

THE AUTOCAR

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

EDITED BY H. WALTER STANER.

No. 385. VOL. X.

SATURDAY, MARCH 14TH, 1903.

[PRICE 3D.]

THE AUTOCAR.

EDITORIAL OFFICES:

COVENTRY.

PUBLISHING OFFICES:

3, ST. BRIDE STREET, LUDGATE CIRCUS, LONDON, E.C.

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COLONIAL AND FOREIGN EDITION.

IN ADDITION TO THE USUAL EDITION OF "THE AUTOCAR," A SPECIAL THIN EDITION IS PUBLISHED EACH WEEK FOR CIRCULATION ABROAD. THE ENGLISH AND FOREIGN RATES WILL BE FOUND ON THE LAST PAGE. ORDERS WITH REMITTANCE SHOULD BE ADDRESSED "THE AUTOCAR," COVENTRY.

The *Autocar* can be obtained abroad from the following:
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 NIGER: Levant & Chevalier, 50, Quai St. Jean Baptiste.
 UNITED STATES: The International News Agency, New York.
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Messrs. Gordon and Gatch.

Notes

The Numbering Proposals.

On another page we briefly report the meeting of the members of the Automobile Club held to discuss the proposed legislation. It will be seen that an overwhelming majority of those present were opposed to numbering, and we think the attitude which has now been taken by the club with refer-

ence to the matter is one which will receive the hearty support of all automobilists, whether they be members or not. The matter has been narrowed down to the questions of whether the club policy shall embrace (1) numbering with removal of the speed limit; (2) an attempt to remove speed limit without numbering; (3) leaving matters as they are. These questions will be balloted on by the whole of the club membership, and they will give a very fair indication as to the opinion of automobilists at large on the matter. It will undoubtedly come as a relief to many to know that the policy we have advocated persistently throughout should have been so thoroughly endorsed by the meeting, and it gives us great pleasure to record that the club which has, with few exceptions, voiced the desires of automobilists so well, should have decided to take the opinion of its members at large before proceeding further with the obnoxious numbering proposals. In these matters it is not necessary to go into details. The speeches made by the upholders of the numbering proposals were of a distinctly diplomatic order, and many pertinent questions and criticisms were left unanswered; but we must say that the false position in which the club had placed itself was retired from in as graceful a manner as possible. But this is a small point, and the victors can well afford to let it pass, as their one aim was to save automobilism from the serious results which would have accrued had the club been able to get its propositions, as they stood in all their incompleteness, passed into law. We hope that when the ballot is taken the members will respond to it fully, as the more representative it can be the better. We do not wish to prophesy, but we cannot help thinking that the third proposition is the one which will be favoured; in other words, that things shall remain for the time being as they are. It is unquestionably the safest plan, as those who read our *précis* of the arguments at the club will acknowledge. What we would all prefer is the second proposition. This goes almost without saying; but the risks of attempting it or the first are very great, and the wisest course is to leave time to do its work. This is on the assumption that Parliament itself makes no move. If it does the club may be relied on to do its best to safeguard the interests of the automobilist, and its efforts will have the unanimous support of all interested in motoring.

Future Developments.

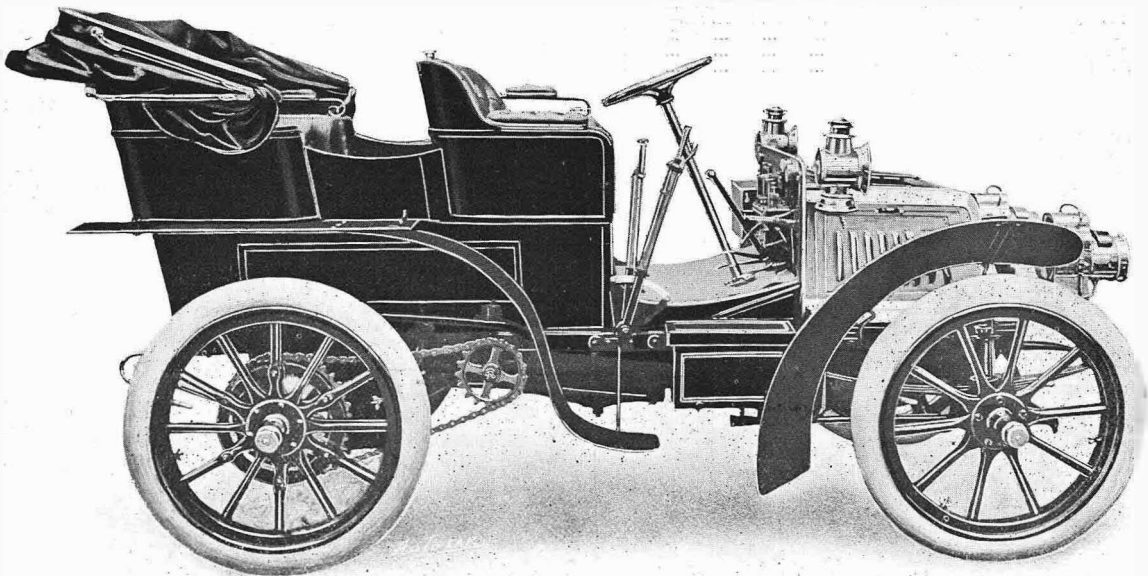
From the beginning of automobilism there have always been many people firmly determined to buy a car some day, but who have been waiting—and are still waiting—for what they call the perfect car. Their idea is that some wonderful system will be brought out which will render all present machines fit only for the scrap-heap, so they wait and wait.

missing years of enjoyment, for the car which never comes. We have many times pointed out in these columns that no great revolution of this kind is likely, and we would draw attention to the paper read by Mr. Sennett before the Automobile Club, which was reported in our last issue, and the discussion upon which is given in another column to-day. It will be seen from this that the general opinion of well-known constructors and others best qualified to judge is that the lines on which development will take place are already well defined. The tendency is not for startling innovations, but rather for taking existing systems and gradually improving them, as experience shows that such action is advisable; but even this process must be very gradual. If an improvement be thought of to-day to a standard pattern engine or gear made by any good firm, it will probably be nearly a year before it will be embodied on the cars turned out by the particular makers, as it will be tested carefully, and possibly modified a dozen times before its final form is decided. These things are being continually done by the manufacturers, but the automobile world never hears of them, as many a change which appears to be very promising is found in the long run not to be an improvement, and is discarded, possibly to be taken up again a few years later, and found wanting once more, by some experimenter who was not fully acquainted with the detail history of the evolution of the autocar. If we turn from the car and look at other mechanisms, it will be found that all the most successful and practical have been gradually evolved in this way.

The American Cup Challengers.

The directors of the Locomobile Company of Great Britain have sent a cordial invitation through the president of the American Automobile Club to the members of the American team who will be coming over to compete for the Gordon-Bennett cup,

and have placed their splendid premises at Sussex Place, South Kensington, entirely at the disposal of the American sportsmen. There they will be able to warehouse their cars and to enjoy every facility afforded by well-appointed workshops and skilled mechanics for getting their cars tuned up before proceeding to Ireland. It is pointed out that the cars will be absolutely safe, as there are separate lock-up shops in which the racing vehicles can be stored. This act on the part of the Locomobile Company is one which, we think, deserves every commendation, as the firm may be fairly described as an Anglo-American one, and though the enterprise is to a very large extent British, a number of Americans are employed at Sussex Place, and everyone connected with it, from the managing director downwards, is acquainted with the States, so that the members of the team should feel thoroughly at home. We have not heard that the invitation has been accepted, but we should imagine it is almost certain that it will be. We do not propose at the moment to discuss the chances of the American team, as a good many appear inclined to do. So far as present knowledge is concerned, their machines do not seem likely to be fast enough, but till more is known about them it is premature to express an opinion. It should be remembered, too, that the race is not always to the swift, and that the Yankees are well used to negotiating rough roads. In any case, it is hardly necessary for us to say that they will receive a very hearty reception on this side of the Atlantic. They will have travelled farther than any other competitors in the race, and this alone, apart from other considerations, would be more than enough to ensure a warm welcome. Englishmen have so often had to race abroad under disadvantageous conditions that they will be sure to extend every courtesy to the Americans.



The new 10 h.p. four-cylinder Panhard which was shown on the Panhard stand at the Crystal Palace Exhibition was one of the Panhard machines which excited a great deal of interest. Those who know the make at all are well aware that the 10 h.p. four-cylinder is one of the most delightful carriages ever made by the firm, as the engine is so smooth in running and the car is just large enough to be comfortable without being cumbersome. The carriage body is by the Regent Carriage Co. from a special design of the English Panhard house. The front seat is divided, and the rear side is hinged so that it can be raised and the rear seats entered from the front. The back seat is designed to take three passengers comfortably, all facing forward, and panels are placed between the back and front seats on each side so that side draughts are prevented. The hood comes well forward when up, and can be detached by the removal of a couple of nuts.

USEFUL HINTS AND TIPS. On Driving a Car.

(Continued from page 264.)

Now you are on your second speed, and you had better keep on it awhile. Try some more corners, and get accustomed to the control of the car on the second speed. Press down the clutch pedal gently from time to time in order to realise just how much declutching will slow the car; but be careful to let it in gently as before. Do not let the car slow down too much, as picking up again on the second speed is not good for the gear. Press down your brake pedal from time to time, and learn how much stopping power it endows you with. When you feel quite comfortable on your second, and realise that you have control of the car, change on to your third, but select a fairly good length of straight road to play on. The change is effected exactly as above described. *i.e.*, press down clutch pedal, move your lever forward into the next notch, and when it is *there*, let your pedal come up gently. In practising changing speed, it is well to select a stretch of down grade, not a hill, but just a very slight slope, as then the car will run on, and you may be more deliberate about your pedal and lever movements. Unclutch frequently as before, and use pedal brake gently to acquire a knowledge of the effect on your third. Practise this well, for by judicious use of the clutch and gentle applications of the foot brake, it is frequently possible to slow up just enough to enable you to get through traffic without changing down. Indeed, with the car from which these hints and tips are written, the second and first speeds are rarely used, except for starting, running through crowded traffic, and hill-climbing. There is, however, one instruction we should have given, and that is when you have changed on to your third or top speed, you should have retarded or throttled down the engine speed, and by moving your accelerator have given your governors full play; for it is not wise for the novice to drive at the height of his top speed right off the reel. You can accelerate the car gradually as you gain more confidence and feel more certain of yourself.

x x x x

We must presume now that you have driven about on level roads until you can steer fairly well. Use your clutch and foot brake in a commonsense manner, and change speed with almost, but not quite, simultaneous movements of clutch pedal and gear lever, so that the dragon of Wantley is no more heard in the land. The next thing to acquire is the knack of changing speed uphill in conformity with the gradient attacked. This, indeed, can hardly be called a knack—it is almost an instinct. First, wherever possible, it is well to put your car at a hill at its best gait on its top speed. (Remember, we are only discussing mild cars—cars really for “men of moderate means,” and not leviathans that would climb Olympus without the touch of a lever.) It will rush up well at first, but gradually you will feel it slackening. You have your throttle wide open or your accelerator down already, and the only thing to be done in case the car will complete the climb on its top is to back down the ignition. Mind and do this, or the motor will knock—indeed, too early firing with the engine running slow has been

known to break crankshafts. So back down as the car slows. Presently it becomes apparent that it is not going over the hill on its first, and the throb of the engine becomes accentuated. This is the moment, or, indeed, rather before, but you will learn it as you go—the psychological moment to change down on to your second speed. Changing down is not so easy as changing up, and requires more practice. When properly done, grinding or groaning should in no way be in evidence, and there should be no forward or backward jerk of the car. It should glide on as though nothing had happened, and you alone in the car should be conscious that any change had been made. But, as we say, it is an instinct that comes by practice—sooner with some, later with more, and never with a few. So you have got to practise it.

x x x x

There is one point, however, in changing down which may probably be observed. It is not necessary to withdraw the clutch wholly—indeed, some well-known drivers say that, if the change is effected at the proper moment, there is no need to withdraw the clutch at all; but we must honestly admit that we have never been able to change down satisfactorily without, and so we do not advise the novice to try. The clutch should be withdrawn sufficiently to admit of it slipping, just how much varies with every car, and the knowledge thereof will only come with practice.

x x x x

Do not delay until the last moment for changing down to a lower gear, but drive on that gear upon which you are running to the best possible advantage. That is to say, keep the engine running at its normal speed as long as possible by the manipulation of the throttle and sparking advance lever. When the speed of the engine begins to drop slightly below the normal, and you feel it labouring, then change, but not before.

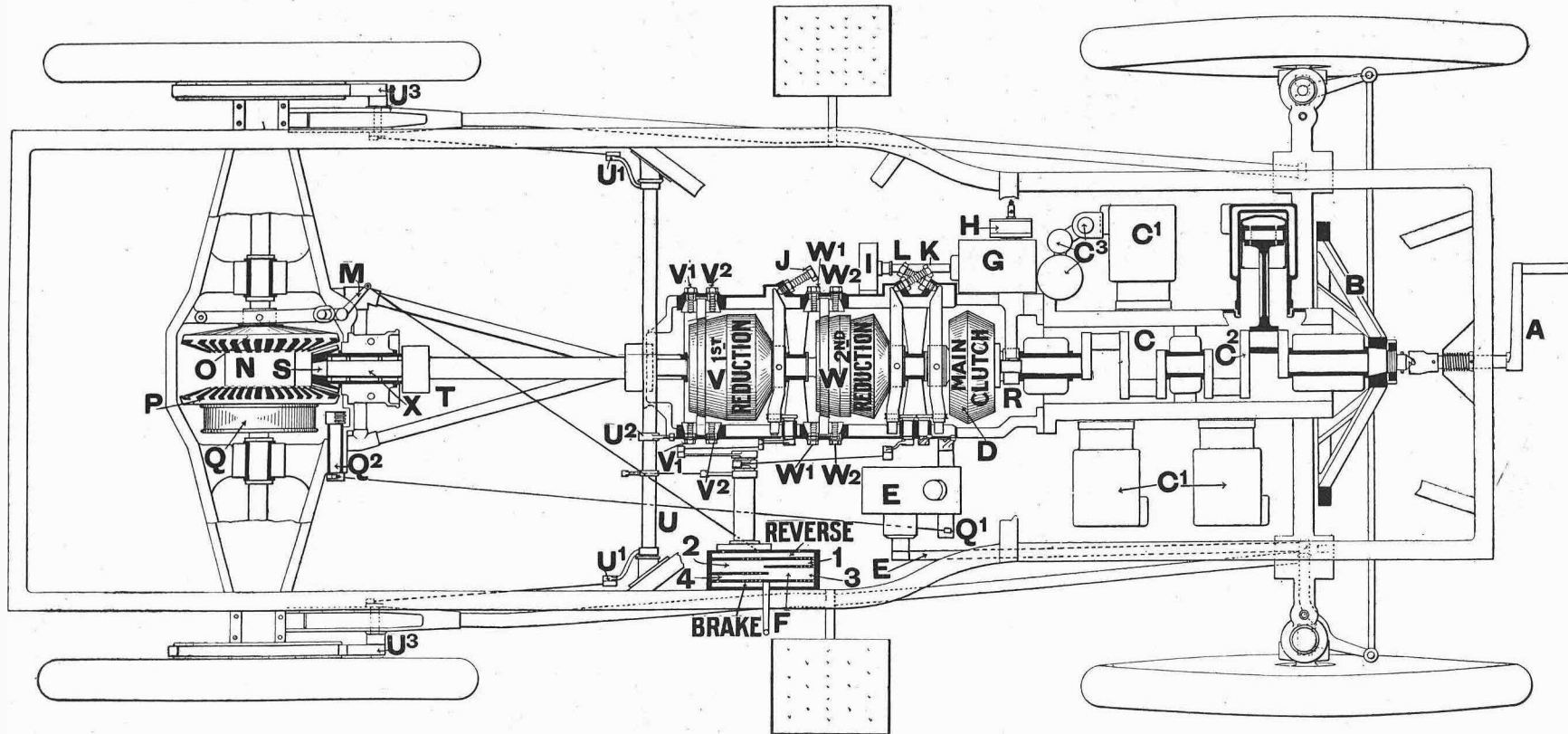
x x x x

In getting over the top of a hill, do not be in too great a hurry to change up again. The man who bangs in his second or his third before the engine is ready to take the car up shortens the life of his vehicle, besides laying up a store of trouble for himself. The true automobilist will come to feel for his car, and to learn just exactly what it likes and how it likes it. Remember, *automobile* is a noun feminine, and when of the genus petrolic, the femininity will be found pronounced to a degree. If you breast the brow on your first, wait until you hear your engine cut out before you change on to your second, and then wait again until the cut-out comes before you once more slip in your third.

x x x x

In pulling up, never use your brakes. The man who blazes hard up to his destination and then jams on both foot and side brakes for all he is worth is an unfeeling person, and should have his car taken away from him. There are times, of course, when the brakes must be used for a sudden stop; but for all ordinary slacks the clutch pedal should be depressed and the car allowed to slow down naturally and easily.

PLAN OF THE 10 h.p. WILSON & PILCHER CAR.



