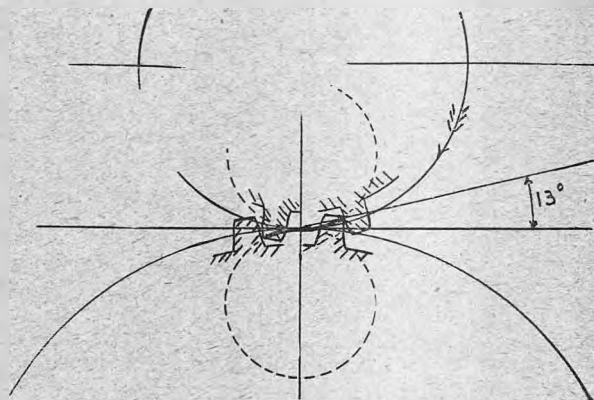


Fig. 5.

pitch point), along an arc which is part of the top generating circle, after which it travels along an arc of the bottom generating circle. This is called the "path of contact," the first portion being the "arc of approach" and the second the "arc of recess."

This figure also shows that the power applied by the driving wheel is not all utilised in turning the driven wheel, but that at the beginning of contact there is a considerable amount of oblique pressure, and that the best results are not given until the contact point is at or about the pitch point.

This obliquity of pressure, which is greatest at the beginning of contact, and in the figure is at an angle of 13° , in time causes the bearings of the two shafts to become worn at the sides opposite to where the teeth engage, which naturally allows the teeth to become a little further out of gear, with the result that the running gradually becomes noisy.

The other type of curves used for giving the shapes of teeth, namely, involute curves, are illustrated by the curve which is given by unwrapping the end of a cord previously wound on to a circle. This is shown in fig. 6, the part nearest the base being the portion used for the tooth shapes. To apply these curves to gearing the path of contact is first decided, say at 15° to the common tangent of the pitch circles. This line then decides the diameters of the imaginary base circles from which the involute curves spring. In fig. 7 the equivalent friction wheels or pitch circles

are as before, and the path of contact is at 15° , as just stated. If now we imagine that the path of contact is a cord being wound from one base circle on to the other, and that a fine pencil be stuck through the cord, we shall find that as the friction wheels revolve without slipping and the cord with the pencil travels across from one base circle to the other, the pencil can be made to describe the involutes A and B (shown slightly longer for the sake of clear-

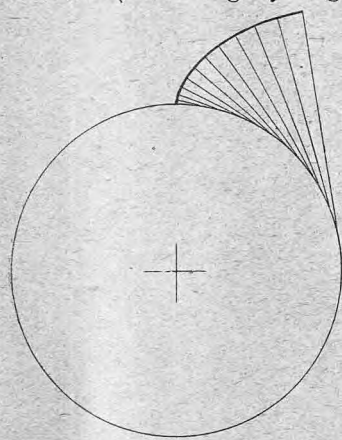


Fig. 6.

ness), thus proving that these curves also transmit motion regularly when used for the teeth of wheels.

Fig. 8 shows the action of involute teeth, and may be compared with fig. 5, which gives the cycloidal teeth. The obliquity of pressure with involute teeth is greater than with cycloidal teeth (compare the involute straight path of contact with the cycloidal curved path), but involute teeth have the

great advantage that they will transmit the motion regularly even when the pitch circles do not touch—a property of great importance in motor car gearing, where quietness of working is very essential, even if a little wear has developed in the shaft bearings.

It will therefore be readily understood that, in spite of greater obliquity, the majority of wheels for car use have involute teeth.

It will be seen that the surface in contact between any two teeth at any instant is very small—in fact, very little more than that given by the width of a line whose length is as the distance from side to side of a tooth. Hence the statement often made that with toothed gearing there is but line contact. In any case, however, the area in contact is very small, and when we consider the extremely high powers which

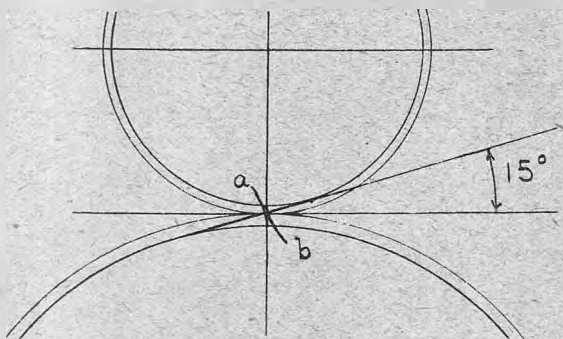


Fig. 7.

are transmitted through the comparatively narrow gear wheels of the modern car it is possible to appreciate of what good material and how accurately it must be manufactured in order to give the splendid results as obtained from the majority of high-class cars.

In order to get a fairly long life out of the teeth, the wheels are generally made with steel that can be case-hardened. The necessary heating and quenching for this process is very apt to leave the wheels distorted slightly, even when the operation is performed with the greatest of skill, and it becomes necessary to grind the wheels true again.

To do this advantage is taken of the property which gear wheel teeth have of tending, however badly they may be formed, to wear themselves into the correct shapes in relation to each other, the reason for this being that unduly high parts on the working faces receive the whole pressure, which with the friction gradually rules them down until the teeth are of even contour.

The wheels are therefore fitted to their shafts and mounted in the gear box, with a belt pulley temporarily fixed on the driving end. They are then driven by means of a leather belt from some suitable power source (generally a pulley on the shop shafting), and the teeth of the wheels, being put into mesh, are smeared with a liberal allowance of grinding material and oil, so that the "wearing in" tendency is augmented. This operation is kept up until, in the opinion of the operator, the teeth are sufficiently true, after which it is very necessary to see that all grinding material is thoroughly removed, otherwise the grinding process will continue even when the gear is in use on a car, particularly if it gets into the bearings. This method of grinding in the gears is not by any means ideal, because it not only grinds down the high parts, but where there are no high parts all the teeth are ground equally, and consequently the skin of hard steel is thinned and the life of the gear reduced.

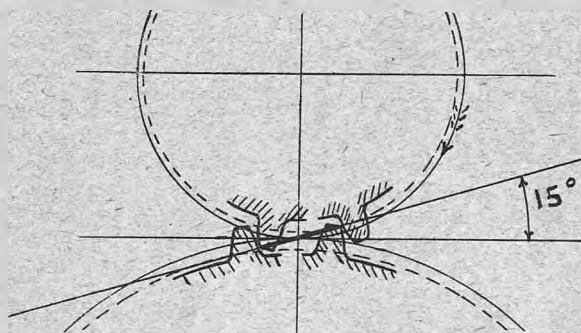


Fig. 8.

The correct mounting of the gears and shaft in the box is in itself a matter of serious moment, and calls for great precision when the housings for the shaft bearings are being bored out, as a very slight misalignment between the shafts themselves will practically convert gearing which is fondly supposed by the designer to have good contact along the teeth into contact at one side only. This want of alignment is one of the greatest causes of noise in the gear boxes of cars which have been in use for some considerable time, and may be the result of fair wear and tear, or may be the result of some unusual, and perhaps even unnoticed, stress to which it has been subjected. It is not an altogether unusual thing for a car to have an entirely new set of gear wheels fitted to reduce noise, only for it to be found that the reduction is very slight, and the car is not by any means so silent as when new. Certain types of aluminium gear boxes are particularly prone to take a slight permanent set as the result of a twisting stress, which may be caused by, say, a sudden application of the clutch or brake, particularly when the brake attachments are on the gear box, or, with a chassis which is on the light side, such a thing as running on to a fairly high side bank with one road wheel when turning may have the effect of warping the gear box enough to put the shafts slightly out of line.

It must be fairly obvious, if jamming in the clutch too quickly is occasionally sufficient to twist the

squared shaft so badly that the sliding sleeves cannot be operated, even if the teeth are not damaged, that stresses are applied of a very severe character which may have the effect of deforming the very ductile material of which gear boxes are generally constructed.

It is very essential that gear wheels should be effectively lubricated as well as the bearings of the shafts, and in connection with this latter statement, particularly the spigot and socket bearing of the straight through on top gear type. Some motorists have a preference for lubricating the gears with thick grease, and this may in some cases slightly reduce the noise, but it is very doubtful whether lubricating in this way is not conducive to rapid wear in the majority of cases, for the simple reason that, if the grease is very thick, the wheels cut channels in it and afterwards run practically dry.

There is, however, another very serious objection to grease, unless it be of a comparatively fluid nature; and that is the persistency with which it holds the metal chips which are likely to be knocked off the sides of the teeth in changing gear—a thing which may be done by even the most experienced driver on occasions.

These chippings are kept suspended in the grease, and are time after time carried between the working surfaces, with the result that their number rapidly increases and the life of the teeth, instead of being lengthened by the use of the lubricant, is considerably shortened. The writer has often seen the teeth of wheels which have been badly scored and worn from this cause, and it is advisable to use a lubricant which is not as thick but that it will allow any chippings to fall to the bottom of the box.

Another common practice often adopted with noisy gearing is to put coarse sawdust or cork chips into the grease, with an idea of deadening the sound.

This practice is greatly to be deprecated, as it is

very easy for the oil ways to become clogged up, especially the spigot bearing, and in the case of this seizing the car will be on through drive even when the gear lever is in neutral position, while if any other gear but the top be in, or be put in, something will have to break unless the car stops. Then again the spaces between the teeth at the roots are liable to become so jammed up with the stuff and tending to force the wheels out of mesh.

In both cases the results may be disastrous to both the gearing and the box; and unless the teeth are actually worn out and need replacing, it is far better to put up with the noise until such time as it is possible to have the gear box thoroughly overhauled by a reliable firm.

The gears of some cars are more difficult to mesh without damaging the sides of the teeth than others, but there are plenty of careless drivers who are liable to chip the sides of the teeth in any make of car, so for their especial benefit fig. 9 is given, which illustrates how the various dimensions of any particular tooth go to make up its ability to resist the breaking stress applied to it when under working conditions.

Each tooth may be regarded as a small overhanging beam or cantilever, with the pressure applied at the outer edge as shown by the arrows.

$S B T^2$

The formula for this is given by $P H = \frac{S B T^2}{6}$

Where P = Pressure applied to the tooth in lbs.

H = Height of the tooth.

S = Safe stress of the material in lbs. per square inch.

B = Breadth of the teeth.

T = Thickness of the teeth.

That is to say, P H, the bending moment, must be $S B T^2$

equalled by $\frac{S B T^2}{6}$, the resisting moment, or breakage

will occur along the line of T.

It will be seen, then, that the strength of a tooth is as the square of the thickness, and directly as the breadth, so that every slice chipped off the sides of the teeth reduces the strength by an equivalent amount. Something to remember when footling the gear in changing speed.

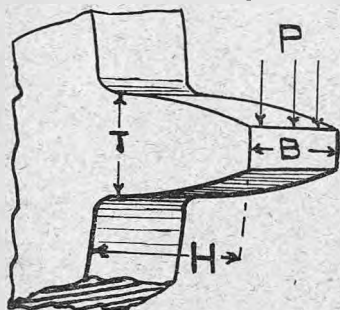
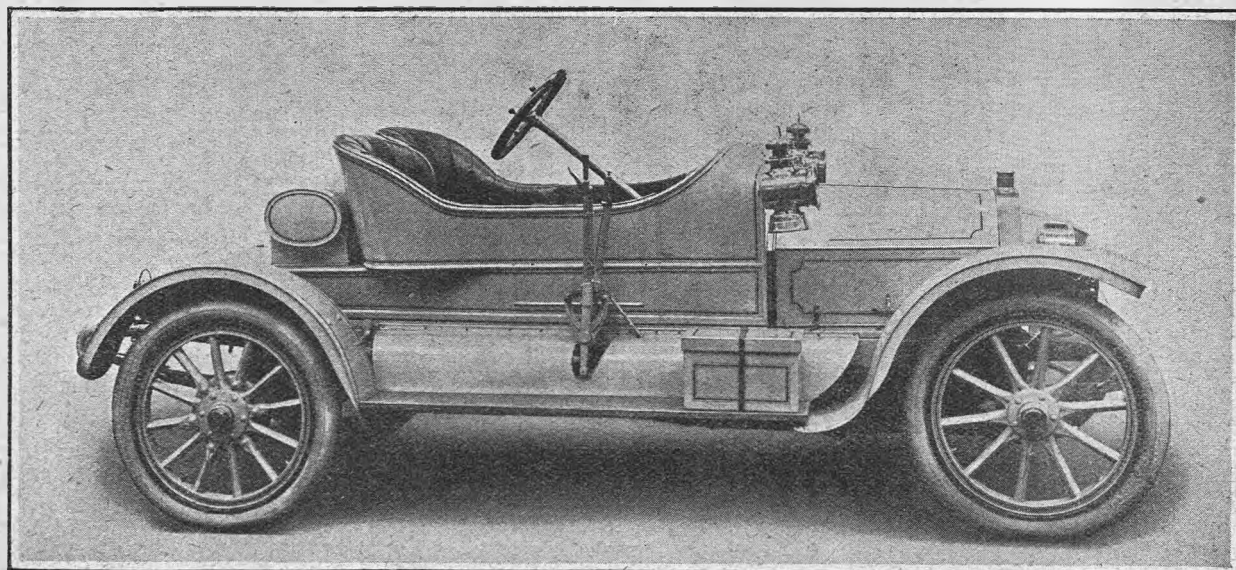


Fig. 9.



A racy-looking 15 h.p. Star car shown at Olympia with a special form of two-seated body.

On the Road.

Lugubrations from an Hotel.

Hotels.

LAST week I wrote my contribution to *The Autocar* from an hotel at Leighton Buzzard called the Swan. Because this little town lies off the beaten track of motors its chief hostelry does not go in for a *table d'hôte*, and consequently the dinner was just what I wanted. But to-night I am staying at one of the most picturesque hotels there is in England in the old city of Gloucester, and, to my regret, I am given the food arranged for a particularly noisy "old boys' " annual dinner overhead. There is nothing to complain about it, except that I have had indigestion since I ate it; but undoubtedly a little meal of three things is much nicer than a procession of six courses, and that is why I think the most detestable *menu* in the world is that provided on trains by most railway companies and thrust on one whether at dinner or lunch. I know one line that asks you what you want, and their chops and steaks are so good that their attendants are getting overworked by the crowds of sensible people who avail themselves of the fare. But to return to hotels.

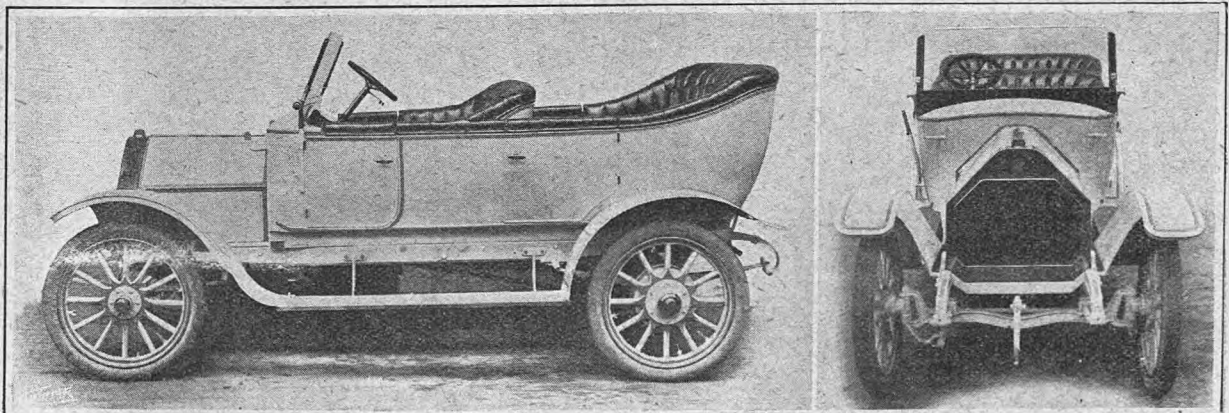
I get a great deal of amusement out of country ones. There is a barmaid at this one whose hair seems a great worry to her. Every five minutes she has to come to the glass over the mantelpiece and see if it is all right. She also seems to have just got hold of the Merry Widow waltz. Therefore I am writing in the coffee room, which, I am glad to say, I have all to myself.

I have been running over the Wiltshire Downs and the Cotswolds to-day, and I can almost put it that I have them all to myself, too, for it is surprising how very few cars one meets on the empty and wide roads that lie between the distant towns. Except that here we have hedges or stone walls and no avenues of trees, this part of the country in the winter is very like parts of Northern France. There is just the same spacious wide sense of freedom or desolation—it depends on the weather and the car which one feels—the same delight in having it all to one's self, and the same pleasure in the idea that one is doing something most other people are not.

Cars and Hounds.

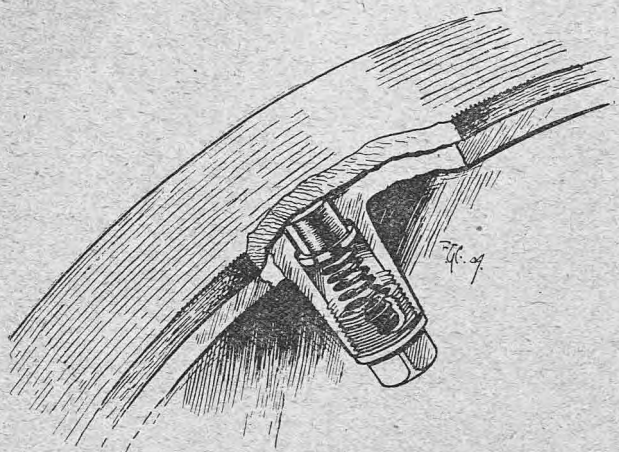
There is another joy in the winter I omitted last week, and that is the occasional glimpse of hounds and the endeavour to make out what pack it is. I

am much too busy and heavy to hunt now, but I read with interest articles on "Motors at the Meet" in *The Autocar* a few weeks back. I think the author makes too much of the case against cars. Opposition to their reasonable use is confined merely to two or three faddists, and we know that one of the chief characteristics of a faddist is that he is always intolerant of other people's fads. All sensible masters not only expect to find them at meets, but make great use of them themselves, and I know of one famous sportsman who boasts that he averages a couple of hours more at home a day now than he used to before motors were invented. Very few horses mind them nowadays; their riders are much more often frightened. But it is curious to note how much more captious ponies still are. I bought one last spring; it came from Exmoor, and was said to be all that could be desired. I do not believe it had ever seen a motor before, and, try as we could, I never managed to tame him. He kicked, he reared, he backed, and had I not taken the precaution to borrow someone else's cart I should have had to have had my own done up before I finished with him. I have exchanged the brute for another, which is very quiet, but was unprovided by nature with the equine equivalent to compression, and the only satisfaction I have got out of the deal was a letter from the dealer who took the original to the effect that he was the biggest brute he had ever come across, and had run over a perambulator on the way home, and would I send him another sovereign. But all this is very much by the way, and what I was driving at was the fact that, though cars have not yet entirely conquered masters of hounds, there is no doubt that they have made their influence very much felt in the matter of shooting. Whereas a few years ago one always got cold and stiff with the long drive, now it seems but an incident in the day. I noticed in Bristol the other morning a procession of cheerful-looking men in large cars, provided with very large luncheon baskets, passed my hotel between nine and ten all bound to the once almost inaccessible districts around, and a little enquiry showed that since motors had come in shoots had let which before were neglected, and places hitherto unget-at-able except for residents in them had become no trouble at all for anyone to reach. The only drawback I can find to the use of motors for



A 14-16 h.p. Belsize car with special flush-sided Hewer body and high wide dashboard. Messrs. J. Keele, Ltd., of 72, New Bond Street, London, W., who are sole London agents for Belsize cars, are making a speciality of this comfortable model.

shooting is that everybody will talk about them at lunch, and I have heard several complaints against the S.M.M.T. for having been thoughtless enough to



AT OLYMPIA. A section of the Sunbeam clutch with first engagement springs under the leather.

arrange their show in one of the busiest shooting weeks of the season.