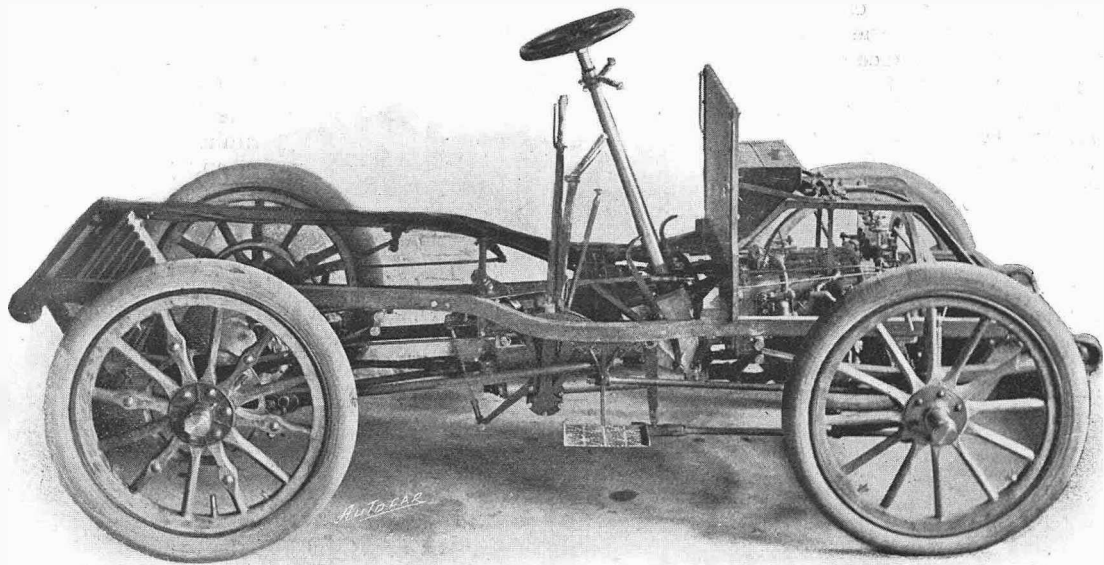
- A, starting handle.
- B, flywheel of motor.
- C, motor crank chamber.
- C¹ C¹, motor cylinders.
- C², crankshaft.
- C³, carburetter.
- D, main clutch.
- E E, steering gear and connecting rod.
- F, speed changing quadrant.

- G, oil pump to lubricators.
- H, commutator.
- I, water pump.
- J, adjusting screw for first reduction gear.
- K, adjusting screw for second reduction gear.
- L, adjusting screw for main clutch.
- M, reversing gear.
- N, balance gear.
- O, forward bevel wheel.

- P, reverse bevel wheel.
- Q, internal brake drum.
- Q¹, pedal actuating Q.
- Q², connecting lever to Q¹.
- R, helical gear drive to pumps.
- R, helical gear drive to pumps.
- S, bevel pinion on propeller-shaft.
- T, universally jointed propeller-shaft.
- U, brakeshaft.
- U¹, connections to road wheel brakes.
- U², connections to road wheel brakes.
- U³, connections to road wheel brakes.

- U², automatic clutch release to brake action.
- U¹ U³, road wheel brake drums.
- V, first reduction gear.
- V¹ V², adjustment bolts to the first reduction gear V.
- W, second reduction gear.
- W¹ W², adjustment bolts to the second reduction gear W.
- X, bevel pinion roller bearing.

THE 10 H.P. WILSON AND PILCHER CAR.



Ever since Messrs. Wilson and Pilcher first turned out an automobile, their carriages have been remarkable for special and most ingenious points in design and construction. We regret that a not too comprehensible objection on the part of the manufacturers precludes us from giving the clutch-cum-epicycloidal change-speed gear in greater detail than is shown in the plan on the opposite page. Although dimensions cannot be stated, we may say that both wheel gauge and wheelbase are on the big side. The frame is in shaped angle steel; but, owing to the suspension system adopted in hanging the engine and gear box, no emphasis is necessarily laid upon its stiffness. The engine and its crank chamber and gear are suspended from and not attached to the frame, although the manner in which this is effected is not shown at all in the diagram and only somewhat dimly in the illustration. There the angle steel truss carrying the crank chambers by two suspension rods can be discerned. The engine is a four-cylinder horizontal one, having the cylinders opposed in pairs, the central line of the crankshaft being the centre line of clutch, gear, and propeller-shafts throughout. As shown, the engine is water-cooled, and runs under governor control from 300 to 1,000 revolutions per minute. The two inner cranks are set opposite to the two outer cranks, and the firing of the cylinders is so arranged as to give the best possible balancing effect. The flywheel, which is of unusually large diameter with heavy rim, is carried on the forward end of the engineshaft outside the crank chamber, and in order to avoid an unsightly shape of bonnet is made with rearward raking arms, as shown. These arms are so pitched in relation to the plane in which the wheel rotates that they exert a propeller action on the air within the bonnet and throw it backwards upon the engine cylinders, thus aiding in the cooling. The large diameter and rim section of the flywheel, of course, is a considerable factor

in the wonderfully smooth running of the Wilson and Pilcher engine. As can be seen from the chassis diagram, the shaft bearings throughout are of unusual length, particularly with regard to the crankshaft and the tail bearing of the propeller-shaft.

When the car is being driven on the top or fourth speed, the drive passes directly down the central line of shafting from the engine, the main clutch and second and first reduction gear boxes rotating all solid together. It will thus be seen that this *prise directe* conduces to an economical transmission on the fourth or top speed. The circular boxes marked second and first reduction contain each a very simple but nevertheless very ingenious combination of friction clutches and epicycloidal, or, as it is better known perhaps, Crypto gear, which forms the subject matter of a special patent. It is impossible to convey a conception of these with anything like clarity in default of comprehensible diagrams, and lacking these for the present, we shall not attempt explanation; but having taken more than one trial run on Wilson and Pilcher cars with this change-speed gear, we are able to testify to the absolute sweetness of its change and running. The passengers in the car are never conscious that the ratio of engine speed to car speed has been varied through the gear. The box marked first reduction is so marked because, by the agency of the clutch and gear it contains, it gives the first reduction of speed from the fourth speed, so that in the usual automobile parlance it is the third speed. The clutch and gear in the box marked second reduction, when brought into action by appropriate movement of the gear lever, give the second reduction from the fourth or top speed, and so is the second speed in usual terms. The third reduction or first speed is obtained by the combined action of the gears and clutches in both the first and second reductions, and so we have all four speeds.

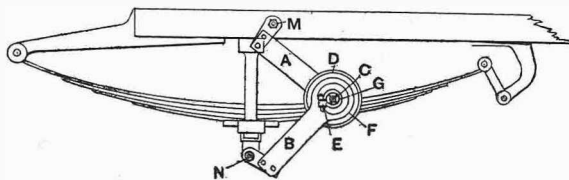
The gears are changed without withdrawing the

main clutch, as in changing speed with driving economies of the Panhard type. The only gear wheels driving when on the top speed are the bevel wheels rotating the live axle. Both the driving and driven bevel wheels are of very large size, and although not so shown in the diagram, have their teeth cut helically on the face of the bevel. These wheels are quite miracles of workmanship, and must be examined to be appreciated. To afford accommodation for the large driven bevels, a live axle case of considerable size and unusual form is provided in aluminium. The car is reversed by throwing the bevel wheel O out and the bevel wheel P into gear with the main drive bevel pinion S. The weight of a 10 h.p. Wilson and Pilcher car with touring tonneau body is 18 cwt.

The engine, of course, is equipped with Wilson's patent induction valves, piston rings, and commutator, all of which were illustrated and described in *The Autocar* of June 7th, 1902, page 598. Another, and we believe a highly meritorious, fitting, is the single trembler coil—that is to say, four coils—working through one trembler, the effect of which is most perfect synchronisation of firing. The remaining details as to wheels, steering, etc., can be seen from the illustration. There is no denying the fact that in the Wilson-Pilcher system of propulsion we have at once an arrangement which is absolutely native, highly efficient, and eminently comfortable, noiseless, and vibrationless.

THE TRUFFAULT SPRING CONTROL.

It cannot be denied that there is yet room for improvement in the methods adopted up to date of fitting and attaching springs between the axles and frames of automobiles. Even the best springs, although very largely nullifying road shock, do not shut it off altogether from the passengers in an automobile. Very flexible springs set up minor oscillations of their own after reducing the main shock before they return to their normal position, and these minor oscillations are also conveyed to the



A B, connecting arms.
C, spindle upon which A and B work.
D, rim formed on the arm A.
E, adjustment locking ring to G.
F, disc on the arm B, working within D.
G, nut regulating pressure between A and B.
M N, working links.

occupants of the car. With springs of less elasticity the oscillations are reduced, but the road shock is more severely felt. As speed increases, so do road shocks, and the frame is not able to follow directly all the movements of the four springs, so that the wheels leave the ground more or less, and thus the adhesion for driving and steering purposes is reduced when least desirable. In the Truffault, an apparatus, as shown in the diagram, is provided to each spring, which, to put it comprehensively, prevents the too sudden rebound of the spring after compression and elongation, and thus, while swallow-

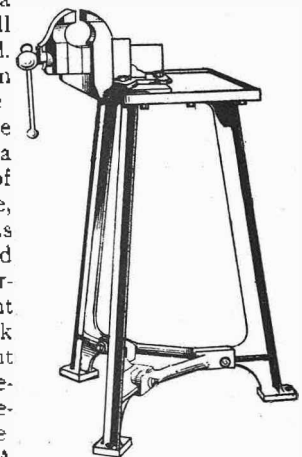
ing up the road shock, prevents the bouncing hitherto due to the uncontrolled spring returning instantly to its normal form. The apparatus may indeed be said to act as a kind of brake upon the too sudden movements of the spring. One such apparatus is fitted to each spring. It is composed of two arms A B oscillating stiffly together on the spindle C. The boss of the arm A is formed with an overhanging rim D, while the boss of the arm B has a disc F thereon which fits loosely within D. A thick leather washer is pressed between D and F by means of the nut G on the spindle C, which is separated from the outer face of the disc F by a leather washer. This nut is castled, and is locked in the desired position on the spindle C by means of the locking ring E. The amount of friction desired to be set up between the arms A and B is obtained by means of the nut G pressing the two bosses together with the thick leather washer between them.

The arms A and B are linked to the frame and axle respectively by means of the rocking links M and N, which move on leather collars on their spindles. These three frictional points offer equal resistance both ways, so that it will be seen that when the road wheel runs over an obstruction or drops into a hole the two arms of the lunge follow the movement of the part to which they are attached, and by the frictional elements introduced do not permit these to regain their normal relationship but in a comparatively gradual manner. The shock and its after effects are thus killed, and the spring oscillations we have referred to quite avoided. Practical experiments made with this attachment have shown such good and satisfactory results that after numerous trials the Société des Automobiles Peugeot have acquired the sole use of the apparatus, and will in future so provide all the cars they turn out.

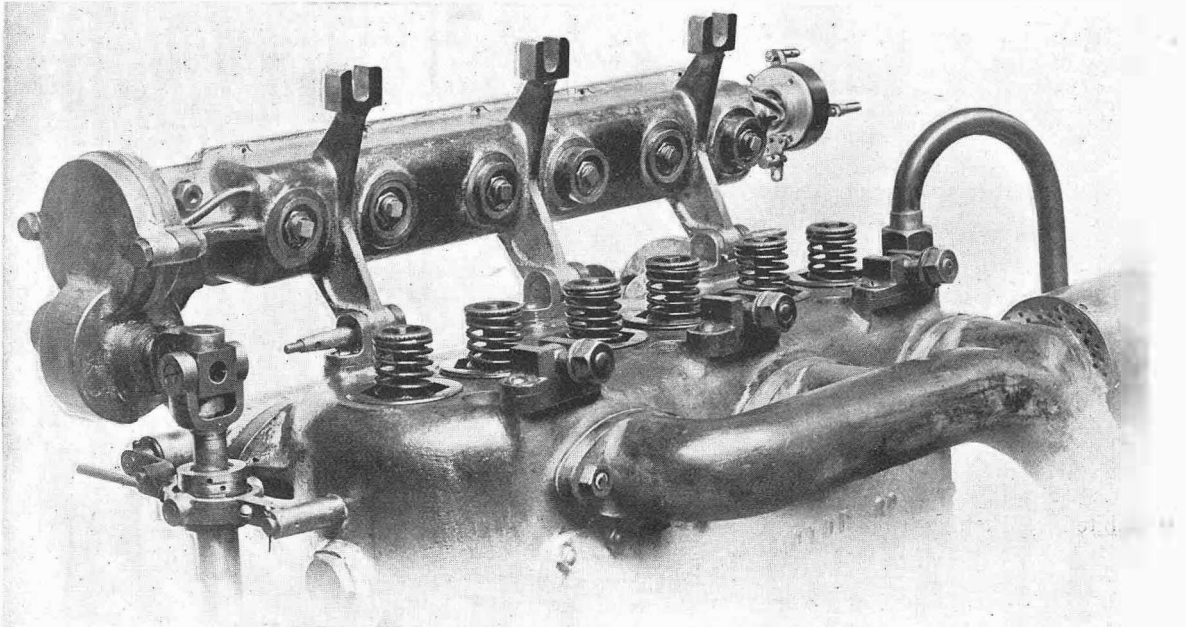
The Vienna Automobile Exhibition opens on the 17th inst., and promises to be highly successful. Among the French firms exhibiting are Peugeot, Darracq, Michelin, De Dion, Clement, Gladiator, Serpollet, Renault Frères, and Panhard.

* * *

What should prove a great acquisition to the motorist's home outfit is a solidly-constructed small bench and vice combined. The opposite illustration depicts such a requisite which is being put on the market by the Chater-Lea Manufacturing Co., of 116-120, Golden Lane, E.C. The construction is particularly rigid, and would stand a considerable amount of weight being put upon any work held in the vice without giving any rocking movement. For further security it can, of course, be bolted to the floor. A Parker parallel-jawed vice can be fitted to order, and this we can strongly recommend from personal experience.



THE MAUDSLAY LAYSHAFT.

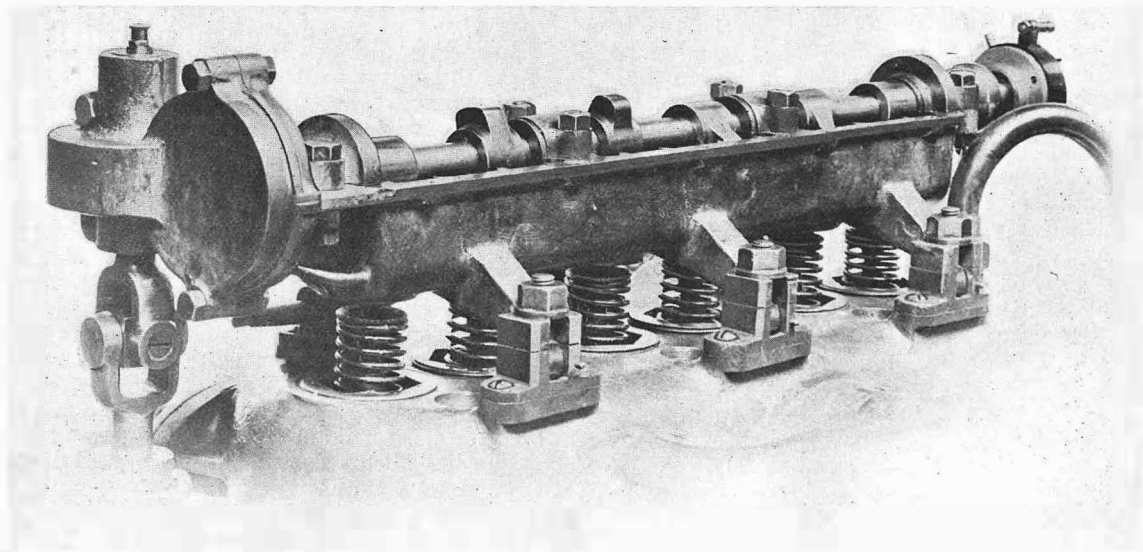


The layshaft thrown back to give access to the valves.

The illustrations given upon this page clearly explain the arrangement of the swinging cam or layshaft which the Maudslay Motor Co. are now fitting to their engines. It will be seen that the inlet and exhaust valves to the three cylinders are arranged in a row in the cylinder heads. Over these the layshaft works, being actuated from the crankshaft by worm gearing and a vertical shaft which also carries the centrifugal governor. Near the top worm gear a universal joint is provided, and this is clearly shown in both illustrations. The chamber containing the layshaft with its cams and plungers is supported on six legs, three of which are hinged to brackets on one side of the cylinder heads, while the three opposite legs are provided

with slotted bosses, into which swing bolts engage to secure the chamber to the cylinders. It will thus be seen that to obtain access to the valves all that one has to do is to slacken off the three nuts and throw back the swinging bolts, and then to lift up the layshaft chamber. The lubrication of the shaft, plungers, cams, worm gearing, etc., is efficiently carried out by means of oil wells and ducts.