Flying and Motoring Bodies.

Since I wrote the above last week's *Autocar* has arrived, and I grieve to read that a certain Mr. R. Hannen reproves me for my ignorance of the good deeds of the M.U. He accuses me of not being a member, and informs me that the M.U. has during the year entertained the L.I.A.T. Considering I was delighted to entertain its charming president and his wife, the secretary of the M.U., and many other famous folk at lunch on the wettest Sunday of the summer, he accuses me wrongfully, and if he had studied my words more effectively he would realise that I have always looked on the Union as the one and only body it behoved all individual motorists to belong to. But, as flattery is unhealthy, I have at times not hesitated to remark on some of its doings, and—just to show my love for it—let me remark that the most fatuous

thing it has ever done is in its latest announcement that it has affiliated with the Aeroplane Club. I could indulge in expressive language, but I will refrain. Let me boil it down by remarking that this move will only have the effect of exasperating once more the Aero Club, the R.A.C., and the many other disconnected associations that represent all and sundry.

And that is the spirit and policy that I have never ceased to bombard, because it is the spirit and policy that, having been the ruin of the authority of all motoring associations, is now apparently going to try and play the same trick on all flying—or would-be flying—organisations. But, in my opinion, all these ideas of binding flying and fliers into "sporting" clubs will prove mistaken. Although I know what happened to the people who laughed at the notions of steam engines and motors being ever of any practical use, there was not the same element of risk about them in their beginnings. But with regard to flying machines there is risk, and the great majority of flying men will be those who fly for the purpose, one way or another, of making money at it. Therefore I think it would be just as sensible to expect all trick-cyclists to belong to the C.T.C., all wire-walkers to join the Week-end Ramblers, and all donkey-boys the Jockey Club. It may be very wrong of me, but I laugh at the *ukases* of the Aero Club, issued by men who have never flown a yard, threatening brave men who daily risk their lives with suspension if they do not do as these earth-walkers bid them. My advice is to look on all flying men as star artistes pure and simple, to go and see them. applaud, and, if one feels so inclined, to copy them. But to tell them where and when they may fly is ludicrous, and it is a great pity the many clubs that pretend to control aviation cannot see it.

But ever since flying became the fashion its arm-chair experts have afforded much chance for melancholy laughter, and one of the chief mirth-makers in that line is the author who nearly a year ago told the Wrights to go home with their hopeless and dangerous machine. Nor can I see any traces of an apology yet anywhere.

OWEN JOHN.

Institution of Automobile Engineers.

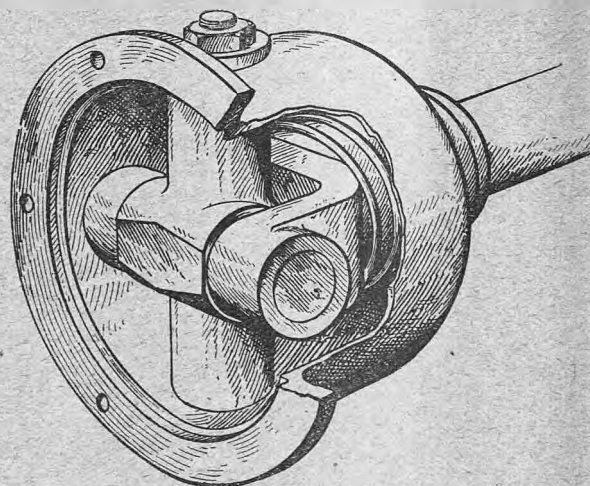
The third ordinary general meeting of the session will be held on Wednesday, 8th December, at 8 p.m., at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W., when a paper will be read by Mr. F. W. Lanchester (vice-president of the Institution), entitled "Tractive Effort and Acceleration of Automobile Vehicles on Land, Air, and Water."

At a meeting of the Council on November 17th it was resolved to strengthen the Standardisation Committee of the Institution, and the following were added thereto: Messrs. J. S. Critchley, A. Craig, D. S. Smith, J. S. Napier, T. H. Woollen, A. S. Hill, R. K. Morcom, and Claud Crompton.

A letter was read from Mr. T. C. Pullinger on this subject, and a set of seven Whitworth fine gauges which he had prepared were placed before the council. A vote of thanks was passed to Mr. Pullinger for the interest he had shown on behalf of the Institution.

The second ordinary general meeting of the London branch of the Graduates' Section of the Institution was held on Tuesday, 23rd November, when a paper was read by Mr. P. W. Pattinson entitled "Pattern Making and Moulding." The paper was illustrated by means of actual patterns, core-boxes, and large

diagrams. The chair was taken by Mr. L. A. Legros (vice-president of the Institution).



AT OLYMPIA. The Alldays propeller-shaft universal joint. The forward flange of the casing bolts up to the rear of the brake drum, the end of the propeller-shaft being in a plunging joint.

An Internal Combustion Pump.

An "Engine" which has neither Piston, Connecting Rod, Crankshaft, nor Flywheel.

ON page 44 of the issue of *The Autocar* dated July 9th, 1904, were published diagrams and particulars of the Vogt internal combustion engine, in the design of which the usual pistons were displaced by a column of water. The force of the explosion acted upon the water at the top of the chamber, whereupon the water was forced down, carrying with it a diaphragm coupled up with the usual connecting rod and crank. There were several most interesting features connected with this engine, which gave constant compression whether the throttle was wide open or nearly closed, but, although we have reason to believe that a considerable amount of time and money has been spent on the idea by one of the largest engineering firms in the country, the device has not apparently been brought to a pitch of perfection carrying prospects of commercial success.

The internal combustion pump which was recently described by the inventor, Mr. Herbert A. Humphrey, M.I.M.E., at a meeting of the Institution, reminds us at once of the Vogt engine referred to, notwithstanding that the principle is startling in its novelty, and that, excepting for the fact that water is used to receive the force of the explosion, the invention bears practically no resemblance to the Vogt engine in principle, design, or construction.

Although the principle of the invention has up to the present time been applied to a water pump only, the motorist will at once appreciate the possibilities which are opened up by this device, which, successfully adapted to the propulsion of a car, would entirely do away with pistons, connecting rods, crankshaft, etc.

However, we will not at the moment dilate upon mere possibilities, but proceed forthwith to a description of the invention, describing and illustrating merely the principles involved.

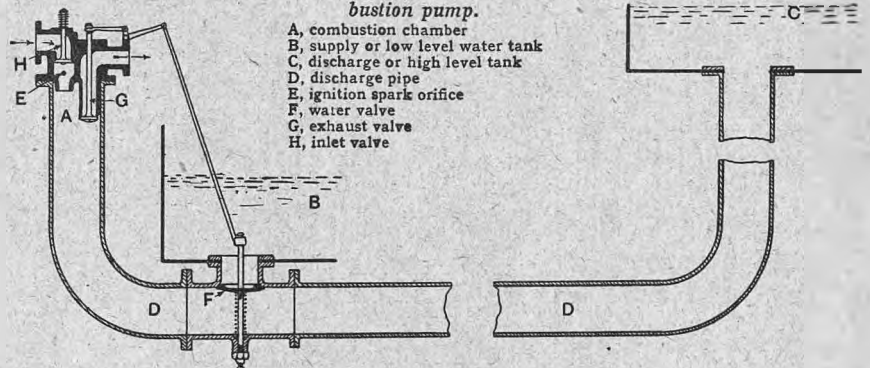
We give a diagrammatic sketch of the pump, water tanks B and C, and discharge pipe D. We will imagine that the water is at rest, the height of same in the supply tank B finding a common level in the combustion chamber A. Gas—i.e., mixture—under pressure is introduced through the inlet valve H into the explosion chamber A over the surface of the water therein, and is fired by a spark at point E. The result of the ensuing explosion is that pressure on the surface of the water drives the column of the latter along the pipe D to the point of discharge represented by the tank C. By the time the explosion has exerted the whole of its force upon the water the latter has a considerable velocity, and the kinetic energy or momentum thus acquired causes the flow of the water to continue for awhile—beyond a period, in fact, when atmospheric pressure has been reached in the combustion chamber A and the pipe D. At this stage the pressure on the underside of the water valve F is less than that above it; consequently the valve opens and allows water to pass into the pipe D, replacing that which has been and is being ejected into the discharge tank or outlet. The water valve and the exhaust valve G are interconnected, so that when the former

opens automatically for the reason described the latter is allowed to open also. The incoming water from the supply tank not only follows the volume in the pipe which is still receding towards the outlet, but also flows towards the combustion chamber, the effect of this being to commence the exhaust movement.

By the time the kinetic energy referred to has been expended, the water in the lower part of the combustion chamber has almost reached the level of that in the supply tank; the water valve is then closed automatically by its spring.

A reaction now occurs, and the volume of water, as with the swing of a pendulum, tries to flow back from the discharge tank C to the combustion chamber A. It cannot go very far, however, for, as we have seen, a quantity of the liquid is already there, i.e., some of that which came in from the supply tank. But the whole volume does recede a certain distance—far enough, in fact, to exhaust all the burnt gases, and, reaching the exhaust valve, to strike against and close it by impact. This valve is immediately locked shut by a most ingenious device, which also operates upon the inlet valve in a similar manner at the right moment. It is hardly necessary for our purpose, however, to

The Humphrey internal combustion pump.



illustrate and describe this essential locking device.

At this moment the excess of water in the discharge tank—which represents the "work done" or quantity of water raised—is carried off in any desired or convenient manner or direction.

By cushioning against the small quantity of unburnt gases still remaining in the head of the combustion chamber the volume of water is again brought to rest, but only after a considerable degree of compression has been set up. This compression reacts upon the water, and a reverse flow takes place which is generated by the reaction. Again the volume obtains some momentum, and continues this reverse flow past a point when atmospheric pressure is reached—until, in fact, automatic induction of fresh gas through the inlet valve H occurs. Yet once again a natural movement of the water takes place and the volume returns, compressing the gases until ignition occurs, and the cycle repeats. There being no half-time shaft, an ingenious ignition device has been invented and applied, by means of which the spark occurs when a certain predetermined compression is reached. The ignition is of the low-tension variety, and from our information we arrive at the conclusion that a spark occurs twice in each cycle—firstly, when the compression following the exhaust is reached, and again when compression of the new charge is at its highest.

The method of starting the pump—we had almost written engine—is simple and easy. Compressed air is admitted to the combustion chamber at sufficient pressure to depress the water level a little below the usual charge volume. The exhaust valve is then forcibly opened; the water rises in the chamber, closes the valve as before described, and gives the first compression, and in due course the first induction strokes.

For all intents and purposes when considering this invention, one may look upon the moving volume of water in the light of a pendulum, for it acts in a similar manner in flowing and receding.

The pump as such has been tested thoroughly by Professor Unwin, and from published reports it is apparent that no hitch occurred in the course of a very comprehensive test.

At the present time the invention has not yet been applied, nor has any attempt so far as we are aware been made to apply it, to power work generally or motor car propulsion in particular, but we feel confident that a plain, untechnical, and unvarnished account of the principles applied will interest the motorist and readers of *The Autocar*, and that the immense possibilities of the invention will be apparent to those who look ahead.

The Sankey All Steel Wheel.

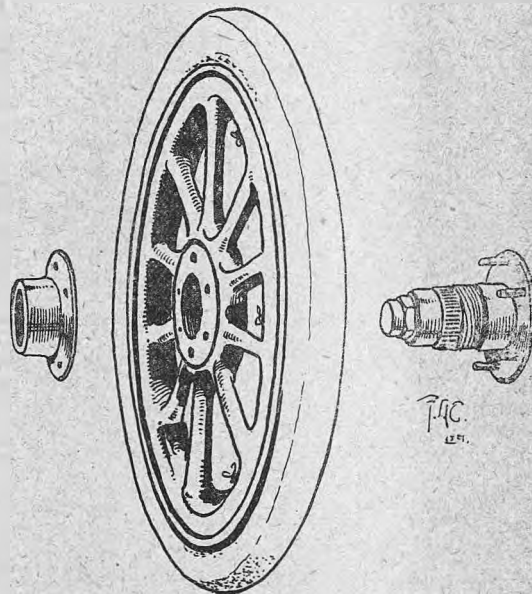
A Detachable Type of Great Simplicity.

THE Sankey all-steel wheels worthily attracted considerable attention at Olympia, for without doubt this system has great possibilities. Although following the general lines of the wooden variety, these wheels, which are made by Joseph Sankey and Sons, Ltd., Bilston, Staffs., whose reputation as metal workers is world wide, have several distinct advantages. The average weight is 5 lbs. less than the wooden artillery wheel, tests show that they are nearly twice as strong, the lines are easy and graceful without any acute angles to hold the dirt, they are affected neither by heat nor cold, and neither split, warp, nor rot. The Sankey wheel is made with either fixed or detachable hubs. The latter type is extremely simple and absolutely safe, and the whole operation of detaching and replacing a wheel occupies less than two minutes.

The fastening adopted is patented, and is manufactured under licence from Rudge-Whitworth, Ltd.,. The hub is formed of two parts. The main part consists of a disc and barrel, and from the disc stand out at right angles five or more pins which fit into corresponding holes in the wheel itself, and not only define the position, but also carry its weight. On the barrel is a ratchet and a threaded flange. The other part of the hub consists of an outer cap, also threaded internally to fit the flange, and carrying within it a pawl which engages with the ratchet and holds the threads locked and the wheel firm in its place on the pinions.

To detach the wheel the spanner is fitted into a notch in the outer cap and brought into position, so

that it of necessity takes bearing on a stud which releases the pawl. A few turns release the outer cap from the main hub. The wheel is then free, and can be lifted bodily off the pins, and as quickly



replaced by another by merely reversing the operation. A great point in favour of the Sankey detachable wheel is its narrowness, as its width is no greater than the tyre.

A correspondent is anxious to find a man who can drive a 9 h.p. single-cylinder car, but who must act as a sexton and look after a church and its churchyard. The vicar will employ him for gardening, and he will, if a good steady man, obtain other employment of a similar kind in the village. He must occupy a certain small substantial cottage at a rental of 3s. per week. He will not be required to drive the car in the winter time. Our correspondent says the job is worth 20s. to 21s. per week. The place is quite in the country, but the cottage is good. We wonder, as we write, if there can be found a man in all this broad realm who can combine motor car driving with grave digging, to say nothing of charring a church and forcing asparagus. By the way, this amazing offer incidentally and by inference testifies to the small amount of attention that a modern motor car requires. After performing the varied duties enumerated above, the happy man who secures the position may possibly be expected to make bricks in his spare time.

The Development Bill has passed for the second time through the House of Commons, and the Lords' amendments to it have been considered. Most of these amendments have been disagreed with, chiefly on the ground that they infringe the privileges of the Lower House in regard to finance. The vital amendment which the House of Lords made, it will be remembered, was one empowering the Treasury, through the Road Board, to make grants to local authorities for the maintenance of existing roads as well as for the maintenance of new roads constructed under the Act. Another amendment disagreed with was the striking out of the clause which empowered the purchase of strips of land by the side of new roads constructed under the powers of the Road Board, and the substitution of a clause requiring the adjoining land owners to make a contribution towards the construction of any roads cut through their estates. A committee of the House of Commons has been appointed to draw up reasons for disagreeing with the Lords' amendments.

On the Track. By H. C. Lafone.

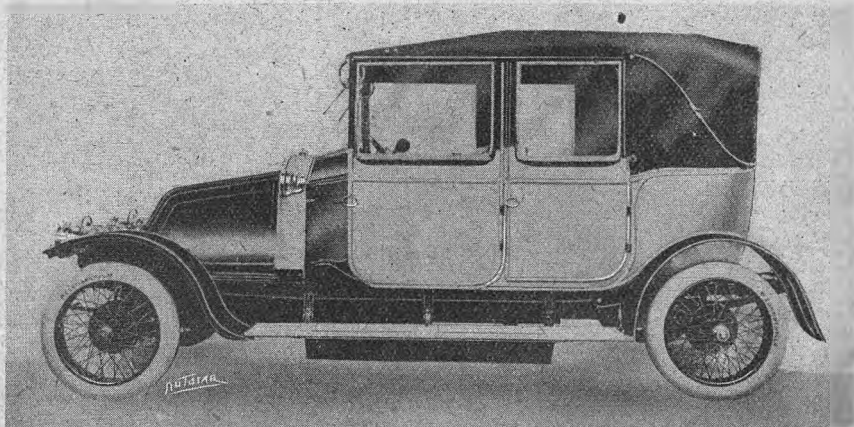
BEFORE I forget it, I want to refer to something I wrote about the Thames car's recent records at Brooklands. I mentioned that one of the stops for tyre trouble occupied almost six minutes. Now, the Thames was (though I did not mention the fact in my former article) fitted with R.-W. detachable wheels, and I hear that the R.-W. people have made enquiries as to why one of their wheels took so long to change. The upshot of these enquiries seems to be that the stoppage was timed at about 1m. 20s. In self-defence I must say that Major Lloyd discussed the whole matter with the Thames driver and myself, and stated that he believed the stop to have occupied almost six minutes. I do not think Major Lloyd had electrically timed it, but he gave his opinion as an *obiter dictum*, and I simply took his word for it. I thought, at the time, that there must be some mistake, and I am now convinced that Major Lloyd cannot have been right. After all there was a stop-watch actually on the spot at the tyre depot, and it was, in all probability, correct in giving the time as something between 1¼m. and 1½m. Obviously the R.-W. people only wish that there may not be circulated any misleading stories to the effect that their wheels take almost six minutes to change in the ordinary way. Everyone who knows anything at all about the wheels would know that two minutes would be rather excessive.

The Torkington tyres had a dust-up on the track last Saturday, when they underwent a 100 miles trial on a six-cylinder car under R.A.C. observation. Of course, no official statement has yet been made, but I think the results of the test will prove to have been satisfactory. I did not remain on the track throughout the run, but I assisted at its commencement, when the speed of the car was about 45 m.p.h. I hunted the trial machine round once or twice, and it seemed to me that the frame and body rode very well on the tyres. At the end of the 100 miles, I am told by the track manager, there was no heat apparent in the rubber. The publication of the R.A.C. certificates will be looked forward to with interest by those who read the description of the Torkington tyres in *The Autocar* some months back. On Thursday last week O. C. Godfrey did a fine performance on a 3½ h.p. Rex motor bicycle. For the class of machine Godfrey's time of 49m. 59s. for fifty miles is, I believe, a record. It was bad luck that a slight mishap caused a stoppage when ninety-eight miles had been covered, for the rider was going so well that he seemed to have the hundred miles record safe. One day this week (probably to-day, Friday) a Daimler is to be subjected to the searching test which every car has to undergo before being taken over by the War Office. If only *all* private buyers would insist upon some trial of the War Office kind before taking delivery of new machines it would be a splendid thing for the purchaser and most healthy for the manufacturer!

I am very glad to see that the B.A.R.C. has instituted

another "standard class," this time for cars up to 21 h.p. by the R.A.C. rating formula. The maximum bore for a four-cylinder engine is 92.075 mm., and there should be countless attacks on the records for this class, as so many engines have a 90 mm. bore. Who will be the first record maker? Two names come to my mind at once. A private match between them has fallen through, but that will not prevent healthy rivalry for premier honour in the new "21 R.A.C. rating standard class." More power to both the cars in question, and may I be there to see the fun!

And what of the daring aviators? At all events one has been aviating. Mr. Wickham, on what I heard rudely described as a mongrel aeroplane, has made



A new and improved type of double cabriolet, designed and fitted by Messrs. Mulliner, of Northampton and Long Acre. Not only is the rear portion enclosed, but the front seats also. The side windows are arranged to be lowered, and the whole of the uprights and leather hood fold back to form an entirely open touring car, also the front part can be used open with the hind part closed.

several short flights, and gives promise of doing very well indeed. Mr. Neale has had the engine of his Blériot running, and will soon be up among the few partridges and pheasants which Major Lloyd has left in the space surrounded by the track. By the way, talking of pheasants, what was that story I heard on September 25th about a pheasant *battue* at Brooklands to be held two days later? Loud cries of shame! Before this week is out I expect we shall have, in the Brooklands hangars, Mr. Astley's engine—the frame and wings of his monoplane, as I said last week, are already there; Mr. Ballin Hinde's machine, and Mr. Moreing's Voisin biplane. Seven hangars are definitely taken, and there are heaps of would-be bird-men ready to book others as they are completed. Judging from appearances, we shall have plenty of aerophun at Brooklands next spring and summer, and our meetings will be quite "self-supporting." No more highly-paid pros. It will be the game for the game's sake.

The applications which are constantly received for copies of the Motor Union Legal Handbook indicate its value to users of the self-propelled vehicle. The handbook contains the acts and regulations relating to the use and ownership of motor vehicles, a summary of British highway law, and the recommendations of the Royal Commission on Motor Cars. Members who have not yet obtained a copy should communicate with the Secretary, 1, Albemarle Street, Piccadilly, London, W., enclosing P.O. for 1s.

Grumbles. By the Grumbler.

THERE are still some manufacturers who apparently do not realise that aluminium will not stand scew threads. The very nature of the metal rebels against it; and yet I am constantly

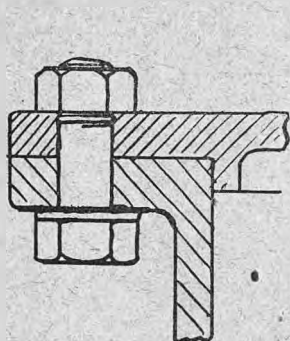


Fig. 1.

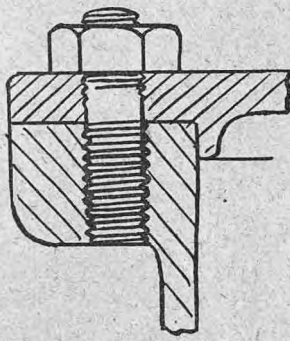


Fig. 2.

noticing details of design affording evidence of want of thought on this matter. The only way to attach anything to an aluminium casting is by means of through bolts (fig. 1) or studs (fig. 2).

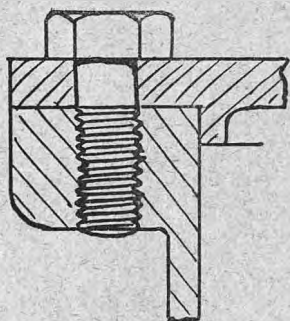


Fig. 3.

A set screw (fig. 3) is bad, for the reason that the aluminium will not stand the thread being unscrewed many times.

The same remarks apply, though in a lesser degree, to cast iron. Cast iron threads are not satisfactory in the long run.

Cast iron flanges are often made much too thin, with the result that the ears break off. The worst offender in this respect is the exhaust collector, frequently referred to as exhaust "pot"—why I do not know.

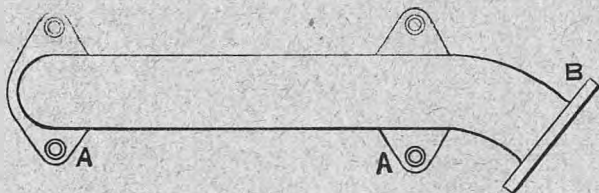


Fig. 4.

Fig. 4 shows a usual design. The ears A do not often give trouble, as they are properly seated, but

the ears B often break on account of the extra strain caused by trying to make a tight joint by forcing together two faces which are not true.

Valve covers are often made of gunmetal and screw into the cast iron cylinders, a copper asbestos washer being relied upon to make the joint gas tight (fig. 5). My experience with this kind of valve cover has not been good. It is extremely difficult to make the joint really gas tight, and the gunmetal, being relatively soft, does not take nicely to the spanner, which has to be applied with exceptional force.

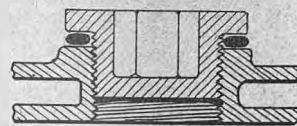


Fig. 5.

I have found the best type of valve cover to be the coned type held in position by a yoke and nut (fig. 6). When once the cast-iron covers have been properly ground in, the joint requires no especial care in refitting, provided the covers and seats are wiped clean before being replaced.

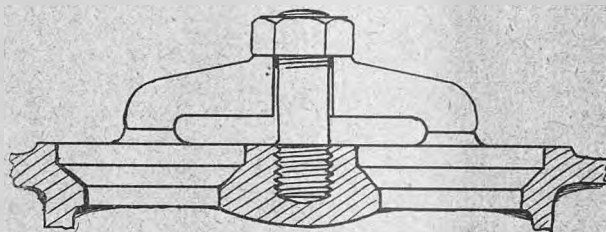


Fig. 6.

Some engines are so designed that the valve guides are detachable and screw in to the cylinder casting. In my opinion the only correct metal to use as a valve guide is cast-iron, and unless special precautions are taken it is impossible to remove these guides after the engine has been in use some time. The most essential feature is that the male thread should not project beyond the female thread. That is, the length A should be less than the length B. Further, the thread should be well blacklead before being screwed home. Unless these precautions are observed it becomes, as a rule, a matter of impossibility to remove the guides without breaking it or "chipping" it away in pieces.

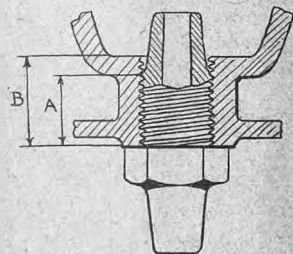


Fig. 7.

Retreading Worn Covers.

We have received many complaints recently of the short life of and small mileage obtained from retreaded outer covers; not that the quality of the material used has always been poor or the workmanship bad, but that the owners of these covers have not been informed before the work was put in hand that the covers were not in a fit state to be retreaded—the foundation of the cover, viz., the fabric, having become rotten, or partially so.

There are, undoubtedly, conscientious and considerate firms undertaking this class of work and one of these is the Acre Rubber Co., Ltd., 57, High Street, Bloomsbury, W.C., who positively refuse to

retread any cover of which they have the faintest suspicion. Unless this firm is quite satisfied of being able to make a cover "as good as new," not only in appearance but in the matter of durability, it will not undertake repairs of any kind to it.

The firm has received some most excellent testimonials as a result of this policy, and we have heard of the Acre Rubber Co.'s retreaded covers being run for upwards of 6,000 and 7,000 miles; but, of course, a great deal depends on the condition of the fabric when the treads are fixed, and it is decidedly an unwise policy to delay sending covers for repair until it is positively impossible to use them any longer.

Motor Union Notes.

(Communicated by the Secretary.)

Practice and experimental grounds for the use of members interested in aeroplanes are being negotiated. Three sites are under consideration, and a definite announcement will be made shortly. Any member who can assist the committee in this matter is requested to communicate with the Secretary.

Mr. W. Tyson has been appointed travelling organiser to the Union, to assist in perfecting the Union's touring facilities and in increasing the efficiency of the Union's local organisation.

The Hastings and St. Leonards Centre of the Motor Union is holding its Annual General Meeting of local members on December 7th at the Queen's Hotel, Hastings. All local members are cordially invited to be present. The past year's work will be reviewed and the winter programme decided upon. The hon. secretary of the centre is Dr. H. G. L. Allford, 29, Cornwallis Gardens, Hastings.

The Local Government Board was to hold inquiries into the applications for ten-mile speed limits at Three Bridges (Sussex) on December 3rd, and at Partridge Green (Sussex) on December 4th. An order has been issued by the L.G.B. imposing a ten-mile speed limit at Bettws-y-Coed. As a result of the opposition to the application, the sections of the roads it was proposed to schedule have been considerably reduced.

Driving examinations for the "Motor Union's Driver-mechanic's Certificate" were held on Wednesday, November 24th, and for the "Motor Union Public Service Certificate" on Monday, November 29th, in London. For the latter examination several drivers attended from Hastings, where the Borough Council have made it a condition that drivers shall possess the "Motor Union Public Service Certificate" before public service licences will be issued to them.

A paper on "Tractive Effort and Acceleration of Automobile Vehicles on Land, Air, and Water" will be read before the Incorporated Institution of Automobile Engineers by Mr. F. W. Lanchester on Wednesday next. A limited number of invitation cards have been placed at the disposal of the members of the Union, and may be obtained from the Secretary.

The next issue of the *Motor Union Journal* is now in active course of preparation. A new feature will be the pages devoted to the newly formed Aviation Section of the Motor Union. Members interested in aeroplanes or other forms of aviation are invited to contribute. The Union will also be glad to receive any notes or short articles of general interest to motorists.

At the last meeting of the General Committee Mr. J. A. C. Skerry, of 23, Bridge Street, Workington, was appointed local solicitor to the Union, and Mr. A. J. G. Robb, Sandy Mount, Oughterard, Co. Galway, was appointed as honorary correspondent.

By arrangement with the *Westminster Gazette* information concerning the state of the roads, etc., is being supplied by the Motor Union Touring Department for publication in Thursday's issue of that paper.

The attention of members is directed to the necessity when employing a driver of inspecting his driving licence. A member recently neglected to assure himself that his driver's licence was still in force, and has this week received a summons under Section 3, Sub-section 1, of the Motor Car Act, 1903, for employing an unlicensed driver. The only answer in the circumstances is, of course, that the offence was the result of an oversight, but it is very difficult to induce magistrates to take a lenient view of such matters and deal with them as technical offences.

During the month of November a number of cases have been dealt with by the Legal Department of the Union in which members have had the misfortune to be involved in collisions on the road. In several cases it appears that, although the accident was due to no fault on the part of the member, this fact will be somewhat difficult to establish owing to the lack of substantiating evidence.

Those members who may be involved in collisions should note:

- (1.) The names and addresses of bystanders who witnessed the accident.
- (2.) The side of the road on which he was travelling prior to the accident and the direction in which he was going.
- (3.) The speed at which he was travelling.
- (4.) The exact width of the road and the condition of the surface, etc.
- (5.) What signs he gave of his approach, by horn, bell, or voice, etc.
- (6.) If the accident happened after dark, whether he was carrying lamps in accordance with the regulations.
- (7.) The measurements of the tracks of the wheels from the sides of the road both of his car and the wheels of the vehicle with which he collided.
- (8.) Any particulars of the manner in which the party with whom he collided was travelling.
- (9.) Whether the other party was on the proper side of the road and what light or lights he was showing.
- (10.) In the case of the other vehicle being a motor car or cycle its number and description.

In the event of a person being injured by the accident, a claim is likely to be made, and it is advisable to instruct an independent medical man to examine the injured party and to report. Under no circumstances should any money be given to a person involved in the accident, nor should anything be said which could afterwards be construed into an admission of liability.

Now that the touring season is practically over, members who have not already done so are invited to furnish the Touring Committee with notes of any of their experiences during the summer months which may be of service to their fellow members. In particular the committee will be glad of any information with regard to hotels and repairers throughout the country. The committee met last week and had before them a large amount of correspondence on this subject. The letters received from members contained much useful information, and many acknowledgments of the comfort and courteous treatment met with at the Union's appointed hotels. In a few cases complaints of ill treatment and excessive charges were received, and were carefully investigated by the committee, who are anxious that all such cases should be reported to them, in order that they may be taken up with the proprietors. By the systematic following up of every complaint, and by the public recommendation of houses at which motorists are assured of considerate treatment, the hotel system in this country will, it is hoped, be gradually improved.

The Amans Pneumo-Suspension.

A Detail Description of an Effective Shock-absorbing Device.

THIS apparatus, which for lack of a better definition we are fain to term a shock absorber, was, as our readers are well aware, shown upon the Gaulois tyre stand at the Olympia Show. It was also demonstrated on a 24 h.p. Minerva car shod with large diameter solid rubber tyres, carrying heavy leather non-skids.

Thanks to the courtesy of those interested in this device, we are now able to supplement the somewhat sketchy description of our show report by fuller detail and carefully made sectional drawings.

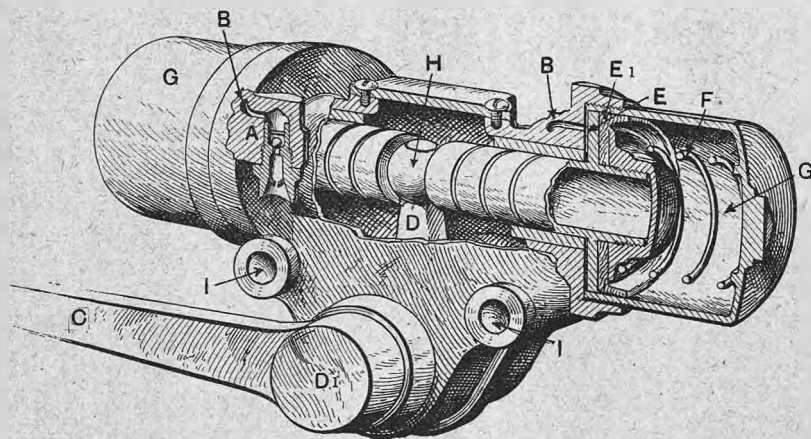


Fig. 1.—Amans pneumo-suspension device in part section.

- | | |
|--|---|
| A A, suction valve | E, leather cupped piston |
| B B, passages from suction valve to suction chamber | E1, leather cups |
| C, rocking lever attached at outer end by doubly articulated rod to axle. Inner end fast on spindle D1 | F, returning springs |
| D1, doubly articulated rod connecting C with axle | G G, compression chambers |
| D, ball-headed rocking arm operating pistons | H, ball head of rocking arm D, having vertical sliding movement on latter |
| | I I, holes for bolts securing apparatus to frame |

The apparatus, of which there are four, consists of a form of dumb-bell cylinder body attached to the frame by bolts passing through the holes I I. Within this double headed body are two leather cupped rams or pistons E working in the compression chambers G G. These piston heads are provided with the returning springs F to keep their countersunk sleeve ends up against this ball H. The spindle D1 of the rocking arm D carrying the ball H projects without the body, and has fast upon it the lever C, which as to its outer end is attached to the axle by the doubly articulated rod C1.

As seen in the sectional drawing, the suction chambers formed as hereinafter described connect with the outer air through the passages B B and the valves A A, as shown.

The leather glands or cups E1, attached to the pistons serve a twofold purpose—(1) for compressing the air and (2) as relief valves.

Now to describe the operation and effect of the device when fitted to a chassis. It will be realised that every movement of the axle to or from the frame due to irregularities of the road surface or other causes must provoke a corresponding but, of course, proportionate movement of

the ball headed rocking arm D operating the pistons E. Let us presume that the arm moves to the right—this movement being due to some inequality of the road surface acting upon the arm through the connecting articulated rod C1, which is fixed to the axle—then the piston in the right-hand portion of the apparatus compresses the body of air contained within its cylinder, called the compression chamber. It will be seen that the movement of the right-hand piston rightwards leaves a concentric space between the left-hand face of the right-hand piston and the body of the apparatus, and this when so formed is called the suction chamber. The partial vacuum therein causes the ball suction valve connected therewith by the passage B to open and admit air. When the normal position of the axle of frame is regained the rocking arm must evidently be moved back again leftwards, so that the right-hand piston is released, and therefore is forced back to its original position by the air which it had compressed and the returning spring F. This reverse action, continued as it will be, must clearly compress the air in the left-hand chamber, and form a partial vacuum in that on the right hand. When the pressure of air in the suction chamber exceeds that of the air in the compression chamber a portion of it passes from the former to the latter between the leather cup gland E1 and the cylinder walls. There is thus an increase in the volume of air in the

compression chamber equivalent to the amount originally drawn into the suction chamber. The action is repeated at every movement of the axle, and a further quantity of induced air increases the volume already stored in the compression chamber. To prevent this pressure from rising beyond a certain limit a hollow space is formed at the back of the piston. A certain quantity of air remains compressed in this space when the piston has returned to its normal

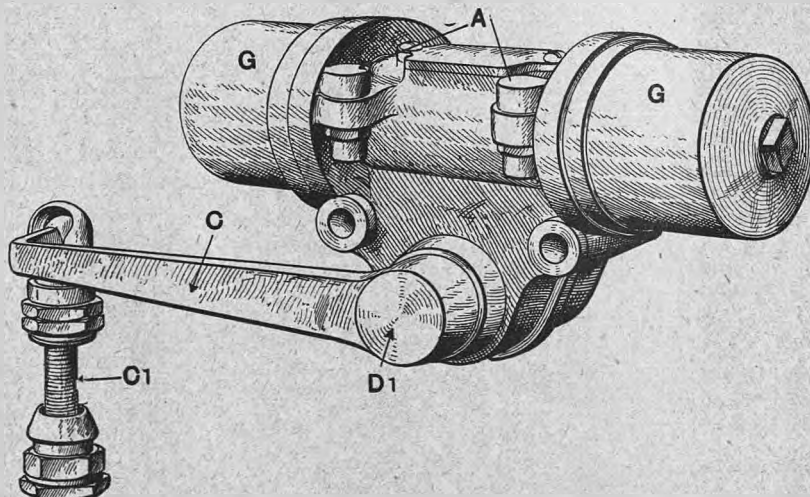


Fig. 2.—The suspension device complete. The letters are referred to below fig. 1

position, and consequently if the volume compressed is sufficient to fill the suction chamber as the piston moves forward no partial vacuum will be created, and the suction valve cannot open and additional air enter.