The features which commend this arrangement of the layshaft are not a few, but the principal among them are accessibility, ease of removal, and the location of the commutator out of reach of mud or rain. A further advantage is that the wiring is shortened and is at once got at for inspection.



The layshaft in position, with lid removed to show cams. The commutator is seen at the right extremity of the shaft. This is on the dashboard and is connected up to the shaft by means of a bayonet joint.

THE RECENT DEVELOPMENT IN LIGHT STEAM CARS.

BY FILSON YOUNG.

To those who have been watching closely the progress of what is called the motor movement, it has become apparent that, with the rapid development of efficiency in petrol cars, there has been during the past year a corresponding and possibly even a greater development in the efficiency of the light steam car as a practical road vehicle. The condition of the light steam car was, until a very short time ago, broadly this. For some two or three hundred pounds the purchaser has been able to get a light car which would run in fine weather and on fine roads with great ease and smoothness for a short time, but which, after a little while, would begin to show signs of wear and tendency to break down, chiefly owing to the lightness of construction and somewhat haphazard trust in the operator's knowledge and experience. The owner of such a car wishing to get the greatest possible amount of efficiency out of it found himself virtually prohibited from taking it out except in fine weather when the roads were dry, as the splashing of mud into the bearings of the small engine rapidly produced symptoms of an approaching end to that engine's efficiency. He found himself, moreover, pinned down to routes where he could pick up clean water within twenty mile stages, and he was also under the necessity of replenishing the petrol tanks at intervals of not less than forty miles.

This, of course, although it provides possibilities of a very pleasant kind of country jaunt or journey, can hardly be described as "motoring" in the serious sense in which that term is nowadays used. To enable the steam car to hold its own with its great rival, it becomes at once necessary to extend its sphere of "non-stop" activity, and to so strengthen and protect its working parts that it may be as independent of weather and condition of roads as it is possible for a pleasure vehicle to be. Now there are a great many people who prefer steam as a motive power to any form of internal combustion engine hitherto devised, and the greatly improved education of the public in matters of mechanics and simple engineering, which has been brought about by the increased use of machinery in modern life, disposes of the alleged bogey of difficulty of management with regard to the steam engine. Really a small steam engine is easily managed and requires only a little knowledge and the kind of common sense that is employed in the treatment of horses, or other animals. Just because it is more sensitive than the petrol engine, it is more easily damaged by neglectful usage, but we have in the steam engine a powerful, accommodating, and faithful servant, which makes few demands. Its ease in running, when applied to a motor car, produces the silence and smoothness that have done so much to popularise it. It means much more than increased enjoyment to those who use it. Noise and vibration usually mean wear, and this involves renewal and expense; inversely, absence of noise and vibration means less wear, and a resultant economy in bearings, tyres, and wheels.

That the problems to which I have referred as being of urgent importance have not been neglected

by the designers and builders of small steam cars is abundantly shown by the recent development and improvement in their practice. So far as cars running in England are concerned, the credit for this improvement is mainly due to the builders of the White cars. By grappling with the problems of lubrication, condensation, and, above all, of a boiler which should be practically automatic and "fool-proof" in its action, they have achieved much; and, by a care in construction which had not been generally shown, they have gone far to remove many of the disabilities under which steam cars have hitherto laboured. In addition to this they have recently brought out a steam car of a type which I believe will have a great vogue in the future, namely, a steam tonneau car with the engine in front under a bonnet in such a position that all taps and levers can be brought immediately in front of the driver on a control board, thus doing away with the awkward fumbling under the seat made necessary by a centrally placed engine. This, however, is a heavy car, and comes outside the scope of my immediate purpose.

I have lately been giving some time to examining the various types of light steam cars, by which I mean cars that can be sold at a price of £350 and under. This I have done, not from the point of view of an engineer, but from that of the purchaser and user of such cars. Personally, my chief experience of light cars has been derived from my own Locomobile, and I think that I may say, without disrespect to the Locomobile Co., that the experience gained by a user of one of their cars has hitherto necessarily been of a somewhat concentrated kind. In this I am sure that my fellow motorists who own Locomobiles will agree. I have for some time held the opinion that the policy of selling, at however low a price, a vehicle which consists of little more than boiler, engine, wheels, and seat, is a thoroughly unsound one, for as the novice discovers by means of one unhappy experience after another that he has still much to add to his car before it can be regarded as complete, he naturally resents the constant expenditure on additions; and, however mistakenly, puts them down in his mental account book to repairs and upkeep.

Feeling this, and feeling also that the Locomobile people were in some danger of dropping behind their rivals, I am all the more glad to see that they have during the last month or two effected a thorough revision of their policy, and that their new car, which was mentioned in *The Autocar* last week, is, in my opinion, the best and most practical light steam car at the price which is now on the market. Of course, there will be many that will hold that the retention of the fire tube boiler is a mistake. For my part, speaking as one who has used such a boiler and has never had any trouble with it, I do not wish for anything better, and I find the process of watching the water level becomes quite automatic, even under the most trying conditions of roads or traffic, or of the most engaging conversation from one's fellow passenger. But in this matter I do not expect to be universally supported, and there is no doubt

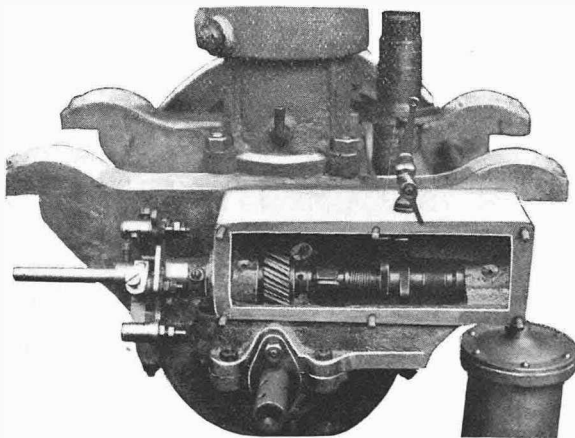
at all that the ideal steam car will be equipped with an automatic boiler of the water tube or flash type, and that a return water system will be used, thus doing away with the present cumbersome water tank, which undoubtedly occupies space which is needed for other things.

It would be unfair to leave the subject of the development in steam cars without referring to the next development in their construction which is likely to become popular. I refer to the construction of a car on the lines of a petrol car, similar to that which I have referred to in discussing the White cars. Among the most interesting experiments in this direction that I have seen was the chassis of the Vapomobile car exhibited at the Crystal Palace Show. I am bound to say that, beautiful as the workmanship was on this machine, it seemed to me to be of too complicated a nature to be used with success by anyone but a highly trained engineer. The massive framework and large powerful engines reminded one more of the engine room of a liner than the more automatic and simple arrangement which are looked for in the motor car. But as an experiment it is important, and, as an example of what can be done in the way of first-class English workmanship, it was extremely interesting. Its designers and builders are entitled to a full share of the credit which belongs to all those who endeavour to break new ground in a developing industry.

It has been said in some quarters that the day of the light steam car is over. I need not say that I regard this view as wholly mistaken. It is probably true that we shall see less and less of the light and frail steam runabout; but, inasmuch as there always will be thousands of people who prefer the gentle and elastic force of steam to any other system of propulsion which is at present practicable, so there is likely in the near future to be an increased development in and use of steam cars, which are, horse-power for horse-power, lighter than petrol cars, and give a correspondingly greater range of efficiency.

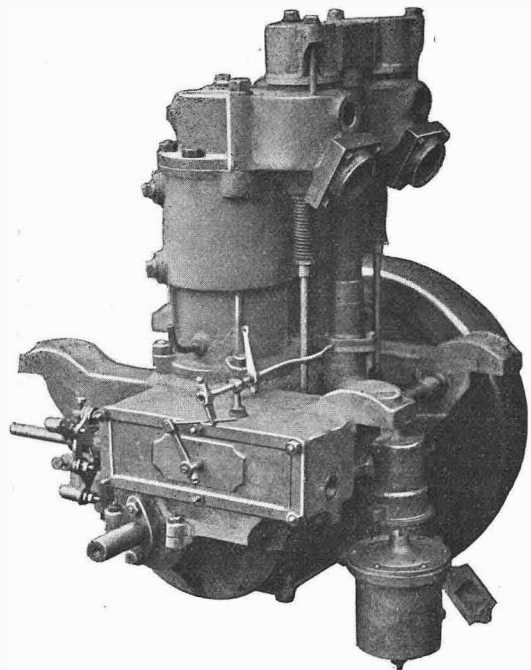
THE MALLINSON MOTOR.

Messrs. Mallinson Bros., Ltd., of Hipperholme, are placing upon the market a new engine for vehicle propulsion. The particular engine which we illustrate is a two-cylinder one, having a bore and stroke



The cam shaft of the 9 h.p. Mallinson engine.

of 4 in. and 4½ in. respectively, and running at 900 revolutions per minute develops 9 b.h.p. The weight of the engine exclusive of the flywheel is about 145 lbs., the flywheel adding another 80 lbs.



The Mallinson 9 b.h.p. two-cylinder engine.

One of the features in construction is the placing of the camshaft at right angles to the crankshaft, the drive being by helical spur wheels. This position places all the working parts in the most accessible position, as will be seen by the opposite illustration. The exhaust valves are actuated by rocking levers. The cams operating these are seen on the right of the camshaft. On the left end of the camshaft box is seen the contact breaker; the water circulating pump is also driven off the same shaft, but is not shown in the illustration. The governor is also mounted upon the camshaft, and is enclosed in the cam box. It acts upon the induction in the usual manner. The carburetter is of the float feed jet type, the inlet valves to the motor being automatic. The reciprocating parts are constructed as lightly as possible, steel tubing being used for the connecting rod. The gudgeon is hollow, and at the bottom of each stroke receives oil from the lubricator, which it passes to the connecting rod bearings and to the opposite side of the cylinder. Balance weights are fitted to the crankshaft, and we understand that very smooth running has been obtained.

They order these matters better in France. "A motor car overturned near Marseilles, and set on fire the woods which bounded the road. The motorists narrowly escaped being roasted to death."

* * *

The first successful motor car trip between Poona and Mahableshwar has been made by Lord Wolverton's car. It is said that the vehicle created so much excitement among the natives at the latter place that the police had to put a fence round the car to keep off the crowds who flocked to see it.

THE CANTONNIER SYSTEM OF ROAD MENDING.

Amongst the "things they do better in France" is road mending; and, despite the general excellence of roads in this country, there is no question that the average surface of the Routes National and of the Routes Departmental in France is above that of our roads as a whole. The question, in view of the greater use that is made of highways in this country since the introduction of the cycle and the autocar, is worth attention.

Primarily, of course, English roads were well made. Telford and Macadam dealt with road-making on a scientific basis, and in the days of the stage coach it was to everyone's interest to see that the roads were kept sound on their original sound bases. It was during the period when locomotion depended upon fast-wheeled vehicles that the roads were consolidated. The granite stripped from the walls of Newark Priory, near Ripley, as is recorded in the reports of the Commissioners at the Dissolution of the Monasteries in the reign of Henry VII., was used to mend the highways between the arsenals of London and Portsmouth; and equally drastic measures were adopted to make good the roads upon which inter-communication between important points depended.

To get some idea of the state of a country where roads do not exist, one must peruse books on African and other foreign travel, where days' journeys perhaps only result in the covering of a very few miles.

The Romans were great road makers—in fact, as a general rule all conquering peoples have been road makers—and they left us great highways as a model for future generations.

The Present Methods.

The methods at present adopted to maintain our roads are not up to a very high standard, as any traveller on them can see for himself. New metal is now being spread—often much too large. It is spread evenly over the stretch needing repair, and is left either to be worn in by the traffic or smashed in by a steam-roller. Only the other day there was a jubilant paragraph in a provincial paper on the arrival of a steam-roller in the district, yet upon any but the soundest-bottomed roads a steam-roller often does more harm than good. It crushes the new metal down, it is true; but it often breaks up the foundation of the road in the process; and if, as always happens, there are soft places in the road the roller simply fills them up and smooths them over without in any way making them sound, so that within a short space of time the soft place is a soft place again, accentuated by the extra hardness of the surrounding portions.

The French method, as we shall show, is better; but it must be premised that it is only applied to the National (or main) and Departmental (or cross) roads, and that anything corresponding to the English lane is unknown in France. In England the cyclist or motorist finds many a lane with an excellent surface, whereas such a lane in France would be almost impassable. The writer once, riding out of Amiens, found himself on the wrong road in the direction of Albert, and decided to cut across country to the road he wished to follow, *viâ* St. Gratien to Ville en Bocage, some six or seven miles

as the crow flies, over a road (?) marked on the map. This short cut took nearly two hours to negotiate, being simply a grass-grown and deeply-rutted cart track, innocent of even a handful of road metal from one end to the other.

The main and cross roads are all laid out with an eye to military use. They have on each side stretches of turf, wider along the main roads than along the cross roads. There is a double row of trees on either side of the main road, as a rule; a single one on each side of the cross roads. The suggestion is that the soldiers could camp on the grass, and cut down the trees for fuel. The trees are mostly of the Noah's Ark pattern, and the general effect is monotonous in the extreme, especially when, as is often the case, the road runs straight for a long distance. Hills are mounted by zigzags to ease the gradient for guns, and there are no hedges, cultivation coming right up to the edge of the regulation grass.

The Cantonnier.

The road is parcelled out amongst the roadmen, or cantonniers, and the basis of the system which produces such good results is that each man practically lives his life on one stretch of road. The length varies; hilly portions, as requiring more attention, being shorter than those allotted on level stretches. Local conditions affect the amount of road a man has charge of, and the result is that every roadman knows his bit of road from surface to foundation. He knows the weak spots, where the water collects, where it runs, where the foundation is sound, where it is shifting or boggy, and from year's end to year's end he watches it and "tinkers" it assiduously. You may see the cantonnier walking in his sabots with a handful of flints well broken in one hand and a toy rake in the other to some place where just that amount of new metal is wanted. He will mend the soft place again and again until he has built it up to the same hardness as its surroundings. How much better and how much less costly is that proceeding than covering many yards of the road with new metal and smashing it flat with a steam-roller, leaving, of course, the relative hardness and softness of the road exactly the same as before? Talking with one of these men on one occasion, he said a very significant thing: "When I am in bed and I hear it raining, I know where I shall have to go in the morning." In that remark lies the whole art of road-mending and the key to the fact that French road surfaces outside the towns are much better than the average surface of an English highway, though without question a great deal more money is spent upon the English road.

General repair is, of course, from time to time necessary; but when every weak spot has been carefully fed up to the same strength as the rest, an even covering of new metal put on at the right time will do much more permanent good to the road than twice, or three times, the quantity spread upon an uneven road with hard and soft spots in it.

The cost of upkeep in England would be markedly reduced after a few seasons if the cantonnier was installed at the roadside and held personally responsible for the condition of the stretch allotted to him. The work is not heavy; but to be

effective it must be continuous, and only in exceptional cases will the steam-roller be necessary. Your French cantonnier will tell you that heavy rolling is not good for well-kept roads, unless they have been built up from their foundations by its use; because, if they have not been so constructed, it breaks up the foundations, cracks and displaces

them, and is directly productive of soft places of the worst type—that is, soft places beginning at the very foundations of the road, and only to be permanently cured by digging down to that level and remaking the road right up to the top, and then carefully feeding all subsequent settlements until the surface is re-established.

CONTINENTAL NOTES AND NEWS.

A New Phase of the Autocar Industry.

The great engineering concerns have for some time past been showing a disposition to enter the automobile industry, and profit from the rapidly-growing business which is being done in these vehicles; and having long regarded the manufacture of autocars as a natural branch of their own industry, there is no doubt that they will do their best to secure a satisfactory share of the trade. During the early period of automobile construction, quite a number of mechanical engineers began to study the question, and some of the big concerns in the Nord even tried to cater for the market by turning out vehicles of different types; but all these efforts at embarking upon the industry failed, the chief reason being that the autocar seemed to need more specialisation than is usual in most other branches of engineering work. Consequently, the large firms, being unable to get a footing, were content to await developments. This specialised knowledge undoubtedly allowed of the industry being confined to a comparatively few automobile makers, who, moreover, had the advantage of possessing the services of a new class of skilled workmen whom they had trained in their own factories; but no maker can nowadays claim a monopoly of knowledge and skill, and the experience gained by the industry has opened up the ranks of manufacturers until all are able to profit more or less from the lessons of the past. The industry would perhaps still be hedged round by some of its old exclusiveness if manufacturers had continued to build cars as they did formerly, when they were obliged to turn out everything themselves. But the constant striving for high powers and high speeds has very largely changed the conditions of manufacture. When makers started building engines of 60 h.p. and more, they found that the making of big crankshafts was a little beyond their resources, or at any rate they could not hope to turn them out so accurately or under such conditions as engineering firms who make a speciality of this class of work. The slightest mistake in turning these big shafts means a considerable loss, to say nothing of the necessity of laying down costly plant and the difficulty of getting skilled men. Therefore, the automobile firms find that they cannot do better than buy their big crankshafts from the engineering concerns. Then the introduction of the pressed steel frame led to a further dependence upon the steelworks, as a maker cannot afford to put down heavy hydraulic machinery for the manufacture of a few hundred frames a year when they can be obtained at much less cost from firms who are able to supply them to the trade by the thousand. The result of this state of things has been to encourage the great engineering establishments to em-

bark on the industry, as they naturally argue that, if called upon to supply parts which the automobile makers cannot turn out, they may just as well start building the whole cars themselves. Thus, the well-known firm of Hotchkiss et Cie., of St. Denis, who have been doing a big trade in crankshafts and other parts with the leading automobile firms, are beginning to manufacture vehicles of their own, and it is intended to complete the first lot in time to take part in the Paris-Madrid race. Now it is stated that Krupp, of Essen, are arranging to construct automobiles; and it was reported some time ago that Creusot were on the point of turning out autocars, though they have not yet carried this intention into effect. The mechanical engineering trades on the Continent are in anything but a flourishing condition at the present moment. For years past manufacturers have been putting down huge plants which are now for the most part lying idle, and they are looking in every direction for means of utilising these vast resources. The automobile naturally seems to offer them the greatest scope for activity, and the fact that these important concerns should be taking up its construction points to an interesting new phase which may have a notable influence upon the future of the industry.