It will be therefore seen that the device is quite automatic in its action, and automatically proportions its air pressure to meet the varying loads applied.

If the slightest leakage occurs, the loss of pressure allows a more pronounced movement of the piston, with a consequent increase in the volume of air admitted through the suction valves; thus the momentary reduction in pressure is at once rectified. It is claimed, then, that the speed of the car, the weight carried, and the state of the roads automatically regulate the suspension.

In conclusion, we may say that the trial trip on the 24 h.p. Minerva referred to above, made over some of the roughest roads to be found within a five

miles radius of Olympia, convinced us of the genuineness of the claims made for the Amans Pneumo suspension. It was not until we alighted from the car at the close of the run that we knew we had been riding in a vehicle running on solid rubber tyres of large diameter. Had we known this, we should have unhesitatingly prophesied a broken axle consequent upon driving fast over an unmade road full of deep holes and hillocks. Tests of a more severe nature than those which were imposed upon the device on the occasion of the trial run referred to could not have been made under ordinary running conditions. The stretch of unmade road mentioned above is one which, on our own car, we invariably avoid, even though a *détour* of considerably over a quarter of a mile is necessary. We must admit that we were in a decidedly sceptical frame of mind when starting out on this test run, but in consequence of the excellent results shown our opinion of this device is now distinctly favourable.

A Double-acting Horizontal Tyre Pump.

Time and Labour Economised.

THIS pump consists of two cylinders placed horizontally and opposed to each other. The pump is actuated by a long lever which is placed into a holder situated midway between the two cylinders. At the end of each cylinder is a non-return ball valve. Connecting the two cylinders is a pressure pipe running along the top of the pump. On either end of the pump is a tap, to each of which a copper tube is fitted. These copper tubes are permanently fixed to the pump and chassis, and are carried to each end of the latter. The pump is worked by the lever being moved backward and forward, and the pump works continuously by means of each stroke, and the pressure in each cylinder is conveyed to the connecting pipe by means of one cylinder direct and one through the connecting pipe.

To connect the pump to the tyre a 4ft. rubber connection is supplied, with a connecting piece on each end. The copper pipes are led to the middle of the front and back part of the chassis respectively. Each pipe has a tap where it joins the pump, so that only the one in use is turned on at a time.

The whole pump is made to screw down to the car, preferably to the off side step board between the front and rear wheels. When not in use the only parts to be carried separately are the rubber tube and connecting piece.

The power of this pump is considerable, for it has a leverage of five to one, and the action is horizontal

(like rowing), and therefore of the greatest muscular advantage to the operator.

By being fixed to the car it is a permanency. It cannot get lost or damaged in the tool box, and it has not to be placed in the mud or dirt when in use, as is the case with foot pumps.



The tyre pump in operation. It is permanently attached to the running board, the handle being detachable.

It is the invention of Dr. Stuart Moore, of Edgbaston, and is sold by the United Motor Industries, Ltd., 46, Poland Street, London, W.

The Motor Union General Committee.

A meeting of the General Committee of the Motor Union was held on November 24th, at the Hotel Great Central.

The Signs and Notices Committee reported that the following signs had been issued since the last meeting:

	Oct., 1909.	Oct., 1908.	Total to date.
Special Caution ...	77	61	1,128
Concealed Turning ...	3	2	173
Carriage Drive ...	2	—	34
	82	63	1,335

Correspondence was read as to a misleading direction post at Trefriw. Steps were to be taken to endeavour to have the misleading sign removed.

A letter was read from Mr. W. Allcock with regard to the

need for direction posts at Purley Corner, on the Brighton Road, and it was resolved that the County Council be written to offering two direction plates, if they would erect them.

The Touring Committee, in connection with the appointment of hotels, decided amongst other things that they would be very pleased to receive information from the Society of Automobile Mechanic Drivers regarding hotels from the driver's point of view.

The Highways Protection Committee agreed to recommend the erection of a mirror at a dangerous corner in Huntingdon if the result of further enquiries proved satisfactory.

The Executive Committee resolved to offer to supply the Derbyshire County Council with special caution signs at half-price, and, provided that at least 200 were ordered from the Union, to make the County Council a grant of £25 towards the cost of erection.

Christmas Presents.

The Gamage Bazaar grows in importance and attractiveness year by year, and may be said to have become an annual institution of national interest—national because it is the constant aim of Mr. Gamage to foster and encourage the manufacture and sale of British-made toys, and each Christmas season shows a marked advance in that direction, though it cannot be said that we are yet within measurable distance of the season when it will be possible to read the title "all-British made" over the portals of the Toyland of Holborn. Free entertainments of a high order are provided daily during the bazaar season. There is much that makes for children's happiness in the Gamage Bazaar, and it is within the power of every reader of *The Autocar* to add to the volume of it, among the children of the poor as well as among those more fortunately placed. Last, but not least, there is every kind of motoring requisite, so that those who wish to make an "automobile Christmas gift" to their friends can do so whether it be in the form of an oil-can *de luxe* or something costing many times as much, a pair of motoring gloves or a magnificent fur-lined coat.

Tourists' Motor Cars in Italy.

The Italian Ministry of Finance (says the *Secolo* of November 19th) has directed the Parliamentary Commission to look into the purport of a law referring to the import tax on motor cars, motor cycles, and bicycles; also into a subsidiary article bearing on a "circulation tax" on foreign motor cars brought for a while into the country. This circulation tax will, it is intended, be applicable only to cars which remain in Italy for over ten days. The tax on the foreign motor cars is on a level with that imposed on those of Italian make, but is proportioned to their stay in Italy, and is calculated at so much a month, the monthly rate, however, being enforced for any fractional period exceeding ten days. The Parliamentary Commission has looked into the purport of the law in question, and will straightway consider an amendment which has been proposed thereto.

A Traveller's Car.

Some interesting particulars have appeared in *Motor Traction* of the results obtained with a single-cylinder 10 h.p. Adams car used on a commercial traveller's round by Mr. Walter Mays, of Merton. This little vehicle during the first fifteen months of service ran without a mechanical derangement of any kind, and during twelve months covered 20,184 miles, running on an average fifty-eight miles a day for 348 days out of 365; 776 gallons of petrol were used, giving an average consumption of over 26 miles to the gallon.

The figures relating to the out-of-pocket expenditure are:

Wages	£78	0	0
Tyres and repairs	20	11	8
Petrol	38	16	0
Oil and grease	4	9	3
Repairs and spares	3	18	0
Sundries	2	14	0

£148 8 11

this working out at about 1¾d. per car-mile.

This is considerably cheaper than horse traction for the same class of work, representing a saving of 1¾d. per mile; besides no "week-ending" could be done with the horse-drawn vehicles.

An Electric Garage Heater.

We are at present trying one of Wilkinson's economical electric stoves which has been specially adapted to heat an ordinary motor house sufficiently to keep the water from freezing. The stove is made by Messrs. F. A. Wilkinson and Partners, Ltd., Harpenden, Herts., and the size we have consumes only 350 watts, so that with current at one penny per unit the cost is only slightly over a farthing an hour, and of course it is perfectly clean and perfectly safe. We have only just put ours into use, and after a test we shall report further upon its heating powers and consumption. It would undoubtedly be a great convenience in many motor houses, as nowadays a good many town residents, and country residents too for the matter of that; have electricity available, and if the consumption be as low as the makers claim that it is, its cleanliness and safety are all in its favour.

New Speed Limits.

The Middlesex County Council is asking for limits over High Street, Harrow-on-the-Hill (from the top of Peterborough Hill to the top of Sudbury Hill), and over the High Road from the cross roads at the corner of the recreation ground, Harrow Weald, to Rising-holme Road.

The Maidenhead Town Council is applying for a number of limits within that borough.

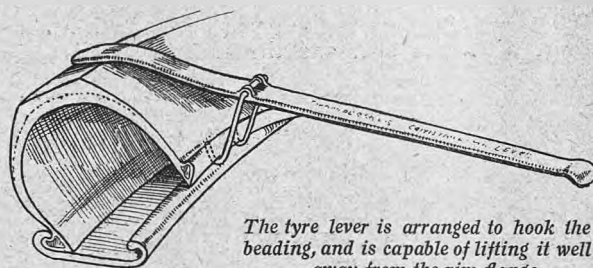
A limit has been set up over portions of London Road, Mitcham, Surrey. The lengths affected are as follows: From Morden Road to Cranmer Road, and from Langley Avenue to the southern boundary of the schools of the Holborn Union.

A speed limit of ten miles per hour has just been imposed by the Local Government Board over a part of Waldegrave Road, Teddington, Middlesex, affecting the road from Teddington Park, which was formerly called Blenheim Road, to High Street.

We are indebted to the Secretary of the Royal A.C. for the above particulars.

A Combination Tyre Lever.

A new type of tyre lever was recently introduced by A. W. Gamage, Ltd., which especially aims at facilitating the removal and replacement of the valve of the air tube through the rim. This new design takes the place of the somewhat cumbersome forked lever originally made for the same purpose, and certainly has several advantages. For instance, the



The tyre lever is arranged to hook the beading, and is capable of lifting it well away from the rim flange.

lever actually remains entirely outside the cover during the operations—as will be seen from the sketch—and for this reason the possibility of nipping the air tube by careless manipulation is entirely removed. Again, the new lever can also be used for ordinary purposes in refitting the cover—a feature entirely absent from the old type of forked lever, which was of use only in the process of refitting the valve.

The 30 h.p. Kessler Engine.

Induction Increased and Exhaust Assisted.

IN our issue of the 27th ult. we gave a picture of an American importation in the shape of a Chalmers car fitted with a four-cylinder engine made by the Chalmers-Detroit Motor Co. for the Kessler Motor Co. This engine has been constructed in accordance with the patented designs of Mr. Martin Cornwell Kessler, English patent No. 21,558. A.D. 1907. We also described an engine working on a similar cycle, but with slide valves, in our issue of October 2nd last, but the engine under present discussion is made with ordinary poppet valves.

In the brief note beneath the illustration above referred to, it was stated that this car attained a speed of 70 m.p.h. down the Brooklands straight, and ascended the test hill at an average speed of 31 m.p.h. on second speed, ratio unnamed. We believe these facts to be correct, but the results are not official. We also understand that the car unladen weighs 1 ton 3 qrs. 24 lbs., but the Brooklands weighing machine has not yet testified to this.

An engine for which such claims are made must, of course, attract attention, and in response to enquiries we are now enabled by the gentlemen concerned to afford the following particulars.

The four-cylinder Kessler engine is an engine of the ordinary four-stroke type, $3\frac{7}{8}$ in. bore and $4\frac{1}{2}$ in. stroke = 98 mm. by 114 mm., having induction poppet valves set in the crown of the combustion chambers, and exhaust poppet valves in the usual position, all operated from one

camshaft. On the opposite side of the motor is another camshaft operating four more poppet valves, one to each cylinder, as shown in the accompanying

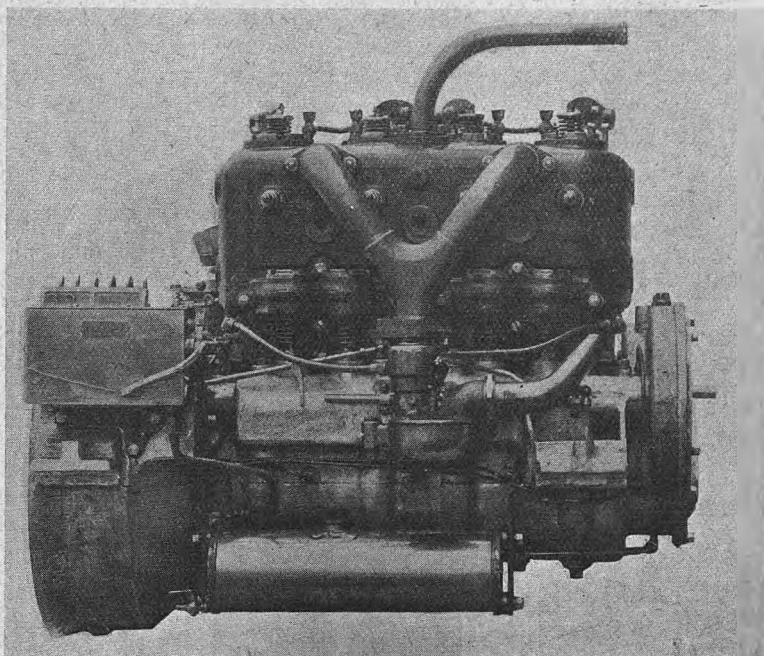


Fig. 1.—The offside of the Kessler engine, showing the inlet piping, carburetter, etc., and the auxiliary valves.

sectional diagram fig. 3. These valves are placed in the course of an air lead from the crank chamber, communicating with a port in the wall of the cylinder opening just above the piston head when the latter is at the bottom of its travel. This auxiliary camshaft, which is actuated from the distribution gear, is capable of a certain amount of lateral movement, and carries a kind of reverse cam as shown in sketch fig. 4. This camshaft can be moved laterally by a lever set above the steering pillar, acting in conjunction with the throttle pedal in such a way that any part of the profile of the reversed or double cam can be brought beneath the valve spindle with which it is in connection.

The crank case is divided into three chambers, two smaller ones at each end into which the end connecting rods dip, and a larger central one in which the two central connecting rods move. Into each of these chambers the air is compressed to a certain pressure by the descending pistons, and travels thence to the cylinders connected thereto by the passages E (fig. 3), as and when permitted by the opening of one of the auxiliary poppet valves C (fig. 3) just referred to.

As we have suggested, this arrangement permits of either a complete scavenging effect upon the exhaust stroke, or a pressure augmenting effect

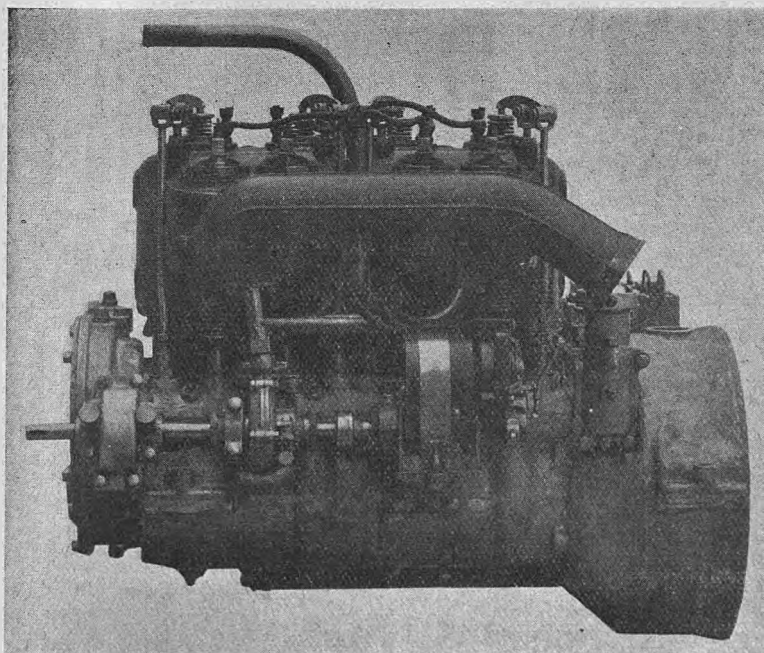


Fig. 2.—The near side of the Kessler engine, showing overhead valve gear, pump and magneto drive.

upon the compression stroke, by the lateral travelling of the camshaft referred to. The method of bringing these scavenging-augmenting valves into operation at will may be gathered from the sketch produced herewith.

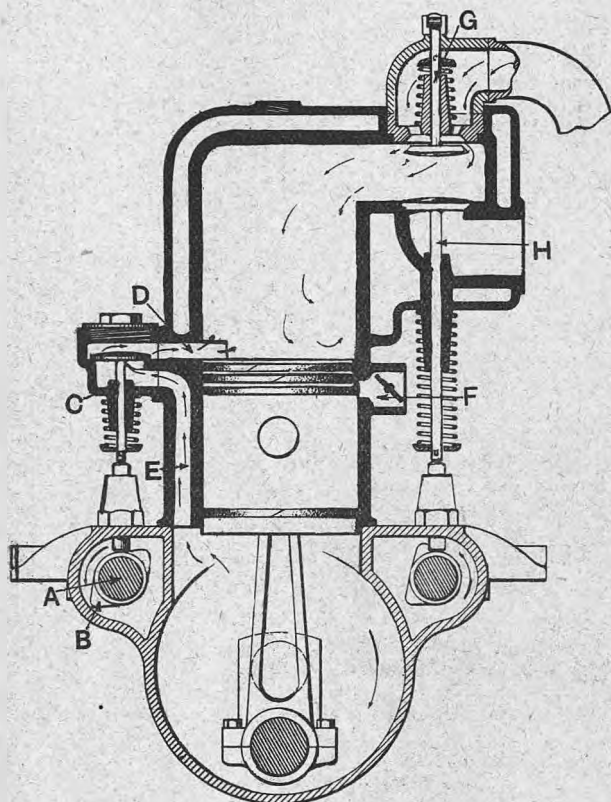


Fig. 3.—Vertical sectional diagram of cylinder.

A, auxiliary camshaft endowed with lateral movement carrying double cams B and operating valve C for scavenging and augmenting purposes or both
D, air port to cylinder above piston head when at bottom of stroke
E, passage of compressed air to valve C and cylinder port D
F, air inlet to tripartite crank chamber
G, induction valve
H, exhaust valve

In fig. 4 we have a diagram of the throttle as set in the induction pipe and connected by suitable rods to the throttle pedal and a lever placed on the steering wheel. When it is desired to scavenge—that is, admit the air compressed in the tripartite crank chamber by the pistons into the cylinders—the camshaft is set by the lever as shown in the sketch fig. 4. The valve here is fully opened by the right-hand mount of the cam at the moment the piston is at the close of its power or explosion stroke, so that compressed air from the crank chamber is admitted thereto, and the burnt charge swept right out through the open exhaust valve.

To augment to the fullest, the lever on the steering wheel is moved so that after the throttle valve has been completely opened the arm A (fig. 4) comes into contact with the spring-backed rod B, which carries a small peg moving in a slot in the piece D. The peg C penetrates a grooved collar formed on the camshaft, and so ensures the lateral movement of the latter required to move the double cam into the augmenting position. When the cam is central to the scavenging-augmenting valve tappet, scavenging and augmenting both take place to the extent of half the maximum of either.

We were afforded a short trial trip upon this car at Brooklands last Saturday afternoon, and can testify to the effect of both the scavenging and augmenting

operations. The speed up the test hill on all three speeds was most remarkable, taking into consideration the alleged weight of the car and the size of the engine. It should be said, however, that whatever may be effected in the construction of future engines on these lines, the particular one under review lacks that quietude and sweetness which our British engine-makers have now taught us to expect. We do not say that this engine cannot be greatly sweetened and quietened; we believe it can, but the present example somewhat fails in these respects. Although we doubt not that it can be quietened, it is necessary to remember that there is no royal road to power and silence combined. If we get higher explosion pressures in a cylinder, we cannot expect smooth running at the slower speeds, whatever we may get at the higher. The point to bear in mind is that the "augmenting" is optional, so that even if the engine remain a little coarse it need only be at such times as the extra power is in operation. At other times there is no reason why it should not be as sweet as an ordinary engine.

The inventor acknowledges the previous existence of motors with suction valves, through which air is drawn to the crank case, and where it is compressed, and subsequently delivered above the head of the piston for scavenging and augmenting the charge, but he points out that in none of these previous arrangements is there any controlling device of the air supply from the crank chamber to the cylinder. He claims to have introduced a most efficient and potent controlling device. Of its ingenuity there can be no question, and we await with interest the results of the official tests.

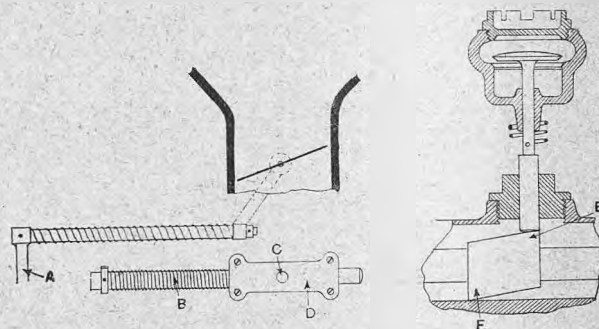


Fig. 4.—Inter-connected throttle and camshaft of the Kessler engine.

A, arm operating camshaft shifting rod
B, camshaft shifting rod
C, peg penetrating collar on camshaft
D, slotted casing forming guide for B
E, scavenging mount of cam
F, augmenting mount of cam

The Austin Co. and the 1910 Grand Prix.

The Austin Motor Co., Ltd., writing in reference to statements which have appeared in the press as to their taking part in the proposed Grand Prix Race in 1910, say: "We have not up to the present, as you know, made any public announcement, or done more than discuss among ourselves the advisability or otherwise of taking part. We intended entering for the race, but when we discovered lately that a bond had been entered into by the leading manufacturers in France, Germany, and Italy, not to take part, we came to the conclusion that it would be useless our doing so under the the circumstances, and we have officially notified the French Automobile Club of our decision. We regret having to do this, because we consider that a well-contested and well-organised race during the coming year would benefit the manufacturers engaged in it, and also the trade in general."

French Recriminations.

London now Admitted to be the World's Motor Mart.

FOLLOWING hard upon M. Faroux's egregious, incorrect, and spiteful criticism of the recent show at Olympia comes a leader in our excellent contemporary *Omnia*, in which the cold truth is served up for the French and no bones made of the matter. M. J. Marsillac, who made a survey of the exhibits at West Kensington, prefaces his criticisms as follows:

"The motor exhibition in London closed its doors last Saturday. It marked in an entirely unmistakable manner the dawn of a new era in the history of the motor industry. It formed the crowning storey of an edifice slowly and patiently built up by British perseverance and tenacity of purpose. It marks the end for France, and above all for Paris, as the centre of the world's motor market. These words will undoubtedly cause surprise, but they are the brutal truth for all that. And it could not be otherwise. Just for a moment forget your French pride, at times somewhat exaggerated, in all our national products, and stand in the shoes of a man of no nationality, of keen observation, lacking any depth of technical knowledge—in a word, put yourself in the position of the man in the street (*d'un quelconque monsieur, que passe dans la rue*). This man follows the automobile movement without being of it, but is nevertheless keenly interested in it. First he finds himself at the moment of our glorious *début*, when the names of French cars, victors in the old Gordon-Bennett races, were in everyone's mouth; then, after Edge's win and the Jenatzky success in Ireland, the renown of our great triumphs in Germany, in the Auvergne, and at Le Mans is in his ears. Shortly afterwards the regulations for these races are modified in the interests of the French industry to afford that industry a numerical superiority in the cars

engaged, although the French industry was at that time much more important than that of any other country. This was badly done, and had an evil effect, for hitherto the world had been accustomed to see us fight one to ten, and these sudden pusillanimous precautions gave rise to satirical comment.

"The years pass on, the regulations are again modified, but our star has begun to pale. If, however, our racing successes were not as brilliant as before, our annual exhibitions at least continued to attract the richest automobilists in the world, and agents who came to fight for agencies, the mere fact of a car being of French construction being a sufficient guarantee the world over for value and genuineness. To have been exhibited in the Grand Palais placed a *cachet* on a foreign car obtainable in no other way, and recommended it wherever it went. But now the blow has fallen. Last year, and without realising the extreme gravity of what was being done, we learnt of the suppression of the Grand Prix. Abroad there was only one explanation for this step—'the French were funk-ing!' If they were not afraid, why did they scratch the race? And if they feared a licking it could only be because they felt that the foreign cars were superior.

"And now the Salon is put down because it costs too much. The English have grasped the situation, and have compensated for their lack of invention and progress by their continuity of effort. They have recognised their markets, they have acquired a colonial reputation for reliability and progress, they are invading the European markets like people who tomorrow will be paramount there, because with standard construction, they acquire the respect of their customers by their honesty and good faith."

A Visit to the Daimler Works.

On Wednesday a representative gathering was to be found at the Daimler Works at Coventry. At the invitation of the Company some 250 guests made an inspection of the works and lunched together afterwards. Among the visitors were many members of the Royal A.C. Committee, as well as prominent officials connected with the Club, the Union, and the Automobile Association. In addition, there were well-known members of the motor industry, members of Parliament, and the civic dignitaries of Coventry, besides several personal friends of the leading officials of the Daimler Company. The idea of the function was to call together a representative gathering of the motor world to show them the well organised Daimler factory with its latest extensions in full operation. Only a little over a year ago the new Daimler engine was an untried invention so far as the automobile world at large was concerned. The Daimler Company believed in it after their exhaustive experiments, but it had not passed through a period of everyday hard work in the hands of the private user, and it was even doubtful at one time whether the private user would buy such an innovation at all. However, he did so, and the most severe critic will admit that the new Daimler engine has paid its footing, and the faith of its introducers has been justified in a very practical way, and that was shown unmistakably by the exceedingly busy and prosperous condition of the entire factory on Wednesday last. Factory descriptions are not interesting to our readers, but any except the most

unmechanical would delight in a visit to large, well organised works such as these, particularly as every effort was made to show the visitors all the main processes adopted in the construction of the cars.

Motor Vehicle Statistics.

The Associate Department of the R.A.C. has compiled statistics from returns from the various registration authorities throughout the country, showing the number of motor vehicles registered on the 30th September last throughout the United Kingdom. The following summary is taken from the *R.A.C. Journal*, where the complete figures are also given:

	Motor Vehicles Registered.				Licences Issued.	
	Motor Cars.		Total with Public Cars and Motor Cycles.		1909.	1908.
	Private.	Trade.	1909.	1908.		
England and Wales	74,748	13,961	163,181	137,323	153,437	131,087
Scotland	6,157	1,056	13,093	10,907	15,146	12,654
Ireland	3,935	164	7,499	6,185	6,403	5,233
TOTAL, 1909	84,840	15,181	183,773	—	174,986	—
TOTAL, 1908	71,405	12,104	—	154,415	—	148,974

French Fuel Consumption Tests.

Results Obtained from Petrol, Alcohol, and Benzol.

LAST week we referred to the particulars which had been given in *Motor Traction* of the fuel consumption tests in France, in which comparative tests were made of petrol, alcohol, and benzol. Our contemporary has now plotted the results in the form of comparative curves on a squared diagram, and these show in a most graphic way that in point of economy by far the best results were obtained with benzol, this, be it noted, not with one car only, but with some sixteen industrial vehicles of different makes and carrying loads which varied from 8 cwt. to 3 tons. In every instance the best results were obtained with benzol, though it was with the heavier loads that the more striking superiority of benzol was shown. In the case of the tests with alcohol the results are less conclusive. With the lighter loads alcohol showed a slight superiority over petrol, and with the heavier loads it stood as nearly as possible halfway between petrol and benzol. With intermediate loads it did very badly in one class, so that, taken as a whole, it was about equal to petrol. *Motor Traction* also gives comparative curves of the average results obtained with petrol in the R.A.C. trials of 1907 and the French results last month. The average result may be summed up in the statement that the two years have resulted in an improvement which enables 40 cwt. to be carried twenty-two miles, whereas in 1907 it could only have been carried eighteen. Here, again, the improvement is less with the lighter loads and more with the heavier, but this serves as an average. It is, of course, true that

the R.A.C. trials were carried out under harder conditions than the French. At the same time, even allowing for this, there is no doubt that in the past two years very considerable improvements in carburation have been attained, not that the matter ends with improvement in carburation, as it is significant that the best results in the French trials were obtained from a long stroke engine. It is also significant that the worst performance in the same class in point of economy of fuel consumption was given by an engine in which the bore and stroke were equal. None of the engines appear to have been specially constructed for using benzol or alcohol, but the competitors were allowed to readjust their carburetters for each change of fuel. The results from benzol are not altogether surprising, as we know of more than one English maker of private cars who has obtained remarkably satisfactory results both in all-round running and economy from .760 benzol. The satisfactory ton-mileage from alcohol, which, as we have said, may be taken roughly the same as that obtained from petrol, is so striking that it deserves more than a passing comment. It is at least sufficient to show that, given a reasonable tax on industrial alcohol, the possibilities of a home-made fuel are not so remote as might have been believed. If such results can be obtained with alcohol by a mere readjustment of the carburetter, it stands to reason that with readjustments of the engine also still better results will be obtained, as it is well known that with alcohol a much higher compression can be employed than with petrol.

The Torpedo Body. A French View.

After the farrago of deprecatory nonsense which flowed from the pen of M. Faroux, of *L'Auto*, on the general aspect of the recent Olympia Show, it is refreshing to find something of British origin which finds undiluted favour with one of that gentleman's contemporaries. In speaking of the British origin of the torpedo body, it must not be supposed that we forget for a moment that the original design emanated from that greatly esteemed Belgian, Captain Theo. Masui, but the idea occurred to him and was materialised on British soil, and it also was claimed to have occurred to other British designers. It was seized upon by British motorists, and made English by adoption, as presenting the most motor car like and the most sensible and comfortable of open bodies destined for mounting on a chassis. After very properly acknowledging Captain Masui's origination, a writer in *La France Automobile* says: "The torpedo is a sort of double phaeton, boasting very special characteristics. The under body is entirely suppressed, while the

bellying outward sweep of the back and sides is continued downwards to the frame and forward to the dashboard. The doors show no projections, the handles being inside or on the top. The *tout ensemble* suggests nothing more than a handsomely shaped bath, but with a purity of outline to which no carriage builder has yet arrived. The elegance of the model is obtained by the clear run of the upper lines, which are raised slightly as to the backs of the front and rear seats. There these lines melt sweetly into the side line; and are but slightly higher than the top of the doors. This body would not be perfect unless it were comfortable, which it is to the utmost degree. Not only does it present the least possible resistance to windage, but the occupants of both the front and back seats are absolutely protected from the wind and dust, and are as comfortable as though seated in a limousine. So we recommend our readers to insist upon a torpedo body being fitted to any chassis they may order."

A Brussels correspondent says in case the A.C.F. does not receive the minimum of forty-five entries but more than twenty-five at the close of the time for receiving entries for the Grand Prix (November 30th), the Automobile Club of Belgium intends to ask that the competition may be held upon the Ardennes circuit. The Belgian Club also announces its intention of organising in 1910 a race limiting the bore to 100 mm. At the moment of writing only twelve entries had been received for the Grand Prix.

"Glottis" asks for information as to the condition of the road from London to Folkestone at this time of year. He particularly would like to know whether the road is "up" anywhere, and how the metalled stretches can be avoided.

* * *

The Harrogate and District A.C. held its annual dinner on Friday evening last. Amongst the guests present were H.S.H. Prince Francis of Teck, chairman of the R.A.C., and the Mayor of Harrogate.

Correspondence.

EDITORIAL NOTICES.

No letters from members of the motor industry will be published when they deal with subjects which may be regarded as advertisements for the writers' or their business interests. At the same time as many of the most practical suggestions come from those engaged in the motor industry, their letters will be inserted when possible, though the names of the firms they represent may be expunged, and the initials of the writers substituted.

Letters of a personal nature will be withheld.

The Editor, although accepting no responsibility for the opinions expressed by correspondents, reserves the right to publish a portion of a letter, and to omit any part which he does not consider interesting or essential.

All communications under a *nom de plume* should be accompanied by the name and address of the writer, not necessarily for publication, but to assure the Editor as to good faith.

Enquirers who ask for the experiences of private owners with specified cars, parts, or accessories, are requested to enclose a stamped addressed envelope, so that replies which space will not permit us to publish may be forwarded to them. Circulars or letters from interested parties will not be forwarded.

THE DEVELOPMENT OF THE TORPEDO BODY.

[14991].—I have noted with considerable interest a letter from Messrs. Hewers Car Bodies, Ltd., in *The Autocar* of November 27th on the development of the torpedo body.

I had not intended to take any part in the controversy, as I had no desire to prevent Capt. Masui from getting a little personal advertisement out of the torpedo body if he wished to do so. In view of what Messrs. Hewers have written, however, it may be interesting to the readers of *The Autocar* to have a little further information about this torpedo body which Capt. Masui claims as the product of his own ingenuity. It will certainly prevent Messrs. Cann, Ltd., appearing in any false light as builders of torpedo and boat-shaped bodies.

Torpedo bodies were built prior to the date that Capt. Masui claims to have had any part in designing one. Messrs. Cann, Ltd., built a high-sided, flush-sided body for me in the autumn of 1905, and on the car (a White steamer) to which it was fixed I won the Shelsley Walsh hill-climb in 1906. Early in December, 1908, however, Capt. Masui asked Mr. Cann, of Cann, Ltd., to come and see him. When Mr. Cann saw Capt. Masui the latter had a rough pencilled idea—not in nearly so much elaboration as the drawing subsequently published by Capt. Masui in *The Autocar* as the original sketch from which the torpedo body was made—and Mr. Cann put in some lines with his own pencil, and Capt. Masui put in others with his until they had designed a rough outline of a high-sided and flush-sided body. That rough sketch was brought to the works of Messrs. Cann, Ltd., and put in the hands of their draughtsman. The draughtsman, with the aid of Mr. Cann's suggestions, evolved out of that a drawing of a torpedo body, and that drawing was submitted to Capt. Masui, who ordered first one body and subsequently other bodies from it. It would be interesting to know whether or not the registration made by Capt. Masui was not made upon a drawing from the actual hand of Messrs. Cann's draughtsman, although that is a detail. I had this registration called to my attention, and as a director of Messrs. Cann, Ltd., was considerably interested in it. I looked up the matter of registration and found in order to infringe a registration one had to build a torpedo body which would be practically identical in every detail with the drawing registered.

As body makers, we knew that the torpedo body as we had designed it would be greatly benefited by some changes in detail and considerable changes in outline. Consequently, we were not greatly concerned about the registration matter, but that there should be no misunderstanding I deemed it advisable to make an appointment with Capt. Masui personally, and in the latter part of January, 1909, I called and saw him with reference to the question of registration.

I told him in quite a friendly way that I considered the drawing was as much ours, if not more so, than his, but that we had no objection to allowing his registration of the design so long as he would guarantee that he would give no other orders for torpedo bodies of that design to any other body making firm. Capt. Masui at once told me he would not bind himself to do this, and consequently I told him—in a perfectly friendly and pleasant way—that we certainly would not recognise his registration as preventing us from building any bodies on the same design should we choose to do so. Capt. Masui certainly understood me to that effect, and made no demur at that time, although he had written previously and asked us to retain the design exclusively for bodies ordered from us by him.

Subsequently Messrs. Cann, Ltd., received a letter from Capt. Masui asking them if they were infringing the registration. They replied frankly they had not done so, as they were building no duplicates of that particular body.

I think a great deal of the credit for the present high-sided body is due to the Editor of *The Autocar*. Re the development of the type, Mr. Cann has been interested personally in the development of the torpedo bodies which we have built, which total a large number on many different makes of chassis. The letters which have passed between the Editor and myself on this subject, and the opinions expressed by him, together with his great interest in the question of body design, have certainly had an appreciable effect on the general development of the type as far as Messrs. Cann, Ltd., are concerned.

I am glad to see that Messrs. Hewers generously give Mr. F. A. Bolton, of Oakmoor, credit for his ideas. We have benefited to a great degree by suggestions from some of our customers, although possibly none of them have really contributed to design. The development of a type of this kind must of necessity be participated in by a number of people. To my mind, Capt. Masui's claim to be the father of the idea of the torpedo body—while I have no doubt he is quite conscientious in making it—is hardly justified by the facts. His suggestion that any money obtained through his possession of the registration should be sent to a worthy benevolent fund certainly disarms any captious criticism. As I stated at the outset, I have no desire to take away any of the advertising value due to him of Capt. Masui's move in the matter, but it will be a long time before any guineas come forth from Messrs. Cann, Ltd., on account of the fact that they have built torpedo bodies and are building them to-day in large numbers. If we wish to make any contributions to benevolent funds we will make them of our own free will, and when they are made we will no doubt be given the credit of making them, and not have our money—and our benevolence—put down to the credit of Capt. Masui.

FREDERIC COLEMAN.

MOTORISTS AND THE GENERAL ELECTION.

[14992].—The local political associations are now sending out circular letters asking for the loan of motor cars for the polling day at the forthcoming general election.

I hope all motorists will hold their hands for the present respecting this important matter until we have the candidates before us, so that we may ascertain what are their views, and what pledges they will give, respecting future legislation in respect of motor cars.

The taxation which has recently been sanctioned by Parliament, alike on motor cars, motor cycles (in particular), and motor spirit, is most unreasonable, and has undoubtedly been a serious set-back to the industry. Apart from the regrettable fact just mentioned, however, is the glaring unjust principle upon which the taxation is to be based. It is to be fixed according to horse-power. Whether the car is brand-new or five or six years old makes no difference. Whether it cost £150 (second-hand) or £1,200 (new) does not matter. One result of this is that those who could afford to buy a good, fairly powerful car second-hand will not do so because the yearly taxation (under the new Act) is so fearfully heavy.

Then there is the question of the present Motor Car Act and the 20 m.p.h. speed limit, and the unfair use which is being made of it in various parts of the country. We in Sheffield are fortunate in being free from the serious persecution which takes place in other parts. Our worthy Chief Constable is broad-minded, and knows what the Act was intended for when it was framed, and does not sit up late at night and rise early in the morning in order to see what the Act can be made to do or how far its clauses can be stretched. His officers, too, are permeated with the same fairness, and I hope this state of things will long continue.