The Paris-Madrid Course.

The course for the forthcoming race which is to be run off in three stages has now been settled, officially so far as concerns France, and subject to a final survey as regards Spain, though it is not expected that the following route will undergo any material alteration: Versailles to Bordeaux (322¾ miles) by way of Rambouillet, Chartres, Chateaudun, Vendome, Tours, Châtellerault, Poitiers, Ruffec, Angoulême, and Libourne; Bordeaux to Vitoria by Bayonne, St.-Jean-de-Luz, Irun, St. Sebastian, Tolosa, Villafranca, Salvatierra, and Vitoria; Vitoria to Madrid by Miranda de Ebro, Pancorvo, Burgos, Banos, Duenos, Valladolid, Olmedo, Adanero, Villalba, Aravaca, and Madrid. Committees are being formed at nearly all the towns along the route to look after the requirements of competitors. The route is reported to be fairly good for most of the way; but there are several nasty stretches of road, which are being repaired with the funds provided by the Government and the local authorities. It is possible that there will be a day's rest at Bordeaux, but nothing has yet been decided.

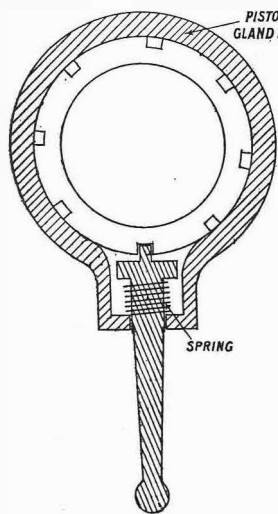
Autocar Fete in Berlin.

It is almost superfluous to remark upon the success of the show which was opened on Saturday in the Flora Garden at Charlottenberg, for every demonstration of such a progressive movement as

automobilism is necessarily a success and an advance on anything that has preceded it. The Charlottenberg show was inaugurated amid great pomp by Prince Henry of Prussia, who was received by a committee with the Duke of Ratibor, president of the Automobile Club of Germany, at its head; and, after the usual complimentary addresses, His Royal Highness passed an hour inspecting the cars on view. One of the most remarkable of these vehicles is a huge tractor with a 40 h.p. alcohol motor, capable of hauling loads of ten tons. It is to be sent to the German colonies in South-west Africa. In the evening a *fête* was organised, when the cars assembled on the West End racecourse, and then proceeded through Berlin, when they passed before the Emperor. No fewer than 307 vehicles took part in the procession, and owing to the number they were divided into groups to avoid any chance of the procession being disorganised. Each car was decorated with flowers in which were concealed electric lights, and the general effect was remarkably striking. There were only three electric and four steam cars in the procession. Among the eminent automobilists participating were Prince von Hohenlohe, Prince Frederick Leopold, Duke and Duchess of Ratibor, Princess of Ratibor, the Persian Prince Djeleddin, Count Talleyrand-Perigord, and General Becker. As a memento of the occasion the Duke of Ratibor presented the Emperor with a rich album containing the names of all those taking part in what is destined to become a historical event.

A LOCOMOBILE IMPROVEMENT.

The latest types of Locomobile contain a detail improvement which will appeal to all users of these cars. This consists of



a ratchet method of tightening the stuffing box gland. The method of working is clearly shown by the accompanying illustration. The outside collar of the ratchet fits round the piston gland nut, the casting of same being extended to form a guide for the working handle. In order to

rew up or loosen the gland nut, the handle is twisted round, thus tightening or loosening the nut as far as is wanted. A spring is fitted round the handle, this ensuring that when the handle is let go the tooth on the end remains in the notch of the gland nut.

The automobile clubs of New Jersey have succeeded in getting a bill through the Assembly regulating the speed of autocars at twenty miles an hour in the country and ten miles in towns.

Correspondence.

The Editor is not responsible for the opinions of his correspondents.

BRITISH CAR DESIGN.

[2864.]—I have read most of the letters which have been appearing lately in *The Autocar* about the merits, etc., etc., of English and foreign cars. The bulk of these letters seem to me to be more or less of an attempt to cry down English makes. Had the aforesaid letters been written by men not in any way connected with the trade, and had they given both makes an extended trial before writing of their merits and demerits, then men like myself would have paid more attention to them. Instead of this they are written mostly by those who have "axes to grind." Criticism from private users of the Napier and Wolseley cars, in my opinion, would go much further with the average Englishman, who, like myself, is not an engineer, than would any amount of croaking by agents of foreign makers. I think the majority of the letters which have appeared would be yet unwritten had Mr. Edge failed in the Gordon-Bennett, or had Mr. Austen been less successful by half a dozen medals in the reliability trials. In the face of adverse criticism, however, it is as gratifying to see the amount of business being done at the Napier works as it is satisfactory to note the high output at the Wolseley works. The way the last named cars scale (good word that) the ascent of one in five on the Adderley Park track is highly satisfactory. I cannot see that the English makers are now losing ground, but they had a bad start.

J. T. CUMBERLAND.

[2865.]—With regard to Mr. D. M. Weigel's statement in your issue of the 7th March, "Ball thrust bearings—these were fitted to an old Mors car that I had in 1898"—these to my knowledge were used by Mr. W. Rowbotham for the same purpose in his motor car in 1895.

With reference to mechanically operated inlet valves, there have been common knowledge for many years, and were used by Mr. Rowbotham in his motor car engine in 1895. See *The Autocar*, Nov. 28th, 1896: "All valves are fitted with strong springs and are of positive action. I find vibrating valves absolutely unreliable, as they tend to throttle the engine, and the least bit of grit prevents them closing properly."

As regards easy access to valves and simple and light cylinder construction, I very much doubt if the construction No. 2, shown in the same publication of *The Autocar*, can be improved upon. I may add that we certainly did not get the methods of balancing the shock caused by the explosion from the Continent, as this was done by Mr. Rowbotham in 1894 and 1895, by exploding the charge between two opposing pistons, or firing the charge simultaneously in two opposing cylinders. This is now utilised by the makers of the cars most free from vibration on the market.

W. A. ZANTI.

[2866.]—Referring to the three letters which have appeared in your columns under the names of D. M. Weigel, D. Yzelen, and A. E. Cohen, all try to prove the demerits of British car construction, and Mr. Weigel's has a large number of statements in it which, if he can prove them by documentary evidence, will be interesting information for an English autocar paper.

His first statement in regard to my mentioning that the Napier car which won the Gordon-Bennett race was lower built than any foreign car in last year's Gordon-Bennett race is still, I contend, correct; perhaps Mr. Weigel will give the measurements of a car which ran in this race which was lower. As I said before, I claim no merit for this; but Mr. Cohen was pointing out the demerits of English cars, and mentioned that the height of the frame was one of their disadvantages, and as the English cars in the Gordon-Bennett race had lower frames than their foreign competitors, I thought it well to correct Mr. Cohen at the outset.

Re aluminium water jackets to engines: I notice Mr. Weigel does not know any other firm outside the Napier which utilises this system of construction. Obviously, it is not done in cheap cars because it is expensive, but I think the Mors cars are very fair representative Continental make, and when they won the Paris-Berlin race they used a separate water jacket made of aluminium as in the Napier.

Does Mr. Weigel also suggest that they did not use the same method of construction in last year's races?

The use of a separate copper jacket is evidently taken for the same reason that made Mr. Napier use aluminium, namely, the reduction of weight, instead of having a heavy castiron jacket—the ordinary practice abroad until Napier introduced an independent water jacket made of light metal, and which did practically no work except act as a vessel to hold the water round the cylinders.

Again, his statement re roller bearings seems to require a little proof, as I rather fancy he is confusing the Lemoine ball bearing axle with roller bearings. I quite admit that the ball bearing axle, on which he says he imperilled his life, did fail at times, but I never heard of a correctly designed roller bearing axle failing, and certainly a Napier roller bearing axle has never failed.

But after all said and done, it would be as well if my letter which is alluded to is correctly read first, as I never referred to roller bearing axles at all, as although they have their uses I should not generally recommend them.

I do not understand how Mr. Weigel can consistently take up the position that he does. I happen to be a shareholder in a company which receives the patent rights of everything made in Cannstatt, by De Dion-Bouton of France, and some other important Continental firms, and whenever these patents are discussed in England Mr. Weigel always says there is no value in them, and that all the ideas are old, whereas if his recent letter is correct the patents for the various points which he enumerates are owned in this country by a company which bought these rights, and therefore Mr. Weigel is using other people's patented rights without paying for them. This seems hardly correct.

He also puts forward as a Continental improvement direct drive on top speeds. Is it not a fact that the Napier car in the Paris-Vienna race or the Gordon-Bennett race of 1902, in the thousand kilos class, was the only car that had a straight drive from the engine to the back wheel without any loose pinions intervening or running round, and that this system of construction before the race was said by several to be only suitable for light cars? Napier was the first man who ever applied it to a powerful and heavy type of automobile.

Re Mr. Yzelen's letter: As the Editor has given so many examples of English and American features which the Continental manufacturers have copied, it is hardly necessary for me to say anything, but it is well that everybody should remember that the English law courts have held that the Universal float feed type of carburetter—without which nine-tenths of the present day motor carriages do not run—was invented and patented by Butler, an Englishman, in May, 1890.

In regard to Mr. Cohen's letter: There is really nothing to reply to except that he asks, "What work demands a car high from the ground?" Surely Mr. Cohen must be perfectly well aware that, if the motor car has to compete with the horse for work over moors or roads where there are deep ruts (and they are often found), unless a considerable clearance is allowed between the ground and the underworks, gear box, engine, etc., the car cannot be run.

Many Englishmen buy Napier carriages for this purpose, and the carriages are built to suit the particular work of the purchaser and are not merely copies of successful racing vehicles. I am certain that if your correspondent will think this point over he will agree with me.

S. F. EDGE.

[2867.]—Mr. Cohen, in his last letter, says that he objects to my suggestion that his former communication might be looked upon as an advertisement for foreign imported vehicles. He further says that he wrote from a purely impartial view. This I am glad to learn, and withdraw what he terms my accusation.

I am still of the opinion that he used a peculiar way of criticising Mr. Austin's letter, which was the cause of my writing in the first place.

What I meant by my reference to tubular frames was that the firm of De Dion and Bouton manufacture more cars for English use than any other foreign maker; and that as they use tubular frames, even from Mr. Cohen's point of view, our makers may not be far wrong in using frames of similar construction for similar uses.

Perhaps I may be pardoned if I was roused by the numerous opinions expressed to the effect that because English makers do not build cars on the same lines as

their foreign rivals they must necessarily be wrong. It was because Mr. Cohen's letter seemed to me to strengthen this opinion that I took the liberty of answering it.

As Mr. Cohen says, in another year we shall see whose principles are wrong and whose come out on top.

PATRIOT.

[2868.]—I have no wish to interfere in the controversy between Mr. Edge and Mr. Weigel, but it should be the particular care of the latter as the advocate of the foreign maker, in accusing the former of "forgetfulness" and "want of knowledge," to be sure of his own facts.

Mr. Weigel gives a list of seven improvements alleged to be originated by foreign makers which have been copied by English makers. The first two, "Mechanically-operated inlet valves" and "Hand regulation for mechanically-operated valves," were used by me on oil and spirit engines from 1885 to 1894, before the automobile period, and the first was in use on gas engines long before this time.

With regard to the third, "Self-generating ignition appliances," I had both oil and spirit engines in 1885 to 1887 ignited by a small dynamo driven by the engine.

No. 6, the so-called "Mechanically applied clutch," has been in constant use in general engineering, certainly for the last thirty years and probably much longer, many having the screw expanded segment similar to the De Dion.

It is difficult to see therefore why the English manufacturer should be grateful to the foreign maker, for if the English automobile maker has not, certainly the foreign maker has not "invented" these improvements.

It is very probable that the first time the hand regulated inlet valve was used on the automobile engine was on the engine I exhibited at the Stanley Show in 1894, and therefore invented by me.

J. D. ROOTS.

[2869.]—Permit me to supplement your list of "British or American inventions or designs which have been followed by Continental makers or have not up to the present been attempted by them" with the following: Four-cylinder engines, by the Daimler Company (early in 1898); self-starting and reversing petrol engine, by Dawson (in 1898); pneumatic brakes, by Dawson (1903); governing on throttle (1894), throttle control by regulating valve lift (1895), inclined steering centres (1895), direct chain drive from engineshaft to live axle (1897), oil-pad lubrication to chain (1897), crank centre in advance of cylinder axis (1897), one-piece live axle (1897—on traction engines earlier), and epicyclic change-speed gearing on engineshaft (1897), all by Duryea; and long wheelbase. I designed and built two frames for light steam cars giving 7ft. 6in. wheelbase myself in the spring of 1900.

HENRY STURMEY.

THE DE DION CARBURETTER.

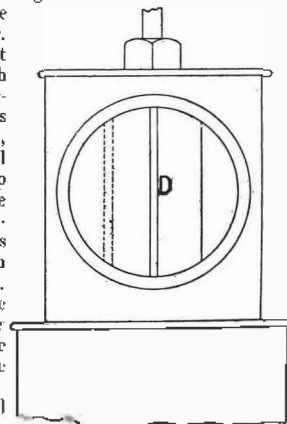
[2870.]—In reply to the letter from "8 h.p. De Dion" with regard to the petrol consumption with the "Viet" carburetter, I have found that thirty miles per gallon was the average consumption. When your correspondent says that the air supply is not variable, I presume he means that when the engine is running at normal speed one cannot give it more air than it will take, and it almost invariably takes the maximum supply.

A glance at the accompanying sketch will show what I mean. D represents the division or knife edge on the drum inside the upper mixing chamber, and is in the position which gives the maximum quantity of air.

All air entering on the right of D goes straight through to the motor. All air entering on the left of D goes down to the spray nipple, and is mixed with petrol vapour before passing up through the centre of the mixing chamber to the induction pipe, where it is mixed with the air which passed it on the right of D.

As the carburetters are sent out by the makers, it is not possible to move D more to the left than the centre of the opening.

If the carburetter is altered to allow of this (a simple



matter), it will be seen that when D is in the position occupied by the dotted line, more air will pass through pure to the motor and less will go down to be mixed with the petrol vapour.

I found that in this position the motor ran just as well at high speeds, and that the petrol consumption was less, that is, thirty miles per gallon.

I hope this will be of some use to "8 h.p. De Dion," and I must apologise for the length of this letter.

PATRIOT.

NON-SLIPPING TYRES.

[2871.]—I notice in last week's *Autocar* a reference to the Lovelace non-slipping tyres. I have had these fitted to my car, and had intended writing to give you my experience of them.

For some years now I have had these fitted to my bicycles; and their excellence was, I thought, sufficient warrant for a trial of them on the larger vehicle. Moreover, they have fully justified all the claims put forward for them by the maker.

If I am not trespassing too much on your space, I should like to give my experiences. In the first place, my object in purchasing a car was to have a vehicle to take the place of a horse and carriage. I wanted a reliable car for doing short journeys at a moderate speed, my chief aim being noiselessness combined with absence of vibration. After duly considering the various claims of most of the leading cars, I decided on getting an Oldsmobile, and eventually purchased a second-hand one, which had had but little use, and was practically as good as new. On a Saturday I drove it a few miles—in fact, this was the first time I had driven a car of any description—and all went well. I had no trouble whatever, either with the steering or the general control. The next morning, however, try as I would, nothing would induce it to start, and I spent practically the whole day trying one thing after another, yet all to no purpose. The Oldsmobile Company issue a most intelligent and instructive guide, at the end of which they state that they only make one sort of motor—"the motor that notes," but mine steadily refused to do so. On the Tuesday following I called in an expert, who at once located the cause in an exhausted battery, and on this being replaced by a new one the car went as well as ever.

That is some four months ago now, and during the interval I have driven the car over all sorts of roads and in all sorts of weathers without meeting with any trouble to speak of, and I think it only fair to the makers of the car to say that I would unhesitatingly recommend it to anyone in search of a simple, moderate-speed car.