Those who have not had experience of a police trap may be inclined to smile, and say that if a man is caught speeding away at more than 20 m.p.h. he deserves to pay, and that it only serves him right. This argument is quite fair, and if a motorist does actually, either wilfully or accidentally, exceed the limit, he should pay a reasonable fine. However, when we see a motorist fined from £5 to £10 [Or more.—Ep.] for travelling, say, 220 yards two or three seconds faster than he should have done [Without any suggestion of danger to any one.—Ep.], it shows how the present Act can be stretched to almost any limit, and proves how those in official positions can, and are prepared to, stoop to any depth of meanness in order to vent their feelings against a section of His Majesty's loyal subjects. Do we not see all kinds of trans-

Correspondence.

gressors of the law dealt with by merely being fined from 2s. 6d. to 10s. for doing things ten times worse than exceeding the legal limit, and many hundred times more dangerous to the public? A trap is set on an open piece of country road far away from everyone, perhaps only 220 yards long, and a motorist on passing through it is timed, and if he be one or two seconds too fast he is prosecuted. It very often happens that there is an error in timing by reason of a faulty watch, or an error in starting or stopping it, or a fault in the operator's vision, but any or all those make no difference. Remember, all motorists are not rich. Is it, therefore, fair to fine a man £5 for the first offence and £10 for the second, and so on, upon evidence like the above?

Motorists, or the majority of them, are true sportsmen, and if honestly caught are sufficiently sportsmanlike to pay up like men such amounts as are in reason.

These two points—taxation and the motor car speed limit clause—are matters which should be dealt with. We as voters and as motor car owners should receive from all prospective members of Parliament an early assurance that they will endeavour to right these wrongs. Unless this or a similar assurance be given, they should not be provided with a single car at the general election.

There are, of course, many other serious matters which require attention in connection with the Motor Car Act. Those given are simply illustrative of the hardships we "grin and bear."

J. H. H.

POINTS IN INSURANCE.

[14993].—In common with many of your other readers I am insured under a Lloyd's policy, and my security is endorsed by a group of underwriters, who are severally, but not jointly, liable for their respective share of the risk.

In the unfortunate event of the assured having to pay compensation over a number of years, it might arise that one or more of the underwriters would die, fail, or go out of business. In such an event, what is the position of the assured? If he be not fully indemnified for any risk coming within the compass of his policy, it would appear to me that such policy is not worth having, no matter what the premium may be.

In justice to Lloyd's I would like to say that I have made two claims upon underwriters in respect to damage sustained to cars, and in both cases my claim has been promptly and fully met.

E. J. BOAKE.

[In the event of the death or bankruptcy of an underwriter, the policy holder's position would be that of an ordinary creditor against the estate of the deceased or debtor as the case might be. If the estate were not sufficient to meet all claims, the committee of Lloyd's, for the credit of the institution, might possibly make a subscription to liquidate the debt. The policies are, however, in no sense guaranteed. As the question is one of considerable interest we make no excuse for quoting *Truth*, of October 27th. In dealing with the Assurance Companies' Bill, *Truth* refers to Lloyd's; and as so many people do not know what this institution actually is, we quote *Truth's* explanation, which is as follows: "I had an article about Lloyd's some time ago in which I explained that Lloyd's as an institution is rightly held in the highest esteem; and it may now be added that the committee has been doing much in recent times to see that every individual member of it affords the committee some evidence of solvency, but there remains the fact that people insuring with Lloyd's are trusting to the promises of unknown individuals to indemnify them against loss. This, it seems to me, is an entirely inappropriate basis on which to conduct insurance. Underwriters may be, and indeed are, honest, and often wealthy men; they are, however, engaged in a business that is exceptionally liable to runs of ill-luck, which may render an individual unable to meet his liabilities. Large insurance companies, with vast funds and widely-spread risks, are proof against a rapid succession of claims which might break an individual; besides which it is a familiar fact that many underwriters fail to display the caution that characterises the operations of insurance companies. To a great extent the big fire offices get the pick of the business, and the most speculative risks find their way to Lloyd's."—Ed.]

[14994].—I have recently had a most unsatisfactory experience of car insurance, which I should like to put before your readers.

I was the owner of a 20 h.p. Rover car, originally bought at Olympia two years ago, listed at £450, and fitted with

accessories, etc., costing about £80, making total cost of £530.

I first insured it in May, 1908, the value being noted on the policy as £450. On renewing twelve months later this was reduced at the suggestion of the company's local representative to £400. The car having been totally destroyed, along with five or six others, by fire in a public garage, I claimed £375, being the amount insured less £25, a liberal allowance for the lamps, which were not on the car at the time.

The insurance company offered to replace with a second-hand car of the same year, and, under protest, my son went to a city fifty miles distant to inspect this. He found it to be a garage car, showing great signs of wear, which had run some 14,000 miles on hire work. I naturally refused this, my car having run less than 10,000 miles, on private work only, and being in perfect condition after a recent overhaul.

The insurance company then offered me, verbally, £250, and nearly four weeks after the fire increased this, in writing, to £300, representing apparently the amount I might have obtained had I been forced to realise in the open market, and in no way the value to me of my own car.

My policy gives the company the right to pay for or make good any damage or loss, and they apparently consider that, in the event of total destruction, this may be done by the provision of a second-hand car of the same date of manufacture.

I most strongly advise those of your readers whose policies contain a clause as to "present market value" to get the company's definition of this phrase. On the figures I have given above, they apparently reckon twenty-five per cent. depreciation for the first year of a car's life, and twenty per cent. for the second.

C 2008.

[All policies contain a clause to the same effect, but the interpretation put upon the clause varies with different companies and according to circumstances.—Ed.]

TYRE PROBLEMS.

[14995].—The letter of Dr. Samways, published in your issue of the 13th inst., is liable to be misconstrued by readers who did not hear or have not read his paper at the R.A.C.; and I venture therefore to supplement it by some remarks that may make it clearer to those readers.

Taken by itself, Dr. Samways's experiment proves nothing, because it would follow that if, instead of his wheel resting on the ground, it had been suspended with its upper periphery resting under a shelf, inflation would have caused the lower half to expand in a downward direction. But a reader familiar with the substance of Dr. Samways's paper at the R.A.C. would realise that it matters not whether the wheel be turned upside down or not, the gist of the argument is that the maximum pressure upon the tyre is at the point furthest away from the point at which the weight, or external pressure, occurs, no matter whether that external pressure is caused by the wheel resting on the ground, or through pressure above or at the side. If we turn Dr. Samways's diagram upside down, or a quarter round, his theory is that wherever the external pressure occurs the internal pressure will occur at the point furthest away therefrom. But is this the case?

The column of air inside a tyre is so elastic that external pressure exerted at any one point will instantaneously increase the internal pressure at every other point within the tube, not at the point most distant more than at any other point. To illustrate my meaning, suppose we were to fit up a tyre with pressure gauges in four positions, one at the topmost point, another at the left-hand horizontal point, a third at the right-hand horizontal point, and one at the bottom, the result would be that all four gauges would register precisely similar pressure; if the weight on the wheel were increased the pressure in all four gauges would increase equally, the topmost gauge would not show any higher pressure than either of the other gauges. And the same would happen at any intermediate point where a gauge might be inserted.

A wheel is not suspended upon the air at the top of the tyre; the tyre shares the bursting strain and the supporting strain throughout its circumference, with the sole exception that the few inches of the tyre in contact with the ground are supported by external pressure, just as though those few inches were reinforced by a "gaiter," just as blood is arrested from exuding from a wound by a bandage.

The wheel is supported upon the column of air contained within the tyre by means of the edges of the cover, which are gripped all the way round the wheel by the frictional pressure exerted by air tube pressure and by the security bolts.

Another experiment—not easy to carry out but easy to imagine—would demonstrate the fact that a loaded wheel

rests upon the lower half of the column of air contained within the tyre. Imagine a very slack-fitting tyre to have its edges greased so that it would be but slightly gripped between the air tube and the rim, and would thus be tolerably free to "creep," the security bolts being removed for the like purpose, and the tube inflated to a very low pressure, the result would be that the wheel would drop—becoming eccentric to the tyre—and the top of the tyre could be pulled up into a loop above the wheel were it not that its edges would be held down by reason of the rim being hooked on to the edges of the tyre. To remove this obstacle, if the edges at the top of the tyre were cut away, there would be no weight whatever on the top of the tyre, which would be supported only by the stiffness of the cover itself.

In practice I think that the point at which a tyre is most likely to burst is where it leaves the ground and for an instant expands, or unbends, with a consequent jerk upon the threads of the fabric, just as, e.g., you can tear a handkerchief more easily by a sudden jerk than by a steady pressure. But that instant is of so microscopical duration that it is impossible to determine the point by experiment; and, if it were, *cui bono*?

The practical part of Dr. Samways's paper is of more moment, i.e., whether all these academic considerations of the forces acting in a tyre can lead us to determine whether large or small wheels, narrow or broad tyres, are preferable. Restricting the problem to that of tyre durability alone, and leaving out of consideration the question of whether larger wheels than those at present in vogue would conduce to easier rolling over roads of the degrees of roughness with which we are familiar, Dr. Samways's contention would seem to be correct that large wheels and narrow tyres are the best, if we ignore the item of increased cost in the event of a gash-burst. Given a tyre of 30in. diameter, and another of 40in. diameter, it is obvious that the surface frictional wear against the road upon each inch of the latter will be the same in forty miles as upon the former in thirty miles, because each part of the 40in. tyre touches the ground less frequently than each part of the 30in. does, consequently the 40in. tyre will run forty miles with only as much wear upon each inch of its periphery as the 30in. tyre, i.e., the surface-friction will wear out a 30in. tyre in thirty miles as much as it will wear out a 40in. tyre in forty miles. For the same reason the larger tyre keeps cooler. And, as Dr. Samways pointed out, a larger tyre can be narrower by virtue of having a greater longitudinal surface in contact with the ground. This narrowness is advantageous not only on the score of raising less dust, but because (Dr. Samways neglected this) a narrow tyre will evade many puncturing implements that would be picked up by a broader tyre. On the other hand, the fabric of a narrow tyre may be subject to more violent bending strains than that of a broad tyre, especially where the edges of the rim dig into the bead. The problem is to decide just where the line can be most advantageously drawn between narrow high tyres and broad low ones. But there are other factors to consider. It has been argued that the experience of bicyclists shows that small wheels will roll smoothly down into hollow places in the road, whilst large wheels will hop jerkily from one ridge to another. Theoretically, the larger the wheel the easier it will surmount the ridges—rolling from the top of one ridge to the top of another—but in practice the bicyclist has found that a small wheel will roll down instead of hopping across a hollow place in the road. The bicyclist has discovered, by rule of thumb, that a 28in. wheel is the size that is best for all-round conditions upon civilised highways; but the fact that such is the case with a vehicle weighing with its load, say, 180 to 220 lbs., travelling at say, twelve to twenty miles per hour, is no reason why the same diameter of wheel should be best on a motor car weighing, loaded, many times that total, on the same roads, and at a higher speed. Nor is there anything in the argument that a high driving wheel is inimical to propulsive leverage; it is merely a question of gearing. A low-g geared high wheel has the same driving leverage as a proportionately high-g geared low wheel, and, moreover—provided the material be sufficiently strong—the longer spoked wheel possesses greater elasticity, which is an advantage to the whole mechanism of a car. The problem can only be determined, as it has been determined in the case of the bicycle, by rule of thumb, or, if you prefer the phrase, "trial and error."

A. J. WILSON.

[This letter was in type, but crowded out last week.—Ed.]

[14996].—I was rather amused to read in your last issue a letter [14935] reintroducing the hardy annual of how a pneumatic-tyred wheel is supported. The only satisfactory way of considering the problem is to study the actual forces at work.

Correspondence.

When the air in a tyre is at a pressure above that of the atmosphere, it pushes against the imprisoning surfaces all round at an equal pressure on every square inch; but since the whole tyre is curved the area of surface that is being pushed outwards from the centre of the wheel is greater than the area which is being pushed inwards, with the result that the wheel as a whole is being pulled outwards by the tyre all the way round. The outward pressure of the air is transmitted to the rim as a pull outwards on each flange (A and B in sketch), and the resultant outward pull of these two exceeds the inward pressure of the air—as already stated—by an amount we will call C.

Dr. Samways's experiment proves this, and nothing more.

Now when the wheel is supporting a weight the tyre at its lowest part is deflected as shown, and, of course, the downward resultant of A_1 and B_1 is less than that of A and B, so that the downward pull C is reduced considerably, and the upward pull of the tyre on the upper half of the wheel is left to support the weight; and so far Dr. Samways is correct.

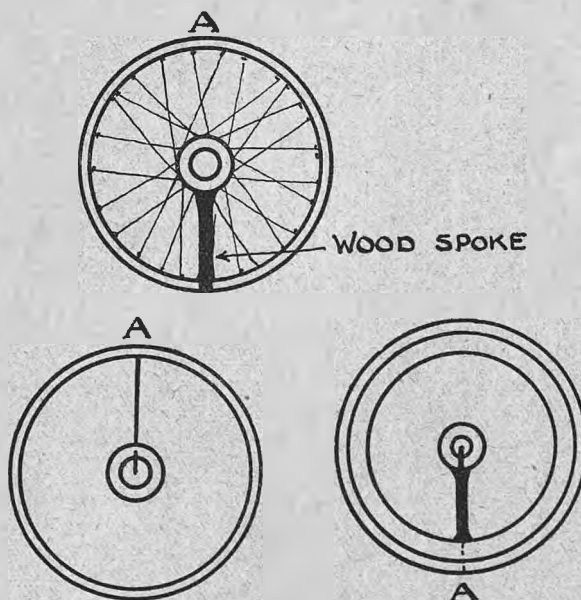
If the weight be increased gradually, there comes a time when A_1 and B_1 are so nearly horizontal that the air pressure upwards is greater than their downward resultant, and the wheel begins to be supported below by the tyre, as well as above.

I think this is shown most clearly if we put it in the form of an equation, calling the total upward resultant pull of the tyre on the upper half of the wheel P (upward), and the corresponding pull on the lower half P (downward); then P (upwards) — P (downwards) = weight supported.

As the weight increases the tyre deflection makes P (downwards) smaller and smaller, until, when the weight exceeds P (upward), P (downward) becomes a negative quantity, or, in other words, becomes a "push up," and assists P (upwards) to support the weight.

A.M.I.E.E.

[14997].—Dr. Samways's paper on "Tyre Problems," read at the R.A.C., is very interesting reading. As an illustration of what he says, a bicycle or motor car wheel with one wire spoke will support the weight of the motor car or bicycle when at rest (assuming that the rim be strong enough not to spread) as shown in sketch, the spoke being in tension.



This is equally true if the rim be supported at A, as Dr. Samways proves is the case with an inflated tyre.

Now with a wood wheel this is not the case; in fact, is just the opposite. Support the rim at A, and the axle is lifted, the spoke being in compression. Some months ago I met one of the best known English motorists, and noticing that he had wire wheels on his car asked him what he thought about them. "They are the best things I have ever

Correspondence.

struck. I was always puncturing with the old wood wheels, but have never had a puncture since putting wire wheels on the car." This surely cannot be a coincidence. I think it must in some way be due to the lower part of the rim "giving" or springing when the tyre on a wire wheel meets an obstruction such as a stone. Of course, in a wood wheel there can be no such spring. As a test: Could some maker of wire wheels place a very thin vertical wood spoke tightly fitting between the hub and the bottom of the rim? Then hoist up the wheel at A, and let it down quickly. Should the wood spoke break, it would prove that there is "spring" in the lower part of a wire wheel rim.

RED-ROCK.

PARIS-MADRID RACE.

[14998].—You will remember that some time ago I made an appeal through your columns for subscriptions towards the erection of a suitable stone over the grave of young Nixon, who was killed at Bonneval in the Paris-Madrid Race in 1903, and I would like again to thank, through your columns, those who so kindly contributed. The memorial stone has now been made and erected, and I beg to enclose a photograph of it.



Apart from the memorial to Nixon himself, the villagers can now no more say that the British are callous of the memory of their own countrymen who lose their lives in sport abroad. I still think, however, that a matter of this description should not have been left to individual action, but should have received attention at the hands of the body representing the sporting side of automobilism in England.

CHARLES JARROTT.

P.S.—In addition to the stone I am having a small iron cross erected at the actual spot on the road where Nixon met his death. I may say that Mr. Frank Fenton, of Paris, kindly superintended the erection, etc., of the stone.—C. J.

THE PNEUMATIC TYRE CELEBRATION.

[14999].—We have before us the circular letter issued by the Michelin Tyre Co., Ltd., dated 19th November, 1909, in reference to the recent banquet celebrating the "majority" of the Pneumatic Tyre.

Without wishing in any way to comment on the spirit of this communication, we desire at once emphatically to contradict the statement that the first detachable tyre was invented by Edouard Michelin in 1891.

It is well-known that the Bartlett-Clincher detachable tyre, patented by the late William Erskine Bartlett (then managing director of this company) on the 21st October, 1890 (patent No. 16,783), was the first detachable pneumatic tyre invented, the validity of which was fully established and finally upheld by the House of Lords as a master patent.

The tyre made by Michelin in 1891 was, therefore, merely a copy of the Bartlett detachable Clincher tyre.

The Clincher patent was purchased by the Dunlop Pneumatic Tyre Co. in 1896 for the sum of £200,000, the North British Rubber Co. still retaining the right to manufacture under royalty.

It is an indisputable fact that owing to the existence of the Clincher patent Messrs. Michelin were only able (prior to the expiry of the patent) to sell detachable tyres of their manufacture in Great Britain through an arrangement entered into with the holders of the Bartlett patents.

We think it desirable to make the foregoing statement in order to "give honour where honour is due" and to uphold our irrefutable claim that the Bartlett-Clincher tyre was the first detachable pneumatic tyre invented.

In conclusion, we would like to state in respect to the banquet that we were only too pleased to support it by the presence of the undersigned, and we regard the tribute paid to Mr. DuCros as the exploiter of the pneumatic tyre in every way deserved. We do not see in it any attempt to proclaim Mr. DuCros as the inventor of the pneumatic tyre.

THE NORTH BRITISH RUBBER CO., LTD.

A. E. BAKER, General Manager.

TYRE EXPERIENCES.

[15000].—I have a Michelin tyre, 920 x 120, which simply will not stay on the rim. I have tried it on three different cars, and on three occasions when running, and once when standing in the motor house the bead slipped out, and of course a burst tube was the result. It has already cost me four tubes, and the Michelin Co. deny all liability, on the ground "that it is now fitted with a non-skid band of other manufacture than our own." I have used this same type of band for nearly five years with the best results, and it does not reach the bead. The cover is nearly new, and the fault is obviously caused by weakness in the wall or bead. I suggested to the company that they should try it on one of their own cars, but this they appear unwilling to do.

W. HIGSON.

BODYWORK AT OLYMPIA.