The tyres are single tube, and for some time I went in constant dread of punctures—particularly as most of the roads hereabouts (Wareham) are covered annually with gravel or flint, which has to be gradually worn in by the users. Steam rollers are conspicuous by their rarity.

The tyres are smooth, and when the roads are dry nothing is lacking; but I soon discovered that on wet roads there was an appreciable loss of power, owing to the slipping of the tyres. Then Lovelace's treads occurred to me with full force, and since they have been on the difference is most marked. No matter how slippery the roads are these tyres grip, while as for side-slip, I now no longer fear it at all, as it seems as though nothing would induce them to move a hair's breadth from their proper track.

From careful timing over a noted distance, I found the car to be more than three miles per hour faster with the new tyres. This is, to some extent, explained by the larger diameter of the tyres, but this barely accounts for a third of the increase, and I can only conclude that a smooth tyre may slip somewhat even on a dry surface.

Whether suction needs to be taken into account I cannot say, though it sounds reasonable to suppose that there would be considerably less suction with a tyre which bears intermittently than with one which has a constant bearing.

Of course, another point which must not be lost sight of is the greater safety from punctures which this tread ensures, and the increased thickness must likewise add to the length of life of the tyre.

Any slip in the smooth tyres was especially marked when a heavy load was taken, and I always felt a little nervous in undertaking anything of a journey with four people up

Soon after receiving the new tyres I had occasion to take four people a distance of fourteen miles over roads none too good; and, as luck would have it, we faced a strong south-west wind. The road is a give-and-take one, with two or three moderate hills, the first three miles being through traffic, yet we did the distance in under the hour.

I have driven in several different makes of car. In some you could hear yourself speak; in others you could not, but in the Oldsmobile you can hear yourself whisper!

I trust this description does not read like a gratuitous advertisement of the Oldsmobile car and Lovelace's tyres. Anyhow, I think it is only fair that when one finds a good thing one should give others the benefit of the experience, especially when it costs nothing.

ARISTOPHAGIST.

FORECARRIAGES.

[2872.]—I am told that the forecarriages which are now being supplied for converting a motor bicycle into a tandem tricycle make the engine more sensitive to overheating, as the front seat or basket acts more or less as a wind shield, and prevents the engine from getting the best cooling effect. I already own a motor bicycle, and would much prefer a forecarriage to a trailer, but if the former has the practical objection mentioned I shall have to decide upon the trailer. Will any of your readers who have used the forecarriage be good enough to give their experiences upon this important question?

MOTOR CYCLE.

MOTOR BICYCLES AND TRAILERS.

[2873.]—With reference to the letter on motor bicycles and trailers in your last issue, No. 2844, I have been in the habit of using a trailer with my 2½ h.p. Excelsior motor cycle, and am glad to say that, instead of getting spoilt, my engine is now going better than ever. In all the machine has run 2,200 miles, a goodly portion of which was with the trailer, and at the present time I can travel twenty miles an hour on the level with the engine pulling twenty stones of humanity, apart from the trailer and its own weight.

RONALD H. SIMPSON.

CARS FOR MEN OF MODERATE MEANS.

[2874.]—On March 1st, 1901, I bought a twin-cylinder 6 h.p. Benz car from Messrs. Hewetsons, for which I paid £250. I used it till March, 1902, during which period I travelled 6,000 miles, including a run to Yorkshire and back, and several journeys to Worthing.

My repairs for that twelve months were: Refixing back tyre, 12s. 6d.; two brake blocks, 2s. 6d.; new cam, 4s. 6d.; total, 19s. 6d.

I have now completed my second year ending March 1st, 1903, during which time I have covered the distance of 6,500 miles, and the following are my repairs for that period: Two new back tyres, £5 13s. 4d.; one pair of chains, £2 10s.; one pair of sprockets, 12s. 6d.; one belt, 16s.; two brake blocks, 2s. 6d.; total, £9 14s. 4d.

This makes the total distance for the two years 12,500 miles, and the repairs for that mileage £10 13s. 10d.

My petrol, lubricating oils, grease, sponge cloths, etc., amount to just under £30 per annum, which, added to my repairs account, gives the following result: Distance, 12,500 miles. Expenses.—Repairs, £10 13s. 10d.; oils, etc., £60; total, £70 13s. 10d. Or just over 14d. per mile.

To these expenses should be added the rent of a stable and the wages of a man to clean car, but as these in no way affect the cost of the running, I have omitted them.

Likewise depreciation is a questionable amount, and I should say twenty per cent. would not be too high. On the cost of my car that would be £50 per annum, and the vehicle would then wipe itself out in five years.

Interest on capital I have not taken into account, as it is a small item in my case.

Now a word for the mechanism. The engine has not been touched by Messrs. Hewetsons since I have had it; all the repairs and adjustments I have done myself. I believe in doing no more to an engine than is absolutely necessary—a statement which is proved by the fact that one of my sparking plugs has done service for fifteen months without in any way being interfered with, but at the end of two years I was anxious to see what wear had taken place, so I took all the four valves out, and found the stems of the exhaust only slightly burnt, and those of the induction valves required cleaning. I ground

all four valves in slightly, and replaced them; the two sparking plugs I also cleaned up and replaced.

The crank brasses I have taken up a little.

The bolts that run through the rods that work the exhaust valves have worn, but not enough to require replacing, so I have bent the rods slightly to take up the play caused by the bolts wearing.

The countershaft I have taken entirely to pieces. The three ball bearing braces on which it runs were in excellent order, and only required a slight adjustment. On putting back the differential gear I was able to insert a washer as thick as a sixpence. This has had the effect of bringing it up tight to its work again.

The steering-gear I had to pieces, but this had not worn sufficiently to do anything to at present.

Having thus overhauled my machine, I am ready to start my third year, the result of which I will send you in due course.

In my opinion, the only method to find out if motor cars are really serviceable, reliable, and economical, is to buy a car and stick to it; only take care that your selection is made after careful inspection of the car, and not of the flowery advertisement.

FRANK WHINNY.

[2875.]—About this time last year I wrote to you giving the cost of running a motor quadricycle for one year, and as there has lately been considerable discussion and correspondence on the subject, I now enclose a statement of my costs taken over a period of two years (1901-1902).

On the whole my costs come out rather heavy. Firstly, because I am rather given to experimenting and trying new ideas and accessories. Secondly, I have been rather unfortunate with breakdowns, having had more than my due share. Again, I should have been money in pocket had I bought a quadricycle in the first instance with two-speed gear and water-cooled head, instead of adding them later.

I recently purchased a voiturette by a reputed maker, and hope to run it at a very little greater cost.

I also append the costs of running a motor bicycle for one year (1902).

	£	s.	d.
Quadricycle, original cost	90	0	0
Sundry fittings, spare gear, etc.	6	10	0
Sundry fittings not attached to machine	1	10	0
Additions to machine, including two-speed gear, water-cooled head, etc.	30	10	0
Repairs, including tyres	12	12	6
Two licenses	4	4	0
Petrol	5	10	0
Lighting, repair outfits, etc.	14	0	0
Lubricating	16	6	0
Cleaning and overhauling	2	15	0
	155	2	0
By sale of machine	£45	0	0
Accessories, spares etc., retained	5	2	0
	50	2	0
	2	105	0
Cost per year	52	10	0
Total distance travelled, 3,900 miles.			
Cost per mile, 3.23d.			
Motor bicycle, original cost	51	8	0
Accessories, original cost	3	18	6
License	15	0	0
Petrol	1	17	6
Lubricating and lighting	10	6	0
Repairs	2	9	0
	60	18	6
Estimated present value of bicycle and accessories	34	18	6
Cost for year	26	0	0

Distance travelled, 2,100 miles.
Cost per mile, 2.97d.

A.M.I.N.A.

DUCELLIER LAMPS.

[2876.]—Having seen two letters about the above, I think it only fair to state that I have found that any spare parts wanted were sent me by return, and that I have always met with the greatest courtesy. So satisfied am I with the lamps that I am ordering a set of five—acetylene and oil—for my new 12 h.p. Caentury.

H. STUART MURRAY.

[2877.]—In so far as my statement concerning spare parts of these lamps is concerned, I owe an apology to Mr. Godin. My repairer wrote in the first instance to a large firm advertising Ducellier lamps, and met with the reply stated. Afterwards he got the glass from Mr. Godin.

But on the point of "satisfactoriness," I think the Ducellier—an expensive, not necessarily a dear, lamp—falls short. In my six-guinea (or thereabouts) lamp, bought late last year, you cannot turn the water off from the carbide, and must empty the water each time you come home. You must also throw away all the carbide in the lamp, and put in fresh if you want to be sure of a light next time.

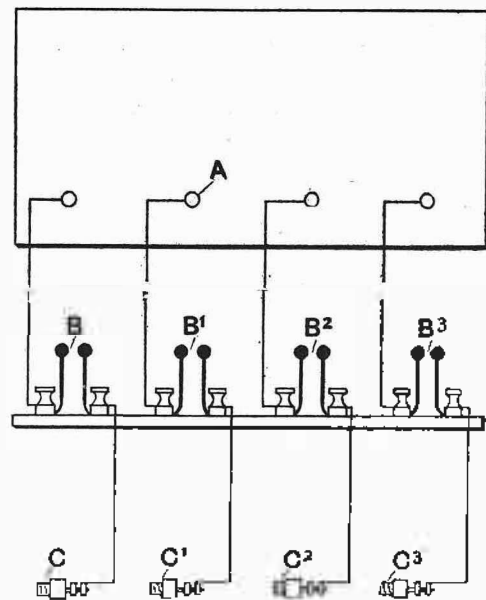
In some English varieties, I believe you can not only shut the water off from the carbide, but the gas given off from the moisture is stored for future use.

BOYLE LAWRENCE.

N.B.—Can any of your readers give me the benefit of their experience of the "Cox Puncture-proof Device" (made at Birmingham), and its effect on resilience and speed? My car is an 8 h.p. M.M.C.

THE EXTERNAL SPARKING GAP.

[2878.]—I have been very interested in the descriptions of the different methods adopted by several of your correspondents to produce an external sparking gap; and appreciating the advantages of being able to see the spark, with the assistance of my agent, I fitted a little apparatus—a sketch of which I enclose—on the inside of the dashboard of my four-cylinder (20 h.p.) Decauville car. With one of each of the four pairs of sparking gap terminals, as shown in sketch, connected to a secondary wire terminal on the coil, and the corresponding one connected by means of the usual highly-insulated wire to its proper sparking plug in one of the cylinders, a splendid spark passed across the gap between the balls and across the points of the plug; but the latter was not so strong, we thought, as when directly coupled up in the ordinary



A, accumulator.
B B' B'' B''', separate coils to cylinders.
C C' C'' C''', sparking plugs in cylinders.

way. I then removed a plug and completely filled in its own sparking gap with lampblack and thick grease, but the spark easily penetrated the grease, and was apparently as strong as when the plug was clean. To prove if this

good result was due to the external gap, I connected up in the ordinary way without the external gap, and then found that the spark went through the grease as well or even better than before. After this I disconnected the wire from the plug, leaving one end of the wire free and its other end connected to a terminal of the sparking gap, so that the secondary circuit was broken; and was surprised to find that sparking, almost as strong as before, continued between the pair of balls, and even when the wire was taken right away there was still a faint sparking between them. Thinking that perhaps it might make a difference if the gap was close to the plug, I purchased one of the attachments advertised for fitting on the terminals of sparking plugs, and then repeated the above experiments with a similar result. With the plug out of the cylinder, and held in the hand by the insulated wire connected to the sparking gap attachment, a faint sparking could be seen crossing the external gap, but none across the inner points of the plug; and with three or four feet of insulated wire attached to the inner end of the plug and held loose in the hand, with the other end entirely disconnected, a very strong sparking occurred at the external gap, but none across the points of the plug. Can anyone explain the cause of this?

From the above experiments, I have come to the conclusion that because there is a good external spark, with the gap either on the dashboard or at the plug, it does not follow that there is a good one or even any at all at the end of the plug inserted in the cylinder, and that instead of increasing the power of the spark it appears to me to be diminished by using an external sparking gap.

OTHO SHAW.

[2879].—In connection with the interesting letter (No. 2838) of Dr. E. Ground in your last issue, may I draw the attention of users of petrol cars to a "fire proof and visible spark gap," patented by Messrs. Hughes and Co., Cheltenham. Having seen this device in action and also subjected it to the most severe test as regards protection from fire, viz., by pouring petrol over it while the engine was running, I can with confidence recommend it.

DISINTERESTED.

Dr. Ground, whose letter (2838) was published on February 28th, asks us to state that the unpleasant experience he narrated with the Panhard spark gap did not occur on a Panhard car.

MOTOR FIRE ENGINES.

[2880].—You are under a misapprehension in stating, as you do in your number for March 7th, that Mr. Crowden "was undoubtedly the first one to produce the modern motor fire engine when he converted the Norwich Union's (Worcester) engine into a self-propeller."



The first motor steam fire engine designed and constructed in modern times was the engine of which we enclose a photograph herewith. This was sent to Port Louis, Mauritius, on August 24th, 1899. The Norwich Union engine was not converted into a self-propelling engine until the spring of 1901.

MERRYWEATHER AND SONS, LTD.

CLUB DOINGS.

The Irish Automobile Club. Annual Meeting.

The Right Hon. Horace Plunkett, the vice-president of the Department of Irish Agriculture and Technical Education, presided at the annual general meeting of the Irish Automobile Club, which was held on Wednesday last week at the Shelbourne Hotel, Dublin. Amongst others present were: Mr. C. G. Townsend, Mr. C. W. Hely, Mr. Guillemore O'Grady, Mr. R. J. McCreedy (honorary secretary), Mr. L. Strangways, Mr. C. J. Engledow, Dr. J. F. Cahan, Mr. P. T. Kiely, Mr. H. B. Hill, Mr. W. Sexton, Mr. R. Murdock, and Mr. J. H. Gainsbury.

The adoption of the secretary's report was moved by the Chairman and seconded by Mr. W. G. D. Goff. It showed a very substantial increase in the membership and a healthy financial condition.

During the meeting it was announced that the club had secured excellent premises at the Earlsford Terrace Skating Rink for the purpose of a garage and clubhouse for a period of three months from the 18th of June next, the premises being secured for the purpose of giving accommodation to the members of the club and their visitors during the period of the Gordon-Bennett cup race.

The election of officers resulted as follows: President, Right Hon. Horace Plunkett; chairman, Mr. W. G. D. Goff, J.P.; honorary secretary and treasurer, Mr. R. J. McCreedy, 2, Dame Court; committee, Marquis of Waterford, Lord Louth, Lord Plunkett, Mr. T. Talbot Power, J.P., Mr. Charles Wisdom Hely, J.P., Sir H. Robinson, K.C.B., Dr. J. H. Glenn, Rev. Hon. B. J. Plunkett, Mr. R. Murdock, Mr. W. Sexton, Colonel Chalonier Knox, Mr. E. F. James, Mr. R. H. Wansford, Mr. C. G. Townsend, Mr. C. J. Engledow, Mr. B. Barnett, Mr. F. Hall, Mr. Guillemore O'Grady, Mr. C. C. Veldham, D. L., Captain H. R. Langrishe, Mr. H. Goff, and Mr. E. C. Herdman.

The Yorkshire Automobile Club.

A pleasant run of this club was held on Saturday to the old-fashioned town of Wetherby. The meet was at Harewood, and at 3.30 the following members and friends attended:

Mr. Kirk, 12 h.p. Gladiator; Mr. Atkinson and party, 11 h.p. Clément; Mr. and Miss Armitage, 11 h.p. Clément; Mr. Bayliss, Sunbeam car; Mr. A. W. Dougill (honorary secretary), 8 h.p. Loidis; Mr. and Mrs. Winn, Renault; Mr. Wharam and Mr. Borland, 4½ h.p. Renault; Mr. Roslington and party, 9 h.p. De Dion; Mr. Milner Argyle and Mr. Hepper and party, 12 h.p. Belsize; Mr. Barton, Darracq; Mr. Bottomley, Boyer; Mr. Smith, Gladiator.

At 3.45 the party left for Wetherby, via the picturesque Harewood Avenue and Collingham Bridge, and afterwards enjoyed tea at the Angel Hotel.

The Sheffield and District A.C.

This club had a very enjoyable and successful run to Dunford Bridge on the 28th ult., seven cars, one quad, and two motor tricycles taking part. The club proposes holding a hill-climbing competition (open to members only) on May 16th, and entries are expected from a 50 h.p. Wolseley down to a motor bicycle. The president has offered two cups for two classes—cars and cycles. The hill selected is at Padley Wood. The club continues to make good headway, and one of its members has signified his intention of entering for the Paris-Madrid race.

Messrs. Kirsop and Co., 22, Pilgrim Street, Newcastle-on-Tyne, one of the oldest cycle houses in the North of England, are the first firm to open a front showroom for motor cars in Newcastle, and have commenced business in this line in premises adjoining their cycle depot in Hood Street. They stock the following makes of cars and cycles: Peugeot, Darracq, Oldsmobile, Raleigh, Bat, Quadrant, and Raglan, and are prepared to supply any make of car, either of English or foreign manufacture. Automobilists coming or going south will find this depot most convenient, as it is practically upon the direct road.

Flashes.

The King, it is stated, has given orders for the construction of a motor launch, to be used in connection with the Royal yacht Victoria and Albert.

* * *

L'Auto quotes some interesting figures dealing with the importation and exportation of automobiles in Belgium in 1902. From Germany eight cars value £1,025, from England three cars = £452, from France 104 cars = £15,695, from Holland eight cars = £808, from other countries = £1,040 were imported; while, on the other hand, Belgium exported to Germany thirty cars = £4,892, to England 118 = £29,880, to France twenty-two cars = £7,600, to Holland twenty-two cars = £3,400, and to other countries £600. Quoting from previous records, *L'Auto* says that there is a decrease of ten cars, but an increase in total value of £14,160 in exportation over the figures of the previous year.

* * *

A meeting of the newly-formed Motor Cycle Trades Association was held last week. The association was formed primarily to deal with the exhibition question, but it now appears to have temporarily dropped the subject, and to be devoting itself to the general interests of the motor cycle trade, though the exhibition question will no doubt be returned to, as the matter is too intimately connected with the welfare of the motor cycle industry for it to be long left in its present unsatisfactory condition.

* * *

A new type of body known as the Shrewsbury phaeton has been designed by Messrs. J. Rothschild et Fils. The aim of the design is to permit easy access to the back seats without hinging either the front or back; in other words, to provide easy entry from the sides to all the seats. There are several other special features in the body with which we shall deal later. Specimens of the new body will be shown by the British Automobile Commercial Syndicate on stands Nos. 52 and 53 at the Agricultural Hall next week. The makers have just taken additional premises at 45, Page Street, Westminster.

* * *

Major-General Sir H. E. Colville has been elected a member of the Motor Cycling Club.

* * *

The police are showing their activity on the main road from London to Cambridge and Newmarket, *viâ* Epping and Stortford; and motorists should be on the *qui vive*. We learn that a constable has even been provided with a bicycle and special uniform for the purpose of assisting him in procuring "cases." Several motorists have already suffered before a bench which we believe includes a magistrate who is himself a motorist.

It is stated that the Krupp Ironworks, of Essen, are embarking upon the manufacture of steam cars made under the Serpollet patents.

* * *

Mr. S. F. Edge, as president of the Motor Bicycle Club, has made a generous and commendable offer to that club, with a view to encouraging further improvements in motor bicycles. He has offered a prize value £20 to the member of the club who during the present year makes the most meritorious non-stop run of two hundred miles on a motor bicycle. The ride is to be performed in the presence of two witnesses, though how the competitor is to be kept under espionage for the whole of the course we have yet to learn. The success of the ride is not to be regarded from the point of view of speed, but from that of reliability. Doubtless the club executive will frame regulations by which these attempts can be satisfactorily checked and estimated.

* * *

The preliminary rules and regulations for the Glasgow to London non-stop trial promoted by the Western section of the Scottish Automobile Club were published in the *Automobile Club Journal* for March 5th. The run will be divided into two non-stop sections—Glasgow to Leeds, May 13th; Leeds to London, May 14th. Each car will be accompanied by an official observer, and the vehicles will be in the custody of the club during the stop at Leeds. All adjustments and replenishing will be deducted from the running time. One mark will be deducted for every minute during which the vehicle is at rest, except in the case of tyre delays, when one mark will be subtracted for each five minutes stopped. Entries can be made to the hon. secretary, Mr. R. J. Smith, 59, Vincent Street, Glasgow.

* * *

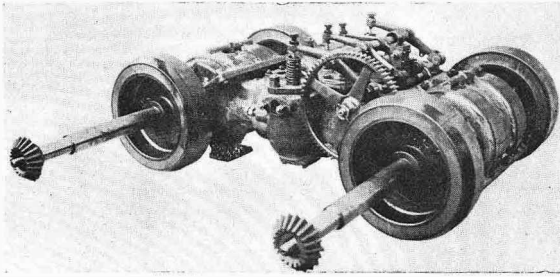
In an article discussing the question of engine position with regard to the motor bicycle, *La France Automobile* gives eighteen diagrams of different makes, fourteen of which are English!

* * *

The Marquis of Anglesea is now the owner of the famous "Gordon-Bennett" racing Napier car. The car, it will be remembered, was exhibited at the recent automobile show at the Crystal Palace along with a replica of the trophy. After the exhibition it was purchased from Mr. Edge by Mr. Chas. Jarrott, and now Mr. Jarrott has sold it to the Marquis of Anglesea. The Marquis is a keen sportsman and an enthusiastic automobilist, and it is just possible that when he gets used to feeling the throbbing forty under him, he may be induced to enter for some of the forthcoming races. He is having a light detachable tonneau made for the car, which at present only carries its racing body with two small scolloped seats.

"THE AUTOCAR" DIARY.

- Mar. 15.—"Paper. "The Motor Problem a Road Problem." By Mr. W. Rees Jeffrey.
- " 16.—Midland A.C. Annual General Meeting, Grand Hotel, Birmingham, 6.30 p.m.
- " 17-30.—Austrian Automobile Exhibition, Vienna.
- " 17-30.—Competition of Automobile Transport Cars, Vienna.
- " 18.—Manchester A.C. Annual Dinner.
- " 19.—Criticism des Transports Automobiles (La France Automobile).
- " 21-29.—Messrs. Cordingley's Show at Agricultural Hall.
- " 21-28.—Paris-Monte-Carlo Delivery Van Trials (1095 kiloms).
- " 24.—Nice A.C. Competition of Brakes.
- " 29-April 6.—Nice Automobile Week.
- April 10.—Cars must be ready for Eliminating Race for Gordon-Bennett Cars (British).
- " 11.—Competitive Test for Gordon-Bennett Cars (America).
- " 16-20.—Automobile Club de Touraine, Trial of Touring Cars.
- " 18-19.—National Sportman's Exhibition, Norwich. (Special Section—Automobiles.)
- " 25.—Scottish A.C. Meet of Eastern and Western Sections at Dreadnought Hotel, Callendar.
- " 27.—Society of Arts Lecture, "Mechanical Road Carriages." By Mr. W. W. Beaumont.
- * Automobile Club of Great Britain and Ireland fixture.



Back view of Bardon engine, showing separate crankshafts with bevel gear on each to drive clutch shaft. Both inlet and exhaust valves are mechanically operated by a single shaft.

We quite recently received from Messrs. C. W. Bluemel Bros., Crown Works, Globe Road, London, E., a particularly neat and serviceable little inspection and test lamp. It is one of the best articles of this kind we have yet seen. A four volt lamp is fitted into a cylindrical ebonised case turned out of boxwood. The lamp itself is held by a bayonet-jointed holder attached to the base of the box, so that the fitting of a new lamp is easily accomplished. The opposite end of the box is fitted with a bull's eye, which serves to diffuse the light, and at the same time protects the lamp from being broken by coming in contact with any of the tools when put into the tool box. A very convenient length of particularly good quality flexible wire is attached to the lamp, which, considering the quality of the material and the workmanship, is retailed at a very moderate price. We can strongly recommend it to the attention of motorists. The use of such a lamp for the purpose of testing an accumulator is sufficiently well known to need no repetition. It should be added that the test lamp takes slightly under one ampere of current per hour, so that its use for more or less lengthy periods does not affect the accumulator to such an extent as might be supposed.

To-day (Saturday, the 14th) an auction sale of motor cars is being held at the garage of the Firefly Motor Co., High Street, Croydon, and quite a number of well-known makes will be disposed of.

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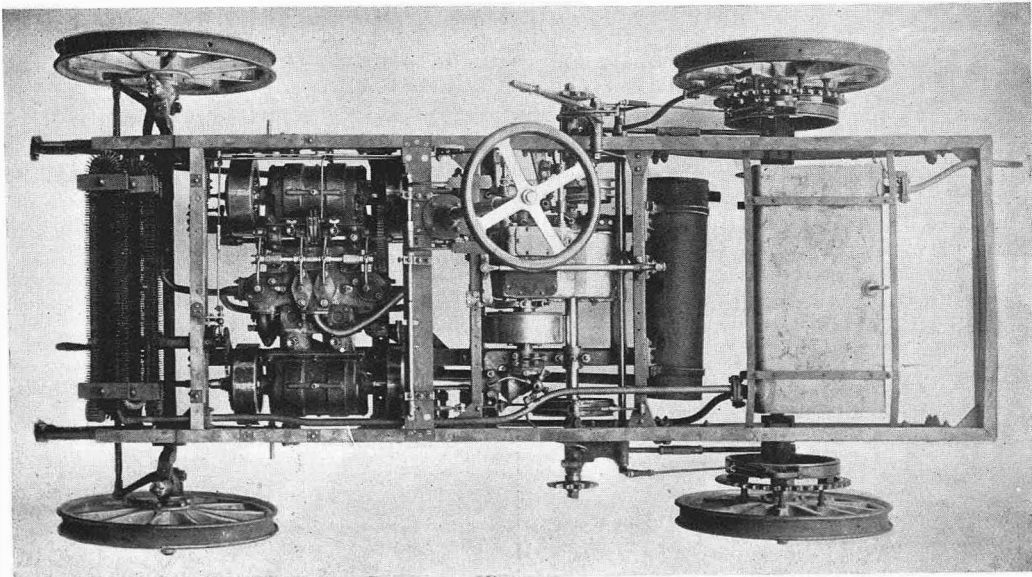
By the time these lines appear in print the first of the new Napier racing carriages will be out on the road. Mr. Chas. Jarrott, for whom the first car is being built, was hoping to be able to give it a trial run last week.

* * *

Discussing the Local Government Board regulations, a member of the Blackrock (Dublin) Urban District Council had heard of two people being knocked down by a motor car, *ergo* "all cars travel at the rate of thirty miles an hour, and ratepayers have no right to walk on the roads at all." Has not this councillor a word of protest against the pace at which the cars of the Dublin United Tramways run over certain stretches of the road in his district? We ourselves have timed these to do a rate only slightly below eighteen miles per hour.

* * *

We hear of a doctor, who, staying lately in a West End hotel and able to afford a new 15 h.p. Panhard car, jibbed most stubbornly at a wage of £2 per week for a chauffeur, or at paying a fee for being taught to drive himself. He desired to take the car by road to his home somewhere in the West of England, and argued with the agent from whom he proposed to purchase the carriage that, as he could drive a pair of horses, he ought to be able to steer an autocar—that it only amounted to pulling a few levers and turning a wheel. Should he remain firm in his intention, we should like to follow him at a respectful distance, say from the Alexandra Hotel to Hounslow, if he ever got so far. To paraphrase a time-honoured remark, "there are electric trams—on the Hounslow Road."



PLAN VIEW OF THE BARDON CAR.

This is an interesting machine in many ways, and is in several respects unique. The engine is horizontal, and is placed across the front of the car. The explosions take place between two pistons which work double throw cranks, a crank being on each side of the car parallel with the side frames. In other words, there are four pistons working in two cylinders driving two double throw cranks. The two cranks are connected by means of double bevel gear with the clutch or first motion shaft. This has the sliding gears of the change speed upon it, the fixed gears being upon the differential shaft, which is connected by outside chains to the road wheels. The engine is, of course, a very smooth running one, but the extra complication of the gear behind the engine is not an advantage, and as engines with single cranks can be made to run with the same freedom from vibration, we can hardly regard the extra complication of the engine and transmission as being warranted.

It is reported that Mr. Johnson, when he relinquishes his secretarial duties at the Automobile Club, will take up an important position with the British company which is being formed to make Darracq cars. His duties in connection with this enterprise, it is stated, will be mainly of organisation on a large scale—a work for which he has shown himself eminently fitted.

* * *

The amalgamation of two well-known businesses in Cheltenham will result in a firm being known as Saunders, Morgan, and Co., The Garage, 22, Clarence Street. The premises are fully equipped with a full set of tools for all necessary repairs, and general garage requirements are well provided for. A staff of skilled men is employed, and all the usual requisites kept. As one of the partners is an electrical engineer and the other a motor engineer, the enterprise should prove of considerable value to motorists in the locality as well as to tourists.

* * *

A very simple—so simple that it is not patentable—device is being introduced to the French public by L'Auto Palais, by which high-powered cars left to the tender mercies of mechanics can only be driven by these men on their first or second speeds.

* * *

Automobiles appear to be growing in use by the G.P.O.'s of all nations except our own. This is particularly the case in Italy, where self-propelled vehicles have given so much satisfaction in Rome that they are about to be put into service in Turin, Florence, Milan, and Naples.

* * *

Our friends across the Channel are considerably exercised over the proposal that petrol, like tobacco and matches, shall be made a monopoly of the State. If this is brought about, says *La France Automobile*, French automobilists will gloomily anticipate a period when the petrol vended by the Government will dispute with the State matches for pride of place as to inflammability.

* * *

The new 12 h.p. four-cylinder Gladiator is one of the best cars on the market at its price. We made a trial trip in one of the latest of these carriages to Brighton and back, and were immensely impressed by the sweetness and smoothness of its running. The four-cylinder engine is extremely well balanced and governed, and picks up the car on its fourth speed after slowing in quite a remarkable manner. The 12 h.p. Gladiator is a car which it is a pleasure to a skilled automobilist to drive, responding as it does to correct and judicious handling. Vibration is practically an absent quantity on all speeds, while its coasting in clutch is more like sleighing than car riding. With regard to the body, nothing could be more comfortable, and the tonneau is the roomiest we have yet seen on a car of this type. Although so spacious, it does not give the carriage a clumsy appearance. Indeed, the car looks class all over.

Prince Hatzfeld has ordered a 15 h.p. Panhard from the British Automobile Commercial Syndicate.

* * *

Mr. H. W. Bartleet, who took part in the 1,000 miles tour, and later contributed an exhaustive article on motor tyres to our columns, has now left Nottingham and taken up his residence in London.

* * *

Those interested in the question of mechanically-operated or automatic inlet valves will be glad to know that the new 20 h.p. Humber, which was exhibited in the Crystal Palace Show and described in some detail in *The Autocar* of February 7th, has been put through a series of most exhaustive tests by the makers. These tests have satisfied them that for large engines mechanically-operated valves are a distinct advantage. They have had the engine running at all speeds between 250 and 1,500 revolutions per minute, and tell us that even at the lowest speed the action is remarkably smooth and regular, and noticeably silent for an engine of the size.



The 12 h.p. Darracq which was exhibited at the Crystal Palace Show. This vehicle was bought by Mr. W. F. Parker, of the Oxford Cycle and Motor Co., and is one of the smartest cars in the Oxford district. It is finished in red and upholstered in morocco, and with its glass wind shields back and front, and storm curtains, is suitable for use in any weather. Its owner, who is one of the pioneers of motoring, and who commenced his riding experiences with a Bollee some six years ago, is at the helm. He has driven many kinds of motors in his time, and has covered thousands of miles without accident.

An unusual pronouncement on the question of speed was made by a Metropolitan police official who has been fined £5 at Kingston for driving at an excessive rate. He said the speed was not more than eighteen miles an hour, and no motorist kept within the twelve miles limit! And this from one who had driven the Archbishop of Canterbury; in fact, His Grace had travelled at the prohibited rate.

* * *

In reference to our mention of the "S.F." repair band in *The Autocar* of January 31st, page 136, the makers—Messrs. Stanley Feast and Co.—tell us that it is an advantage to solution the band to the tyre if it is to be used permanently. This, of course, is an obvious fact; but we did not mention it at the moment, as we were simply dealing with temporary repairs.

A very remarkable letter was sent to Mr. Lettis, of the Locomobile Co., a few days since, of which the following is a copy: "At the request of your guides we write to ask you not to use or make black goods, but those of curative colours. Black came into the world through evil agency, and is against the Divine laws. Your guides earnestly pray that you will help us in these important matters. Your faithfully, (Signed) SNOWDROP." We withhold the address of the sender, but may say that the writing is apparently in a feminine hand. We have heard this gospel before, but do not remember having seen it applied to autocars. It is perhaps unnecessary to enquire into the state of mind of a person who mixes colour with religion. Such topics are altogether outside our province.

* * *

In the ordinary way magistrates do not encourage amateur policemen, but when a motor is in the case their view is apparently apt to be different. Only last week at Epsom a farmer complained of the speed of a car which passed him in a lane, and although the driver of the car endangered no one upon the road, he was fined £1 and 17s. 6d. costs. We should like to ask the magistrates of Epsom whether the farmer at whose instigation the summons was issued is the same person who is locally known as a rabid motor hater, and whether he is the man who amuses himself by stopping every motor he can, and if he succeeds, uses improper language to the occupants of the car. Further than that, we should like to know whether any of the witnesses who substantiated his evidence as to excessive speed were in his employ, though this is immaterial, as everyone knows that the average farm labourer is not qualified to judge speed, and his evidence should not be taken.