[15001].—In face of the laudations that the press have poured out so lavishly on the work of motor car body makers exhibited at Olympia, it may seem rash to offer a few words of criticism. I do not propose to discuss the luxurious limousines and other covered-in bodies, but confine myself to the open touring car pattern. Now the three essentials for a touring car are: (1) Comfort in the seats; (2) protection from wind; (3) luggage carrying capacity. I venture to assert that not one car at Olympia among the standard patterns fulfilled these three requisites.

It is true that one can have a body built to one's own specifications, but only at an utterly preposterous price. I maintain that the fit and suitable pattern should be the standard pattern, and that those individuals who prefer discomfort should be allowed to pay heavily for it, instead of the reverse being, as now, the case.

If the buying public would make up their mind what they want and ask for it insistently enough the makers would soon fall in line and supply it as standard at a reasonable price.

Uncomfortable Seats.—When I contemplate the discomfort that motorists cheerfully put up with, I am inclined to wonder if most people really know what comfort is. Well my idea of a comfortable seat is not a hard flat narrow cushion, but one that is deep enough to offer support almost to one's knees and that is sloped backwards at least three or four inches. It should also be supported on coil springs, or else so well stuffed as to absorb the vibration of travel.

It seems to me that at least the driver's seat should be adjustable fore and aft so as to be equally comfortable for a tall or a short man. Why must the front seat be built solidly into the sides of the car? Why not have it movable, as in an ordinary dogcart?

Protection from the Wind.—After long, long delay, makers are at last realising the necessity of supplying high doors. but in several cases these are not high enough, and in still more cases the dash is too low to afford protection from the wind. Then a heavy, fragile, and expensive glass screen is fitted—as an extra. The new Torpedo shields are a move in the right direction, but in every case that I noticed they are built too low and have to be supplemented by a glass screen.

Now, the lower half of the ordinary screen can only give a view of the car's bonnet, and it is quite unnecessary that it should be transparent. Let it be done away with, and the Torpedo dash brought up above the level of the steering wheel. This would in itself protect one's hands, and most, if not all, of one's body, and probably if its top rim were given a forward curve, like that of the County wind screen, one's face as well.

A narrow glass screen could then be used in conjunction with the hood as a draught excluder. This heightening of the dash would allow room for a petrol tank large enough for all moderate sized cars, which tank would be in its ideal place, giving a gravity feed, and so obviate the idiotic complications of pressure feed and long fragile supply pipes. I should add that with properly sloped seats and more raked steering wheel the dash would not need to be any higher than some of the cars show now.

Lastly, in the matter of luggage carrying capacity. It must be admitted that the motor car has not much spare room for anything beyond its passengers, but that should not be an excuse for the makers deliberately sacrificing what little space they have available, e.g., filling the space under the front seat with a petrol tank, or omitting to avail themselves of the long running boards for narrow lockers under them.

It is quite true that the sloping seats I advocate are very extravagant of room, but the comfort of the passengers is of more importance than anything else in body design, and nothing should weigh against that.

As we may hope that we are now within sight of the time when pneumatic tyres will be a thing of the past and their attendant spare wheel abolished, perhaps chassis designers will give us a car with the side levers so arranged that the driver can mount from his own side without disturbing the passenger on the front seat. At present their excuse is that the spare wheel has to be carried alongside the levers, so that it is no use altering the latter alone. S. T. C.

THE HOPKINS DUPLEX ENGINE.

[15002].—In your issue of the 20th inst. you illustrate and describe a valveless two-stroke motor which in my opinion has probably as many faults as it would be possible to get into one piece of mechanism, and is a form of heat engine which could by no possibility approach the usual four-cycle type in economy and efficiency.

Following the cycle round, it will be noted that on the out-stroke a vacuum is created in the chamber formed by the enlarged diameter of the cylinder and the piston extension, into which, at the end only of this stroke, the new charge is induced. Hence a lot of useless negative work in producing the said minus pressure, and a minimum of time in which to get in the new charge; also probably a very jerky and undesirable action on the carburetter.

On the in-stroke, the new charge, induced under the above circumstances, is compressed during practically the whole of such in-stroke, thereby generating the maximum pressure and heat, none of which, it will be noted, reappears as work on the expansion stroke; and then at or about the moment of greatest compression this compressed charge of new mixture is used to supply the adjoining working cylinder, being injected into it while the exhaust port is open, which inevitably leads to wastage of the new mixture, to say nothing of the fact that it is held by the highest authorities that where one gas is used to scavenge another the scavenging gas should have only a very few pounds absolute pressure, as otherwise it does not push the gas to be scavenged before it, but blows lanes in it, so to speak.

Finally, there is the danger of prematurely inflaming the new mixture by using it to directly scavenge the hot exhaust gases. There is left a dirty, insufficient charge to be compressed and fired, to provide for any useful outside work it may be expected to supply, in addition to all the useless negative work already indicated.

Essentially it seems to me an inferior copy of Kelly's duplex engine, produced two or three years ago, which engine had several identical features, but avoided many of the faults of this design.

If inventors would look for efficiency first, and look upon simplicity as desirable only where it did not encroach on that feature, time and money would be saved, and real progress would be made. LN 4606.

[In fairness to Mr. Hopkins we submitted a proof of the above letter to him, and the following is his reply.—Ed.]

Sir,—In reply to "LN 4606" re my Duplex valveless engine, it will perhaps be as well to remind your correspondent that extremes can be applied to most cases. In the first place he surmises that the vacuum I use in the pump chambers is of great intensity, and second, that the pressure I apply on the mixture in this space and in the cross-over connection passage is somewhat equal to the compression in the firing chamber. This is where he is wrong. It is possible so to arrange the clearance spaces that the first compression of the mixture is only sufficient to ensure that it will enter the

explosion space after the pressure of the exhaust gases has been relieved by the piston having passed the outlet ports. The position of exhaust outlet in relation to piston stroke will control what this pressure should be, say, between 8 and 15 lbs. Thus the work expended in my pump chambers need never amount to that required to operate the half-speed shafts, cams, tappets, valves, springs, etc., of the four-cycle type of engine giving the same number of impulses per minute.

Has he ever calculated how much petrol it takes to compress one exhaust spring a few hundred times per minute? If not, he might put on a slightly stronger one and note the difference in petrol consumption. This will illustrate one point where negative work is done by a four-stroke engine, and not to be found in my valveless.

There is no danger of prematurely firing the incoming charge of new mixture owing to the low pressure I use in the pump chambers. Apparently there is not much trouble with the minimum of time spoken of for the mixture to enter. I find I can get speeds up to 2,070 revolutions per minute, and with one pair of my duplex cylinders there are two explosions per revolution, thus equalling 4,140 per minute. Further, the writer is under the impression that some four-stroke engine designers claim it as an advantage with mechanically-operated inlets to time the valve late, and so create a vacuum before letting in the charge. Would not this be likely to jerk the carburetter as mentioned?

I do not consider there is a fair comparison between my valveless system and the other two-stroke system, in which I note it is necessary to use eight valves (more negative work) to control two explosion cylinders.

J. H. HOPKINS.

THE TORPEDO BODY.

[15003].—I notice in *The Autocar* of November 27th a letter re the "Development of the Torpedo Body," written by Messrs. Hewers Car Bodies, Ltd.

I am not prepared to discuss here the value of my registered design No. 535,893, but only to state that it is a fact that as soon as an idea has proved successful it finds many claims of priority.

It is certain that most of the novelties are the result of the present state of science and knowledge, and are the emanation of a multitude of vague ideas and the consequence of a necessity.

It is for this reason that the Legislature gives only a very restricted protection to inventors, stating with much reason that every invention ought to be the property of the Commonwealth.

The only reason of the Patent Act is not to discourage those who are giving their time and their intelligence to the research of a problem, but to try and recompense them by a temporary monopoly.

In every novelty it is not so much the idea itself that is interesting, but the practical realisation of same.

On this subject we are certain that your esteemed contributor will agree that the torpedo body has only become popular since I have put it on the market. The name "Torpedo" itself, which is adopted now, is the name I have given to this type of body.

I am very pleased that Messrs. Hewers Car Bodies, Ltd., do not wish to stop the flow of guineas to the coffers of the Cycle and Motor Traders' Benevolent Fund, and hope that they will send, as most of those who have taken advantage of the "Torpedo" design are sending now, their contribution to this fund. T. MASUI.

BODY WORK ON SMALL CARS.

[15004].—On going to the show this year I was delighted to see such marked improvement in the coach work, but it struck me that the work on most of the low-powered two-seaters left much to be desired. The following points seem to me worthy of note:

(1.) Footboards and mudguards. These are, as a rule, of a very primitive kind. Surely it would cost little more to have a long footboard (with drawers) coming close up to the wheels, and well curved bicycle-shaped mudguards, also close to the tyres. Besides this, there should be a shield on the inner side of each mudguard reaching as far as the chassis, and another one between the footboard and chassis.

(2.) Side doors are nearly always too low; to my idea they should have their tops on a continuous level with the sides of the car and top of the dash, the latter being made higher and broader than usual. This point is really most important, as two-seaters are practically always driven by the owner.

(3.) Seats. These should be low and deep, with a fairly

Correspondence.

high arm between of the same kind as those used in railway carriages, i.e., can be used down, or pushed up out of the way. The backs ought to be high, reaching at least to the collar, and to compensate for the low seats the steering-pillar must be well raked.

(4.) Wind screen and hood. The wind screen should be broad and of the jointed type, so that there is an aperture to see through when the glass is covered with rain. The hood should be of the Victoria type, coming well forward at the sides.

The would-be motorist goes to the show and sees just the small car he wants for, say, £240; the only trouble is that the body is so uncomfortable. On asking the cost of having it made something like I have mentioned above he is probably first of all told that the chassis is quite unsuitable for it, and finally after much trouble he is told that it would cost between £50 and £60 more, and strongly advised not to have it done. To finish up he is probably shown a six-cylinder two-seater costing a thousand, and is asked why he does not have that instead.

Although this may sound somewhat like a myth it actually happened to me this week. Surely for another, say, £10 or £15 these small comfortless bodies might be made quite luxurious if the makers would only take the trouble. As far as I am concerned I am waiting for the next show, although I would gladly have started and joined the noble army of motorists at once, but £50 on comfort in these hard days has to be thought of.

COUNTRY DOCTOR.

A FRIEND IN NEED.

[15005].—I should like to tender my thanks to the two gentlemen in car numbered LD 537, who so kindly assisted me on the Cambridge-Huntingdon road on the 22nd ult by taking my car in tow when broken down. They were proceeding in the opposite direction, but volunteered to fetch some rope, and they then took me where I was able to leave the car under shelter. Such actions as these deserve recording, although perhaps only those who have been in such a predicament as I was can fully appreciate them.

WALTER BROWN.

ROAD METALLING.

[15006].—I was astonished to see in your valuable journal of November 20th, under the heading of "Motor Union Notes," that Mr. W. J. Fletcher, the county surveyor for Dorset, had given instructions that where possible half the road should be spread and partly rolled at a time. All I can say is that I only hope he has. It certainly was time, as up to now the Dorset way of repairing roads (laying down right across the roads stretches of field flints the size of a man's fist to double fist partly broken with edges as sharp as razors, and then waiting for the steam roller to come and roll them in, on top of the flints, road dirt being used as a binding) is absolutely the worst in England, as, unfortunately, doing a good bit of motoring over them I know to my cost.

I wrote to Mr. Fletcher pointing out to him that if he must use field flints to make his roads he might do half at a time. Perhaps this was about three weeks ago. He has at last issued instructions to this effect, and things may be a bit better for the unhappy Dorset motorists who, like myself, use their cars in the winter.

If no improvement takes place, I should certainly advise all Dorset owners to pay their licences in a county like Gloucestershire, where the roads are excellently made—even the by-roads are first-class—and the repairing sensibly carried out. Excellent signs are also put up in Gloucestershire warning one of dangerous places.

This (the paying of our licences) is about the only pressure we motorists can bring to bear on county authorities, and I for one shall pay to Gloucestershire in future if the Dorset road repairing continues to be done in the present abominable manner. This may possibly have some effect on the Main Roads Committee.

ALAN BRADBURY.

[A proof of the above letter was sent to Mr. Fletcher, and his reply is appended.—ED.]

Sir,—I greatly appreciate your kind thought in sending me a proof of your correspondent's letter, and I only wish he would exercise a little of the same courtesy, instead of sending you such a grossly exaggerated statement, and holding up to public ignominy an official who has always tried to carry out the work of repairs on the main roads in the best manner possible, and for the interest of the motorists as well as the ratepayers. No fresh instructions

have been given as to repairing the roads halfway only at a time. This has always been done where possible, but the main roads are too narrow to allow it to be successfully done except in places where the roads are wide, for reasons I can explain to your correspondent if he would care to discuss them with me.

I am sending you herewith a copy of the memorandum which has been issued to our roadmen for some years, and has lately been reprinted, which will show you how mistaken your correspondent is in some of his statements.

Your correspondent's threat of withdrawing the payment of his licence in the county is too contemptible for comment. I only wish he knew something of the difficulties a county surveyor meets with in his endeavours to do his duty faithfully, and at the same time to try and please everyone, especially gentlemen like your correspondent, who think they know more about road repairs than officials who have devoted their life to the work.

WALTER J. FLETCHER.

[The memorandum referred to contains the following: "The greatest care to be taken that only such a quantity of materials is spread in front of the rollers as can be consolidated during the day or before sunset, and if the rolling of any materials spread cannot be properly finished before dark the roller must be passed over the rough material at least three times before it is allowed to leave off work for the night." Not only so, but the memorandum gives the instruction that "on no account is any dirt or soil from the roadside to be spread; and if the roller drivers are found spreading any binding, the matter must be at once reported to the assistant surveyor, who will suspend the driver." It would appear that the explanation of the complaint in question was the fact that the steam roller broke down about four o'clock in the afternoon, and the roadmen were unable to finish rolling in the flints the same day.—ED.]

FOREIGN TYRES ON BRITISH CARS.

[15007].—Can any of your readers inform me as to how it comes about that quite fifty per cent. of the British-made cars exhibited at Olympia were shod with foreign made tyres? And if a reciprocative feeling is extended towards British made tyres at the Paris shows? One would think that firms manufacturing British cars, made throughout by British labour, would complete the production by fitting home-made tyres.

FREDERICK J. THISTLETHWAITE.

GIVING WARNING OF POLICE TRAPS.

[15008].—Here is a simpler idea for giving warning of police traps. After coming out of one, or before going into one if you know it, lay a trail of 100 yards of confetti. Easy to do, easy to be seen, not easily removed, especially if at all wet ground, and unmistakable.

SMITH.

A SWITCH STARTING MAGNETO.

[15009].—As you considered my patent for a starting ignition system of sufficient interest to publish an abridgment of it on page 908 of *The Autocar* of November 27th, perhaps you may consider the following development adds to that interest and warrants the publication of this letter.

Instead of using an ordinary induction coil, I now use a spare magneto armature. It is evident that by this arrangement a somewhat expensive spare can be carried without, figuratively speaking, "eating its head off" in idleness.

J. DALRYMPLE BELL.

BEDFORD CARS.

[15010].—As a constant reader of *The Autocar* I am also extremely interested in the origin of Bedford cars. Some months ago while at the Reo Co.'s works at Westminster I was shown a Bedford chassis, and was informed that the Reo Co. were agents for these cars. This chassis struck me as being obviously American, having such points as epicyclic gearing, etc., which are usually found in American cars.

VIATOR.

FARNINGHAM (KENT).

[15011].—On page 874 of *The Autocar* of November 27th, I observe a paragraph upon the dangerous character of this village, and wherein you refer to a notice which is on the Maidstone side of the village, and state that there is need for a similar one on the London side. I beg to inform you that such a notice is already in evidence on the London side, and was erected upon the same day as that at the Maidstone end of the village.

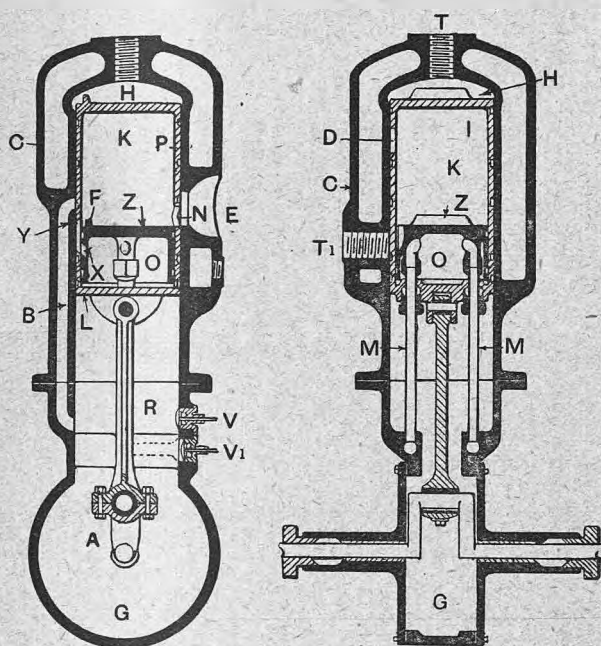
H. P. MAYBURY.

A Novel Double-acting Petrol Engine.

A Complication of Questionable Utility.

THE title "One-stroke Engine" applied to a petrol motor sounds strange; nevertheless, a single-cylinder engine designed to give two explosions for every revolution has been the subject of experiment in America, and the French motor paper *La Vie Automobile* publishes the following description of the latest petrol engine designed on the lines of a steam engine, viz., with a power stroke for each travel of the piston.

Although this novel design possesses a mechanism enabling a power stroke to occur each time the piston ascends and descends, there are four phases in each stroke, viz., expansion, exhaust, induction, and compression.



Cross and longitudinal sections.

A, crankshaft	K, inner compression space	P, hollow piston
B, transfer passage	L, bottom end of piston	R, connecting rod
C, water jacket	M, hollow stems connecting valves with space O	T Tr, sparking plug orifices
D, port in piston exposing Tr	N, exhaust port in piston	V V1, inlet valves
E, exhaust port	O, induction space	X Y, passage between O and K
F, baffle plate		Z, fixed head of inner combustion space
G, crank case		
H, compression space		

Reference to the accompanying line drawings will show that the piston P is hollow, longer than usual, and closed at both ends; the base is provided with two holes and stuffing boxes, through which pass hollow stems M M. These are fixed in the base of the cylinder casting, and support at the top a fixed member Z, fitted with rings bearing against the inside walls of the piston P. The piston P is provided with the usual connecting rod R. This construction provides four separate chambers as follow: H corresponds to the combustion space in an ordinary motor, K a space between the bottom of the piston P and the fixed member Z. The remaining two chambers are the space between the fixed member Z and the bottom end of the piston L, which, with the crank case, perform the rôle of suction pump and transfer passage.

The following is the way in which the motor works: In the sketches figs. 1 and 2 the piston P is on dead centre of compression and first firing stroke, and a charge of gas is compressed in the piston head H. Another charge of gas not compressed is in K.

(1.) In the combustion chamber H is an orifice T for a sparking plug, by which the gas is ignited and the piston forced to the bottom of the stroke. The gas in the chamber K is compressed at the same time, and another charge of gas drawn into O through the hollow stems M M and the valves V V. The gas is also compressed in the crank case G.