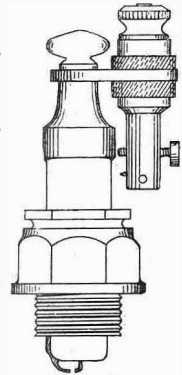
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If anything were required to demonstrate the comparative perfection to which motor bicycles have now attained, it is surely forthcoming in the success which attended the London to Brighton run of the Motor Cycling Club held on the afternoon of Saturday last. Although but ten members left Hyde Park Corner, those ten arrived at Brighton in good time; the journey, however, was performed over exceptionally bad roads. We have known the London-Brighton road for the last twenty-five years; but we cannot recall any occasion upon which we remember it to have been in a more evil state. The surface from end to end was about as holding and as slippery as it well could be, and the fact that the staunch little machines ridden brought their riders safely through was nothing short of wonderful. We followed the run throughout on a 12 h.p. Gladiator belonging to Messrs. S. F. Edge, Ltd., and excellently driven by Mr. E. A. Perman, so that we were able to note the behaviour of the machines throughout. No trouble was experienced, except for the mud which was thrown upon the belts, and which obliged some of the riders to dismount from time to time to clean them. It would seem necessary that more attention should be given to belt protection in the future design of motor bicycles if these machines are to be rendered quite effective for use in bad weather.

The Regal car which we illustrated in three positions last week was referred to as the 9 h.p. pattern. It should have been the 6 h.p. It is fitted with De Dion or Aster engine according to the purchaser's wishes.

* * *

Most motor accessory manufacturers and producers are vying with one another at the present time in the production of sparking plug external gaps. We have during the last few weeks drawn the reader's attention to many such devices, and the one illustrated (made by the United Motor Industries, Ltd.) is a further addition to an already lengthy list. The arrangement shown may be fitted to any sparking plug having an end screw, such as that shown in the illustration. The fitment itself consists of a brass plate to which a second brass pillar carrying an adjustable spark gap screw is fitted, and is thoroughly insulated from the bridge piece by means of a vulcanite bush and washers. To this post the high tension wire is connected instead of the sparking plug, as is generally the case. It will thus be seen that the current has to traverse the pillar, jump the gap, and to return and continue its path through the plug by way of the cap on the end of the sparking plug porcelain. The price of this fitment is extremely moderate.



* * *

Mr. George B. Batten writes as follows anent the Panhard spark gap, explaining in a manner comprehensible to the lay mind the reasons for the electric current jumping better inside the cylinder after its little practice leap outside. When a sparking plug becomes covered with dirty and charred oil, a conducting path - bad conducting path though it be - is formed between the wires of the plug, so that the secondary or high tension current of the coil is able to leak through this path without being put to the exertion of jumping across the gap provided for its most necessary leap. When, however, an outside spark is provided, the current, of course, cannot leak through the badly-conducting path, because for the moment the circuit is broken by the outside spark gap. Then surgings are set up by the great self-induction of the coil, until suddenly these overcome the resistance of the spark gap and the current jumps across with such intensity and such rapid oscillations that there is no time for them to leak away through the charred oil path, and so they vainly must leap the inside spark gap too. In fact, the current, instead of leaking continuously through the charred oil in a quiet way, gets through in "chunks," so to speak, and cannot help sparking. This is much the same as the difference between water being trickled out gently from a garden syringe and being forced out suddenly in a series of jerks. The spark gap, concludes Mr. Batten, has long been made use of in many other electrical devices. This being so, it is a matter for regret that profound electricians, fully aware of all its virtues, allowed us to suffer so long from greasy plugs, and left the boon of the outer spark gap to be made known to the automobile world through the observation of an engine tester.

A large garage has been opened at Worcester by Mr. J. Bladder, of 69, Sidbury. It will hold some fifty cars. The conveniences include an inspection pit, electric light installation, accumulator charging, and a good repair workshop. The proprietor is county agent for the Rex, Humber, M.M.C., and Locomobile cars.

* * *

A complete charging and lighting plant, in several sizes, is being put on the market by Messrs. J. C. Meredith, Ltd., of Birmingham. This consists of a petrol motor and dynamo complete with switch and resistance boards, the output being from ten amperes at fifty volts, or ten amperes at 110, up to twenty amperes at the same voltage.

* * *

We learn from the *Natal Witness* that a 4½ h.p. Stirling car recently made a trip from Durban to Maritzburg, a distance of seventy-three miles. This is the first occasion on which the road, a notoriously bad one, has been traversed by a motor car. The whole of the surface, with the exception of the last few miles, is one mass of boulders and slints. The stones—many of them as large as coal scuttles—constantly threw the clutch out of gear, causing considerable delay. Until the road has been completely overhauled, motorists will do well to give it a wide berth. The performance of the car under such circumstances may be considered highly satisfactory.

No. 1 of the *Motor Cycling Club Gazette* is an interesting little publication. It should do much to strengthen the club and cement its members together.

* * *

Mr. Watson, the well-known yacht-builder, is considering a design for a motor lifeboat. There are already four steam lifeboats on our coasts, but they can only be used at stations where there are harbours.

* * *

The Great Central Garage Co., Ltd., of 300 to 306, Marylebone Road, inform us that they have been appointed by Messrs. Ewart-Hall as licensed agents for the Charron, Girardot, and Voigt cars, and already one of these machines has been selected by Lord Effingham.

* * *

Some little time ago we announced that Mr. H. R. Kirk, of Leeds, had purchased the Napier racing car which Mr. Jarrott will drive in the Gordon-Bennett cup race. As Mr. Jarrott will be driving a De Dietrich in the Paris-Madrid race, Mr. Kirk has nominated Mr. Rowland Winn, of Leeds, to drive his Napier car in the latter event, and he will start No. 17. Mr. Winn is one of the pioneers of the Yorkshire Automobile Club, and Mr. Kirk has the greatest confidence in his skill, determination, and pluck, and is convinced he will do the machine full justice.



Mr. C. T. M. Nicholl, of Kobe, Japan, is the owner of a Duryea Surrey or double phaeton. It has excited the greatest interest among the goahead Japanese, and our illustration shows the car with a native crew on board.

LEGISLATIVE PROPOSALS.—NUMBERING REJECTED.

The Meeting at the Automobile Club to Discuss the Bill.

On the 6th inst. a meeting of the Automobile Club was held at 119, Piccadilly, to discuss the proposed legislation with regard to the numbering of motor cars and the removal of the speed limit. Only eighty odd members out of a total of 2,300 were present, this being due to the fact that the membership at large had been led to expect that there would be such a crowded house that many of them, particularly provincials, abstained from attending.

The Chairman of the club, Mr. Roger W. Wallace, K.C., first referred to the legislation which the club was taking up with regard to the Gordon-Bennett race, and expressed the pleasure it gave him to say that the Bill entrusted to the management of the Hon. John Scott Montagu had so far met with unqualified success, and it was now hoped that Lord Londonderry would undertake to pilot it through the Lords. He then turned to the draft of the Bill proposed by the legislative committee for the numbering of cars and the removal of the speed limit. He said the Bill was not Mr. Scott Montagu's, but the legislative committee's, and he hoped they would all agree eventually on the form the Bill should take, so that there should be no division among themselves, as they were not sufficiently numerous as a body to disagree about any policy which was placed before Parliament or the country. He invited discussion, but before this asked the secretary to read the report of the conference between the club committee and the legislative committee which took place on December 3rd. (This meeting was dealt with in *The Autocar* of December 13th, pages 395 and 396. We might summarise it by saying that the club committee, while it endorsed the action of the legislative committee in accepting the principle of identification of cars coupled with the abolition of speed limit, considered that before the formal assent of the club was expressed, certain assurances should be obtained that would do away with the numerous objections to the identification proposals.) Letters from members unable to be present were read, some for and some against numbering.

Earl Russell expressed the opinion that the members of the club had not had the question presented to them in quite a fair manner, for the proposals had been put forth as though they were assented to by the club as a whole, and before the members had had any opportunity of understanding the proposals or balloting upon them. He did not consider the paragraph of the Bill providing that motorists should have the right of appeal to the King's Bench Division against magisterial decisions was practical, and he criticised the apparently contradictory wording of it also. When it came to the question of identifying cars by numbers or by name, he was thunderstruck that the proposal was found to be put forward in the name of the Automobile Club. There were persons, especially the police, who would like to have cars numbered, but it seemed to him no reason why the club should father a proposition or go out of its way to suggest that such a burden should be laid on the shoulders of automobilists. The belief that if they did not introduce legislation the Government would do it, was not on a very solid basis, and he did not think any such action was sufficiently imminent to make it necessary for them to place their heads under the yoke. In all probability it would be at least five years before the Government would take the matter up. Now year by year and month by month prejudice was decreasing. Horses were getting more used to cars, farmers did not mind them so much, and the people who were once filled with prejudice against them were now driving cars themselves, or had relatives who owned cars. If they once put numbers on cars it would be twenty years before they could get them off again, particularly as they would be told that they themselves (automobilists) proposed them. The longer they waited the less intense would be the cry for legislation; the County Councils Associations themselves had altered resolutions made two or three years ago; they were changing, everybody was changing in their judgment on the question. They all knew, too, that on really fast cars the numbers would be illegible; apart from the speed, they

would be obscured with dust. If they must have identification a small plate with a number or with the name and address of the owner could be placed upon the car in an inconspicuous position, so that a police officer could assure himself that he had not been given a false name and address. He cited a number of other objections to the proposals into which we need not go, as they have already been mentioned several times in our columns, and he showed very plainly the annoyance to which automobilists would be exposed through the numbers being misread, as, although they might be able to prove an *alibi*, they would be put to the waste of time and expense of doing this. The speed limit was practically abolishing itself. In London they were allowed to exceed it, and in the country there were many parts where higher speeds were permitted. Already the Premier was an enthusiastic automobilist, and in another two or three years there would be many more members of the Government and Parliament generally who would also be owners of cars, and there would then be little difficulty in removing the speed limit, as it would probably die a natural death in the meantime. The right thing to do was to submit a ballot paper to the membership at large.

Mr. Midgley entirely endorsed Lord Russell's arguments, and mentioned how, through carrying a number in the 4,000 miles tyre trials, he himself had had to go down to Hertfordshire in November to answer a County Court summons, and defend the claim made for damages which were alleged to have been done by him in September, his identity having been traced by the number. It was true he won his case, but not till he had made three visits in all to Hertfordshire. He also referred to the bad effect that numbering would have on the industry, how it would stop the spread of the pastime owing to the objection which so many people had to numbering. Things were improving every day, and time was working in their favour, and it would result in the speed limit becoming an obsolete law, or in it being formally removed.

Several other speakers followed on the same side, and

Mr. Robert Todd expressed his opinion as a lawyer that the idea of suggesting numbering and obtaining the abolition of the speed limit as a recompense was more or less of a fallacy. The abolition of that limit was sure to come; in fact, they might say it was almost dead already, but if it was abolished to-morrow and some prejudiced official wished to prosecute an automobilist he might have him fined for driving furiously or to the common danger. There was no speed limit for bicyclists, and yet they had frequently been summoned for this offence. In short, if they gave in to the numbering they would get nothing substantial in return, and if it was once imposed it would be a very long time before it was abolished, and he offered a very strong objection to putting their necks into the noose. He pointed out the futility of several recommendations in the amended draft from a legal point of view, which may be summarised by saying that they were giving away their freedom by suggesting numbering without any assurance that they would get anything in return, and he therefore proposed that a vote of the whole of the membership should be taken by post upon the subject.

Captain Deasey seconded the resolution, and

Mr. Basil Joy asked whether he might not suggest the committee themselves had altered their views considerably since the legislative propositions were drafted in light of the alteration which had taken place in public sentiment since that time.

The Chairman (Mr. Wallace) pointed out that the views of the club on the subject were given three months ago at the conference between the club committee and the legislative committee on December 3rd. He added that the only reason the numbering proposals were put forward was on the plea of expediency. None of the members of the committee wanted them, but Mr. Walter Long had always insisted upon the necessity for identification, and had told them that a Bill would be brought forward by the Government itself if they did not bring in one, but they had recently been informed upon the highest authority that the Government did not intend to press the matter further at present.

Mr. Charles Jarrott could not help thinking the best thing to do was to wait till the Government brought in a Bill

to force numbering, and then to direct their full energies towards inducing the Government to remove the speed limit on the strength of their numbering proposals. He could not see they would have any gain by their present action. If the Government proposed numbering the whole of the automobile world would be united in working together for the removal of the speed limit. He was convinced that numbering would have a very bad effect upon the spread of automobilism; in fact, it might be regarded in the light of a national disaster owing to the serious setback it would give to the movement.

Mr. de Winton particularly emphasised the fact that the abolition of the speed limit would not free them in any way from prosecution in prejudiced districts.

Mr. Cohen pointed out the very real danger of the Bill as drafted by the club coming out of the House of Commons in a very different state from that in which it entered. It might mean that they would find themselves numbered, but with no abolition of the speed limit. It was all very well for the club to suggest a thing, but the Government were not waiting for their suggestions, and would amend the Bill just as they thought fit. As to the risk of the Government bringing in a Bill if they did not because isolated members of the Government or Ministers had suggested that it was going forward, they must remember that years usually elapsed before these matters came to a head. For instance, the Deceased Wife's Sister's Bill had been half a century under discussion, and had not yet become law, and there were many other bills almost as long delayed.

The Chairman mentioned the fact that the Local Government Board had authority without any further Act of Parliament to enforce numbering.

Mr. John Scott Montagu briefly sketched the history of the Bill, and admitted it was open to criticism, which he considered was in many ways beneficial, as it had already resulted in alterations. He dwelt upon the time which he, Mr. Firth, Mr. Knox, and Mr. Wallace had spent in debating how further safeguards could be introduced into the Bill. He had acted simply as the mouthpiece of the committee. He was loyal to their decisions, and would remain so. He was in the hands of the club to carry out its wishes. The appeal clause was, to a large extent, a tactical point; something they could waive if necessary. None of them knew how difficult it was to embody safeguards in an Act till they tried to draft them. He had been talking to the Prime Minister that afternoon, and Mr. Balfour had inferred that he did not think the Government could possibly take up the matter this session, while as to any private Bill on the subject that had a very small chance indeed, and he (Mr. Montagu) might sum up

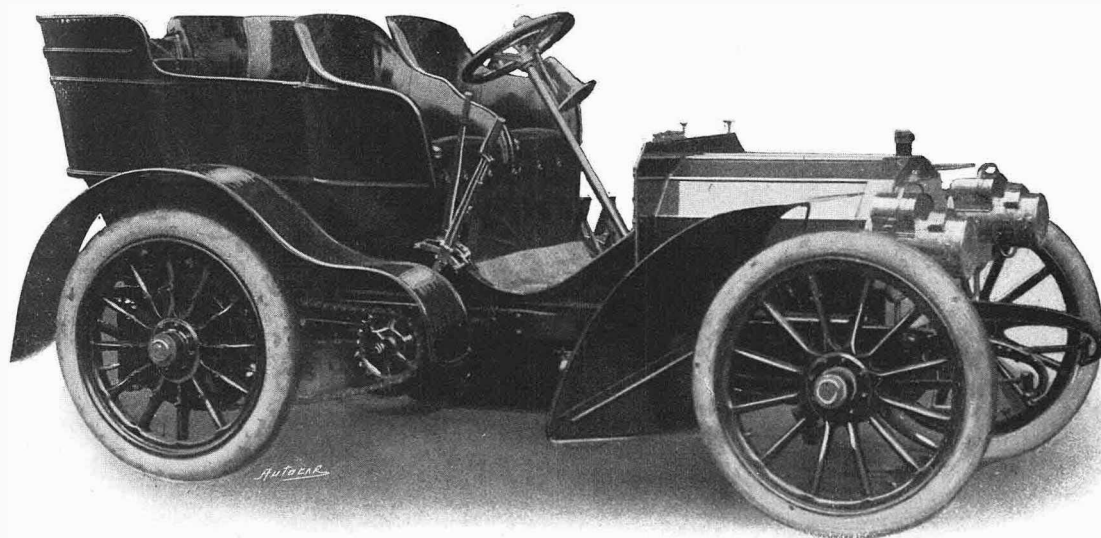
the Parliamentary position at the moment and the question as a whole by saying that they had to decide whether they preferred to leave things exactly where they were or would make an effort to remove the speed limit and give something, even the small numbers on the cars, which might satisfy their critics in return. He had been able to induce the authorities in his own county Hampshire to take an extremely reasonable attitude with regard to automobile driving, and if every county would take up a similarly reasonable attitude there would be no need for legislation.

Mr. Staplee Firth stoutly combated Mr. Todd's legal view upon the Bill. He dwelt upon the very wide powers the Local Government Board had in the Act. As it stood they could impose numbering if they wished. The one view of the club was to do what they could for automobilists, and to carry out the views they held. If it would satisfy the authorities he would prefer the registered certificate rather than numbering, which would have to be produced on demand from a police officer. He was glad to say the black sheep who had done so much harm to the movement were becoming fewer. He referred in terms of appreciation to the manner in which Mr. John Scott Montagu had pushed forward the Gordon-Bennett Bill, which was only drafted on the 10th February.