(2.) When the piston P is at the bottom of the stroke it uncovers the exhaust port E and also the port in the transfer passage B, which allows gas compressed in the crank case G to enter the cylinder above the piston P. This cycle of operations is the same as an ordinary two-stroke engine, viz., exhaust at the bottom of the stroke and crank-case compression of the fresh charge. At the same time a port D in the piston, when opposite the second sparking plug hole T1, allows the gas compressed in K to be fired.

(3.) The piston P rises by reason of the explosion in K, fresh gas is compressed in the combustion chamber H, another charge is drawn into the crank case by the valve V and compressed in the space O.

(4.) Arrived at the extremity of the compression stroke, the piston P uncovers a port N opposite the exhaust E; at the same time a by-pass V opposite the port X of the fixed member Z allows compressed gas in the space O to pass into the chamber K.

R.A.C. Founder Members' Dinner.

Nearly half the founder members of the Club were present on the 24th ult. at the founder members' annual dinner. Although by the lapse of time the 300 founder members have lost forty per cent. of their original strength, the attendance this year was so much larger than in recent years that the meeting place was transferred from the Club House to the Grand Oak Room at the Hotel Great Central. Mr. Roger Wallace, K.C., presided. H.S.H. Prince Francis of Teck, K.C.V.O., D.S.O., who was a guest, and who proposed the toast of "The Founder Members of the Royal Automobile Club," reviewed the history of the automobile movement from the year 1895, and announced that a total club membership of 5,000 would be reached next month. The toast was responded to by Sir William Goff, Bart., D.L. (president of the Irish Automobile Club), Mr. T. W. Staplee Firth, Sir John I. Thornycroft, F.R.S., and Mr. A. J.

Walter, K.C. The Hon. Arthur Stanley, M.V.O., M.P., another guest of the evening, proposed the toast of "The Chairman."

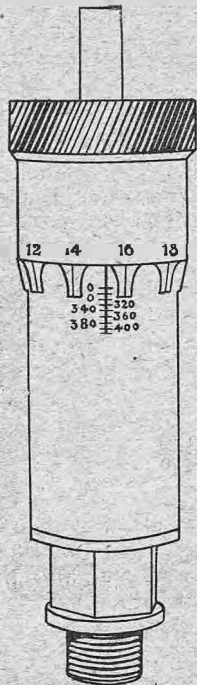
After the speeches an entertainment was given, in which both founder members and professional artistes took part. During the proceedings a wireless message was received from Mr. Frederick R. Simms, who took the initiative in starting the Club in 1897, and who now sent his good wishes from the *s.s. Mauretania* in mid-Atlantic.

At the next meeting of the International Conference of Recognised Automobile Clubs, to be held in Paris on the 7th December, the R.A.C. will again bring forward the question of speed records, with the object of having all such records recognised as world's records, if automatically and electrically timed.

A Compression Indicator.

A Device to Locate Loss of Power.

OF the many annoying phases in running a car, one of the greatest is when there is a leakage of power. There may be nothing radically wrong with the engine or transmission, yet there is a loss of energy somewhere. The remark applies not only to autocars, but to general engineering plant. The leakage may be great or small, but in any case it makes for a non-economical working of the engine, whereas the proud owner or chauffeur always likes to feel that his engine is tuned up to perfection. This is the natural pride of the thoroughbred engineer. Hence a keen interest should be felt in a device explained hereafter, viz., Okill's pressure indicator for all kinds of internal combustion engines.



The Okill pressure tester.

The writer has more than once heard the assertion that nine out of ten motorists cannot tell what the compression of their engine is under running conditions, the majority of them trusting to that rule-of-thumb method of shutting off the ignition, turning the handle, and—probably being misled. For if the handle be turned slowly the compression feels stronger than when it is turned quickly. In short, to judge by handle resistance is unreliable and erratic. It would be safe to say that many a manufacturer could not give off-hand the actual compression of their engines; they are content with a theoretical computation that it "ought" to be so-and-so, but they have only the vaguest actual knowledge of what it is under working conditions.

All technical experts are agreed on the desirability of getting full compression if inefficiency is to be avoided. Yet thousands of car owners do not consider the point and therefore complain that their mileage per gallon is poor compared with some friend's.

The Okill indicator, like many another valuable

device, is remarkably simple. It is the invention of a man who has been associated with the automobile industry from its infancy. The method of using the gauge is this:

When taking the compressions of a multi-cylinder engine, the sparking plug is removed from one cylinder, and the indicator, illustrated herewith, inserted. The engine is started. (It will be noted that the instrument is used for testing the compression under running conditions, not theoretically.) A pointer begins to vibrate, and then the vulcanite cap or screw on the top is rotated until the pointer ceases to fluctuate. When it stops it shows precisely the compression pressure on the figured cylinder or scale.

Any and every other cylinder can then be tested, and if it be found, for instance, that there is 85 lbs. per square inch and another 65 lbs., it would be quite plain that there is loss in the second, so that one can at once proceed to examine the valves. If these be found in fair condition, the piston rings would call for inspection, and so on. In a range of cylinders it would be a long and laborious process of guesswork to locate the trouble, unless one can have the simple and efficacious assistance of a handy instrument such as that referred to.

It is highly serviceable for tuning up a car and for measuring the power of explosion, *i.e.*, the power developed. The process is similar to the above. If there be two ignitions, the indicator may be inserted in the sparking plug hole and fired from the magneto, but if there be only one ignition system a special Y-shaped arm is provided, the indicator fitting into one of the top arms of the Y, and the sparking plug in the other. The engine is then started, and the indicator takes the full force of the explosion, the finger vibrating as before until the screwed top is adjusted to the exact gauge of the compression.

Various well-known firms have used the indicator, and if it were permissible to give here the names of at least a couple of firms whose cars have accomplished some wonderful performances after being tuned by the aid of the Okill indicator, the makers of the latter (Taylors, All Saints Street, Bolton) would have a gigantic recommendation. This, by the way, is but one of many good lines which this firm of engineers have to offer.

Daimler Engineering Scholarships.

The Daimler Motor Co. (1904), Ltd., have decided to continue their offer of works scholarships for 1910. These consist of one major and four minor scholarships. The major Daimler engineering scholarship carries the following advantages: (a) Instruction in the theory of motor engineering for two years. (b) A systematic course of practical instruction for this period. (c) A salary of £50 per annum for two years, provided that the holder of this scholarship shall agree to serve the Daimler Motor Co. if the company so desire, in any capacity they may select, at a salary

of not less than £150 per annum, for two years after the expiration of the scholarship. (d) Payment of the usual pupils' premium, viz., £100.

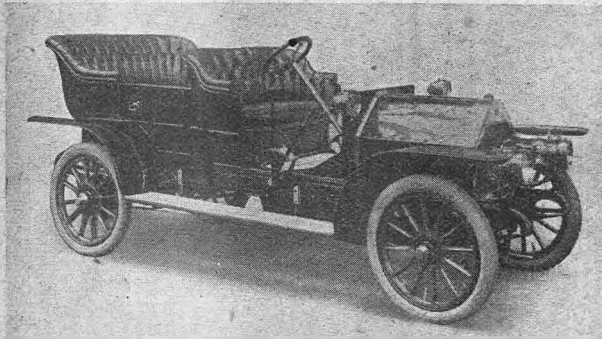
The four minor scholarships carry the same advantages of practical and theoretical instruction in motor engineering, but the amount payable to the pupil during the holding of the scholarship will be at the rate of £20 per annum. Full particulars of the conditions for gaining these scholarships may be obtained on application to Professor W. Morgan, B.Sc., manager, Pupils' Dept., Daimler Works, Coventry.

Members may obtain on application to the Secretary of the Motor Union copies in pamphlet form of the rules and courtesies of the road, which have been compiled by the Union for the guidance of motorists

and others using the highway. This little document, which is being issued by local councils to applicants for drivers' licences, is of a handy size for use in a pocket book or licence, measuring 4in. by 2¾in.

Flashes.

Referring to the mysterious notice board erected on the Elham Valley main road from Canterbury, to which attention was directed in our correspondence pages (p. 901) last week, a naval officer suggests that



47 OLYMPIA. A standard 14-16 h.p. Belsize car which is likely to become a popular vehicle.

the notice is evidently a fake, the initials B.F. and R.H. standing for "Blooming Fools and Road Hogs," and the initials M.O.B.C. after the fictitious clerk's name for "My Own Blooming Council." Nevertheless, the notice may have a disquieting effect on some motorists.

* * *

In its issue of Friday last *L'Auto* gives what is presumed to be a counterfeit presentment of the head of the firm of Messrs. Napier and Son, with the inscription "Sir Montague S. Napier!" *Pas ca L'Auto*. But if what ought to be had been—well, we don't know! Perhaps this is the Gallic method of suggesting that at least one other member of the British motor industry is deserving of knighthood.

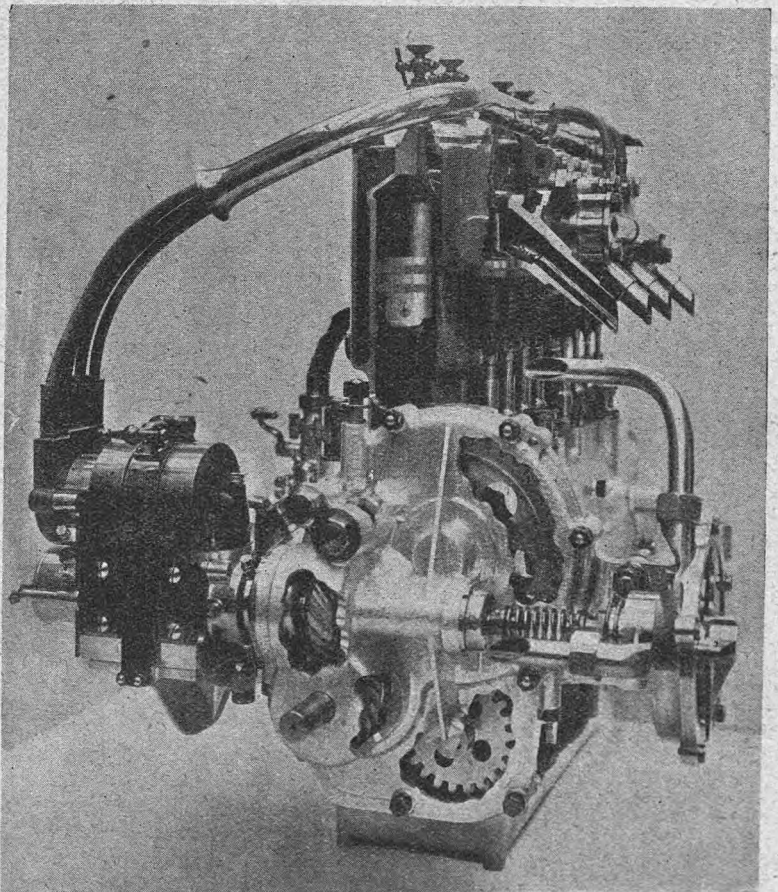
* * *

Mr. G. R. Leyland, of Pembroke College, Cambridge, while driving his motor car on the 25th November collided at a street corner with a young man named Phillips (a fishmonger's porter), who was riding a bicycle. The cyclist was so severely injured that he died in the hospital the next morning. At the coroner's inquest on the 27th November some of the witnesses suggested that the car was being driven so dangerously that the driver could not pull up, and that the car mounted the pavement and ran along it for a distance of fifty yards, and collided with a pillar box. It was urged on behalf of the motorist that the car was under proper control, and was being driven carefully, but when the collision took place the bicyclist passed underneath the front off side wheel, breaking away the radius rod and otherwise rendering the steering useless, so that the car became uncontrollable, this being why it mounted the pavement. Mr. Staplee Firth, on behalf of the motorist, cross-examined the witnesses, and the jury found a verdict of accidental death, exonerating Mr. Leyland from blame.

The Eighth International Automobile Show of Vienna, promoted by the Austrian A.C., the Austrian Automobile Industrial Society, and Society of Automobile Traders, under the patronage of H.M. Francis Joseph I., will be opened on the 1st of May, 1910, and continue until October, 1910. This exhibition will be held in the Rotunde des k.k. Praters, Vienna. The exhibits will comprise pleasure cars, business vehicles and lorries, motor boats, flying machines, motor parts and accessories, also all material and tools connected with the building of automobiles, motor boats, and flying apparatus. Space may be taken from the 1st of May to the end of June, or for the whole duration of the show, that is, from May to October. The latest time for sending in applications for space is the 30th December, 1909.

* * *

A motorist was killed on Wednesday night last week as the result of an accident. When turning a dangerous corner on the Bath Road, near Twyford, he nearly took the wrong turning and suddenly turned the car to the left. It skidded, went into the bank, and overturned. Captain O'Kinealy was pinned beneath the car, and when picked up was dead, the base of the skull having been fractured, whilst the chauffeur, who sustained a broken collarbone and three broken ribs, now lies in a serious condition. The jury returned a verdict of accidental death. The Highways Protection League will, no doubt, read with satisfaction the report of the inquest on this accident as being one of the fruits of the policy which they favoured in their recent letter to the *Times*.



The sectioned engine of the 1910 14 h.p. De Dion car, 75 x 120 mm. in section, clearly showing the internal mechanism.

Flashes.

H.M. Trade Commissioner in Canada (Mr. R. Grigg) states that eight 20 h.p. motor cars were recently purchased by business men in St. John's; he is of opinion that many more will be purchased in the near future.

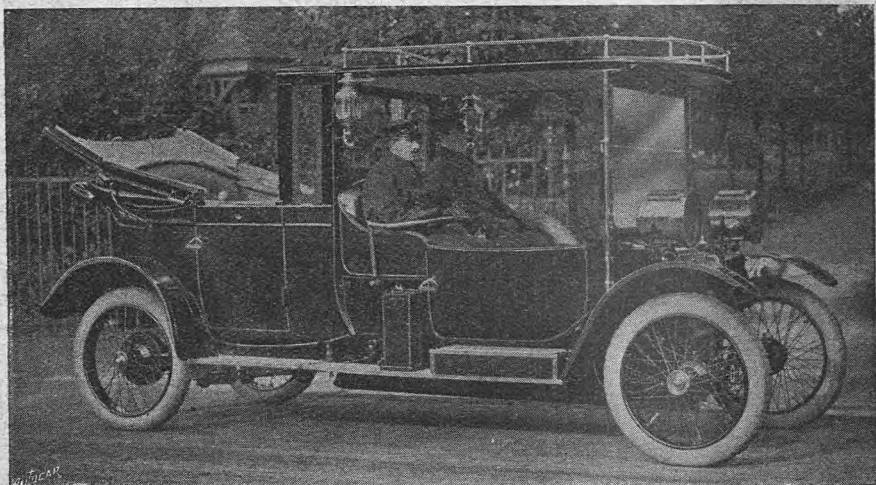
* * *

Albert Joy, an Automobile Association scout, was summoned on the 26th ult. at Dartford for obstructing the police in the execution of their duty by warning motorists of the existence of a police trap on the Maidstone Road. The police alleged that while they were timing motor cars over a distance of two miles the defendant stationed himself inside the control, and in consequence of his warning certain cars, which would have been found to have exceeded the speed limit, passed at a decreased speed. Mr. Harker, for the Automobile Association, submitted that the evidence as to the speed of the cars at the time of the warning was not of such a character as would have justified the Bench in convicting the drivers of the cars under the speed limit section, and that there was therefore no offence according to the recent ruling of the Divisional Court. The Bench upheld this contention, and dismissed the summons.

* * *

Mr. G. H. Cutbush, writing to the secretary of the Automobile Association, bears testimony to the admirable work done by the A.A. scouts altogether apart from their duties in warning motorists of places where speed is dangerous and inadvisable. "Recently (he says) I had the experience of a breakdown in a somewhat wild part of the country where trains are few and villages far between, and the ready assistance of your A.A. agent and patrol for the district made matters as pleasant as they could be under the circumstances. The fact of our being in

trouble seemed a sufficient passport to the good offices of your men. In the patrol system motorists have one of the most useful organisations devoted to their service, and I cannot imagine the patrols being removed from the roads under any circumstances. Their uses are so many that the modification of one of their duties can make no material difference."



A fine 40 h.p. Lanchester supplied to Mr. Dudley Pennington, of Birkdale, Southport. Mr. Pennington, who has owned several cars, considers that for a town or covered touring car the Lanchester is the acme of motor construction.

The Staffordshire County Council has resolved to proceed at once with the work of danger-posting the county where no official warning signs have been erected up to the present.

* * *

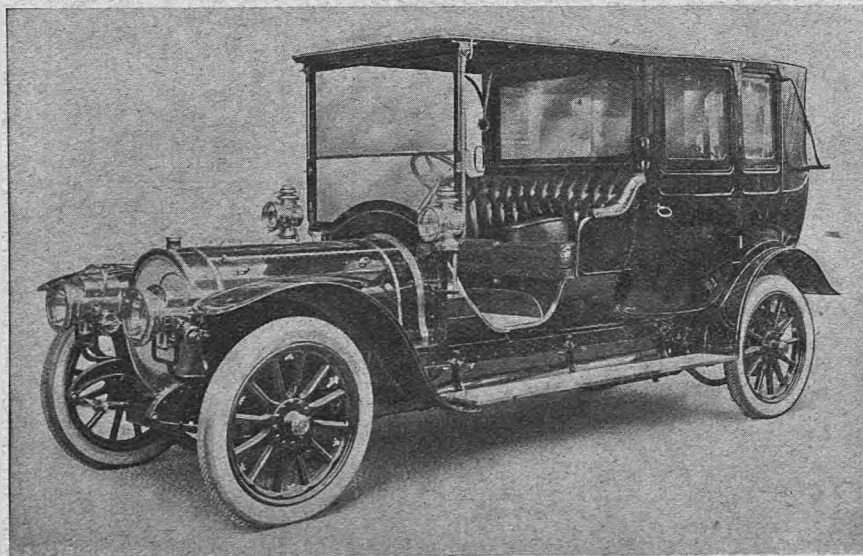
The Management Committee of the Society of Manufacturers and Traders on November 25th considered various matters arising out of the recent exhibition, including the question of the catering arrangements, with a view to possible improvements at future shows.

* * *

At the Penarth Police Court, near Cardiff, on October 20th, seven young men were charged with inflicting wilful damage on a warning sign, the property of the Automobile Association, by persistently throwing stones at it and damaging the enamel, in spite of their being warned not to do so. The magistrates convicted the men, and fined each of them £1 and costs, in addition to ordering them to pay for the damage they had done.

* * *

The R.A.C. has undertaken to erect one of its special danger signs at the top of a particularly dangerous hill near Oakamoor village, Staffordshire, on the main road from Cheadle. Winding down among trees, the gradient of the hill increases from about 1 in 10 to 1 in 6. The surface is bad, and there is a bad corner on the descent and a right-angled turn at the bottom to the left and right.



AT OLYMPIA. A handsome Delaunay Belleville limousine.