Earl Russell said he gathered from the speeches which had been made by those who upheld the Bill that no case had been made out for the moment, and it seemed to him the committee themselves began to feel that the situation was changing, and that nothing would be lost by waiting a little.

The Chairman shortly summarised the discussion, and said that the club as a whole would be asked to ballot on the matter. Divergent views had been expressed, and the questions which would be decided by ballot would cover them. First of all there were those who did not wish any means of identification at all, but who desired an increase of the speed limit. Secondly, there were those who wished identification to be given in consideration for the abolition of the speed limit. Thirdly, they had those who knew that legislation must come eventually, but thought it wiser not to do anything at present. He had always been in favour himself of letting the matter drift till they were strong enough to express their opinions, but it must be remembered that as the number of motorists became larger, so would the dust and other objections, urged against them by their opponents, grow and possibly prejudice would increase proportionately.

Mr. Todd's resolution was unanimously carried: "*That this meeting declares itself to be opposed to any proposal in favour of numbering or naming, and requests that a vote of the whole of the members be taken by post.*"



The present type of 20 h.p. Mercedes car, several examples of which were to be seen at the recent Crystal Palace Show. The car is of the 1902 type, as described in detail in "The Autocar" of May 10th and in succeeding issues. The particular machine we illustrate belongs to Messrs. Milnes-Daimler, Ltd.

RECENT DEVELOPMENT IN THE MODERN AUTOMOBILE.*

The Discussion on Mr. Sennett's Paper.

The Chairman (Sir David Salomons, Bart.) was grateful to Mr. Sennett for the interesting and instructive paper they had listened to. Contrary to the usual rule, he asked permission to say a few words before instead of after the discussion, as he was anxious to get away. If you took a locomotive of to-day and compared it with one of George Stephenson's time, and examined it in a fair spirit, you would find that there had not been one iota of progress. It was exceedingly remarkable that George Stephenson should have hit upon the right mechanical methods, which had never been improved upon to the present day. The locomotive of to-day was undoubtedly different in some respects, but the differences were due to diverse improvements on the principles then involved and to meet public requirements. If you looked at some of the earliest forms of petrol motors you would find that there had been enormous modifications, but the principles remained the same. He urged upon those who devoted their time and attention to road locomotion to improve what they had before them. Certain disadvantages referred to as existing in road carriages of to-day required improvement, especially the question of change of speed. One firm had tried to get over this difficulty by making an engine of large dimensions, that is, by increasing the number of cylinders instead of the usual four, thereby making it powerful enough to do the work required when running at an exceedingly low speed. He was afraid that this attempt would fail. Probably the coming fashion—if it were a fashion—was the electrical gear, but there they had the disadvantages of considerable weight and a vast quantity of wiring, and all knew that insulation tended to fall off under continued vibration. Certainly electric gearing had made a very considerable step in advance, and many of the disadvantages to which the lecturer had referred had past. There was one point to which he wished to draw attention. Up till then alignment had been kept by the rigidity of the frame. If the frame which carried the carriage, engine, etc., were made strong enough for the purpose, and sufficient flexibility given to the general alignment, it was very evident that a great trouble had been removed. If you had a flexible alignment your frame might get out of truth, but it would not signify, because your alignment, though still a little out of the truth, would practically produce no increase in friction. He had been a sufferer from what was known as back ignition, and a friend of his in Paris had bitten his tongue completely through by his machine back firing. He had written a paper in which he dealt with electric ignition, which would be published shortly.

Mr. Austin said he would like to give members some information on the subject of petrol motors. He thought it was very difficult at the present time to indicate the direction that design and manufacture of automobiles would take. He thought it was better to use a principle which was well known, and try and eliminate small defects, than to endeavour to revolutionise the industry. It was impossible to design anything so complicated as a motor car right off and have no difficulties and no trouble to overcome. Although manufacturers had looked askance upon the change-speed gear, he thought it had served a very good purpose. He felt it was bad, but it had obtained a result which everybody wanted—that was a flexible engine. They wanted an internal combustion engine, with the same amount of flexibility as a steam engine. If all the attention of designers were put upon the gear instead of the motor, he believed they would be working in a wrong direction. He instanced a car, say of 20 h.p., which would run through traffic and up reasonable gradients on the third speed, and if required to do a little speed the fourth gear could be used. Mr. Sennett had passed some rather disparaging remarks upon side chains, but it was difficult to see how they were going to get the same flexibility and the same directness of drive, and, consequently, the same efficiency, by any other means. A broken chain was very easy to repair—much easier than to repair a broken shaft. If chains were only treated properly, they would give much better results. He thought the chain a great advantage over the live axle. It was a very bad thing to make the dead weight on the axle, and on the tyres, greater

than was absolutely necessary. He thought that it should be a leading feature in car design to make the dead weight on tyres as little as possible. To have a live axle the weight must be very great, and sooner or later the axle would break or the wheel fall to pieces. With regard to an eight-cylinder engine as against change-speed gear, it meant greater complication and weight.

With regard to horizontal and vertical motors, while he thought horizontals were better, he believed it possible to build a good car with a vertical motor. With reference to electric ignition he had often been requested to make motors with two systems of ignition, but had always absolutely refused to do so.

Mr. Walter Hancock said the whole of his studies had been confined to steam carriages alone. Mr. Sennett had referred to a cable, and from the description he considered it was eminently suitable in effectiveness, and also in safety and durability. He was particularly struck with the suggestion that the petrol engine should be brought more into consonance with the steam engine by having a discharge and pressure on each side of the piston. That unquestionably is the weak point of the gas engine—that you only get one effort with four operations. There was a fourfold strain on the whole of the working of the engine, which necessitated more strength in the working parts than was necessary.

Mr. J. Lyons Sampson was quite of opinion that electrical ignition was the only one. He thought the idea of doing away with gear was a step in the wrong direction. He did not think the petrol engine could ever be made to compete with the steam engine as regards flexibility. In a steam engine when you lowered the speed of the piston the pressure upon it increased. In a petrol engine the opposite occurred. Not only was power lost but pressure as well, because the pressure on the piston of the petrol engine is very momentary unless the engine is revolving quickly. If you did not have a high piston speed you did not get the pressure over the whole stroke. By putting in cylinders the complications and weight were increased. Plenty of power was obtained with the third speed, but there were times when the other speeds came in very handy. If they were not always used it was a very good thing to have them there. As regards chains, he thought the chain was a very good, useful old servant, and he did not think the live axle was likely to supersede it for a considerable time. The chain gave considerable flexibility. He did not think a square shaft fitting into a square boss was a really mechanical drive. In the different cars that used that arrangement he had not seen a really perfect mechanical joint. There were a great many forms in use, but he thought they were a long way off perfection. The movement of the springs, and the variation in length between the axle and the engine, were very hard to provide for in a mechanical way that would work continuously and well.

Mr. Duncan had listened to the paper with very great interest, and had taken to heart many of the suggestions that the author had made. Being interested in the manufacture of motor cars, he was always on the look-out for a suggestion, and welcomed any that were worth working out. He thought the change gear now universally used was the best they had at hand. He fully agreed with Mr. Austin with regard to side chains. He had always looked upon a live axle as being a great source of trouble. The brakes a year and a half ago used to be a great source of trouble owing to rattle, but that was now done away with. Coolers were very costly to make and very fragile. A point they knew nothing about was would there be any deposit in the cooler, and that could only be shown after a certain amount of running. When he was first told of the eight-cylinder engine, he thought that the makers were dreaming. He would rather have a four-cylinder engine than a heavier one which would be only working on four cylinders, while the other four would be doing nothing.

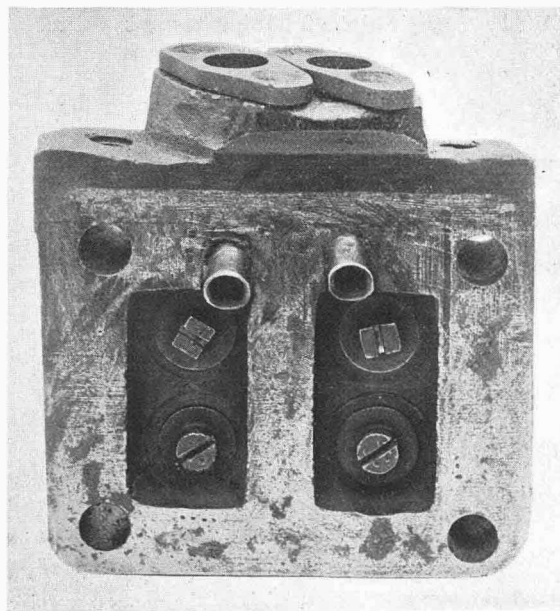
Mr. Swindley said that, speaking as a motor car driver, an amateur simply, and not as a mechanical engineer, with regard to the silencing of motors he did not want his car to be too silent. He liked to hear his engine snort a bit;

* A paper read before the Automobile Club of Great Britain and Ireland on 27th February, 1903.

it told him what it was doing. Speaking not alone from his own point of view, he had spoken to many men on the subject, and people generally liked to hear their engine. He considered electrical cars were far from being noiseless. There was an electric cab which came down his road at about midnight which woke him up regularly every night of the week. The motors might be noiseless, but the other part of the vehicle was as rattlesome as could be. He did not think the point of silent motors was one which should be insisted upon too much. He had a motor car, and he liked people to know it. If cars got so very noiseless, they would have the asinine law stepping in and hanging bells all round the car, and he would prefer the noise of the engine to the bells. He was very much taken with the high-tension wire that Mr. Sennett had shown them, and should like to ask him why the wire should be attached as often to the frame of the car as possible? With regard to chains, speaking as an old cyclist, they had a good deal of difficulty with their chains, but overcame it very largely by putting them into oil-tight gear cases. He had often looked at automobile chains, and thought how cruel people were to them, leaving them perfectly naked and exposed to the grit and mud. He did not see himself why dust-proof gear cases should not be made for these chains. It was done successfully with bicycles, and should be possible with automobiles. With regard to live axles, he had been driving a two-cylinder live axle car since August, weighing about 12 cwt., and making it go as fast as he possibly could. He had looked after lubrication, etc., and it seemed to him that it was perfectly satisfactory. He could get thirty miles an hour out of it on the level with an 8 n.h.p. engine. He had had no trouble with the live axle.

Mr. Sennett considered that the most valuable part of a paper was the discussion. He was pleased that they had had the benefit of Mr. Austin's and others' experiences. He was also pleased to find that none of them were very antagonistic to the views he had ventured to put before them. With regard to Mr. Austin's remarks, he was very pleased to hear him corroborate his view that the change-speed problem was in all probability to be solved by means of greater elasticity, or, as he put it, by flexibility of the motor. If your motor had plenty of power it could always be started on the third gear. That being so, four speeds with a powerful motor were absolutely unnecessary. They had got to that point, and as the power of the motor increased they would soon find that the second and the first and the third would go. The question was, what ratio ought the hill-climbing speed to hold to the top speed? He had suggested that it ought to hold some ratio less than a half. If your motor was built for thirty miles an hour, then the epicyclic ratio should be about one-third of that. He recently made a run in a carriage which had no change speed at all. They went up Shooter's Hill with a full load, and everything went off perfectly satisfactorily; but supposing they had stopped on the middle they would have had some little difficulty in starting. That was what made him say that to do away with the whole of the change-speed gear was unnecessary. They had not yet got the reversing petrol motor. With regard to side chains, Mr. Austin told them they broke, and that it was a nasty job to repair them. Still Mr. Austin thought they were useful things, and he was of the same opinion, but he hoped they would not live. Mr. Austin was a little severe on live axles. He remembered that Mr. Renault won the Paris-Vienna race on a live axle carriage. With regard to lubrication of the live axle, he had found it was only necessary to lubricate the box once a month. Every word that Mr. Hancock had said about the effect of explosion was practical common sense, and he was pleased, because it corroborated what he had said—that the sooner they got away from explosions and into slow combustion the better. Mr. Hancock mentioned that the strain on the crank pin was enormous, due to rapidity of explosions; and when they considered that with dynamite and gun-cotton the combustion was so rapid that it could not often wait to do damage in the direction it was wanted, but it positively did the damage on the solid block of steel; that showed the terrific strain which is thrown on the upper end of the cylinder, and the immense difficulty in equilibrating an explosion of that kind. Mr. Lyons Sampson was not very hopeful with regard to doing away with the change-speed gear, and he gave a correct scientific explanation, with which he thoroughly agreed. But his (the speaker's) re-

marks referred to sustained combustion, and he illustrated this by diagrams on the board. In his own experience he had not found much trouble with live axle lubrication, but with regard to the eight-cylinder engine, he thought that it possessed greater advantages than mere suppression of speed gear. For instance, with an eight-cylinder engine the diameter was so small that you could start it with ease. Mr. Swindley had said that he liked to hear his engine snort. He believed lots of them did, but, unfortunately, the public did not. Mr. Swindley's taste ran on the lines of the Frenchman who disliked above everything else a noiseless motor. Mr. Swindley had mistaken what he had said. He had not said a word about silencing the engine, but what he wished to draw attention to was to the silencing of the exhaust. That was the great thing, and he coupled with that a collateral advantage of that system of combustion using a very long cylinder and getting a very long expansion. If you expanded in your cylinder you did not want to expand in your exhaust-box. With regard to attaching the sheathing of the cable to the car, it was rather difficult to explain to a non-electrician, but he explained it this way. Suppose you were sending an electric message from here to America, you knew perfectly well that electricity travelled at 186,000 miles a second; therefore the time taken for the current to reach New York was negligible, but, nevertheless, the speed with which the messages are received is rather slow. The reason for that was that it took a certain time to fill up the core of the cable with electricity, so to speak. When you were using that sheathing for each alternation of the current of the core you got a corresponding inductive effect set up in the sheathing, and the interaction of those two was to strengthen the discharge and to get a bigger jump between your sparking points, and a fatter spark. But when you had done that you wanted to get rid of that, because for the next alternation it would act as a retarding factor instead of increasing the fatness of the next stroke. The consequence was that you put it to earth as quickly as you could, and the way to do that was to attach it as often as you could to the carriage. He concluded by thanking the members for the way in which they had received his paper.



While paying a visit to Mr. Crowden, at his Motor Works in Leamington, we came across a very interesting piece of mechanism in an old Woltmuller valve box which had been taken off an engine having a pair of cylinders each with a bore of 3½ and stroke of 4 in. The compression used was about 90 lbs. per square inch, and a particularly interesting point about this is that the valves were only ⅜ths diameter on the seats. Both the inlet and exhaust valves were mechanically operated, and were given a lift of ¼ mm. The ports leading to the chambers were 15 mm. diameter in both cases. It will be seen from the illustration that tube ignition is used. The valves, the ends of the ignition ports, and the glands for the ignition tubes are also clearly shown. The speed at which the motor runs is from 300 to 500 r.p.m.

THE GORDON-BENNETT RACE AND IRISH TOUR.

The Irish tour which will be promoted by the Automobile Club after the great race will be full of attractive items. It is too early yet to give the complete programme, but in addition to the hill-climbs and other interesting events, the directors of the Phoenix Park Racecourse Co., Ltd., whose grounds adjoin the Phoenix Park, where it is proposed to hold the speed trial at the time of the Gordon-Bennett cup race, have expressed their willingness to offer cups or prizes to the value of £250. to be competed for at a gymkhana for motors on their course. The Automobile Club has approved of the suggestion, and has asked Mr. J. Ernest Hutton to form a committee to make the necessary arrangements. There will also be the race for motor boats for the Alfred Harmsworth International cup, which has been presented by Mr. Harmsworth to the Automobile Club. The Marine Motor Sub-committee of the club are formulating the conditions in connection with the first race, but are not at present prepared to make a more definite announcement. The following decisions, however, have been tentatively arrived at: (1.) That the race shall be for motor launches not exceeding 40ft. over all measurement of hull. (2.) That there shall be no restriction as regards motive power. (3.) That all competing boats shall carry two hands, of whom the helmsman must be an amateur (to be defined hereafter). (4.) The race to take place in some sheltered water in the United Kingdom, probably in Queenstown Harbour, Cork, just after the Gordon-Bennett cup race, which it is proposed to run early in July.

We have received the following letters in reference to the above subject:

Sir,—I notice that a claim has been put forward as to who was the originator of the idea of holding the Gordon-Bennett race in Ireland, and also suggesting starting a fund for the improvement of the Gordon-Bennett route in Ireland. The first suggestion I heard for the race to be held in Ireland was from Mr. Cland Johnson, the secretary of the Automobile Club. He suggested that Ireland was the only possible place, either on the afternoon that I arrived in Vienna, directly after I won the Gordon-Bennett race of 1902, or else on the following morning when I went with him to the Austrian Automobile Clubhouse. The date would be the 29th or 30th of June, 1902.

The suggestion for the improvement of the Irish course emanated from Mr. Johnson, January 13th, 1903, when I was in Ireland inspecting the proposed course.

S. F. EDGE.

Sir,—I notice that Mr. S. F. Edge has placed himself and his car at the disposal of the Automobile Club to go over the Gordon-Bennett course and advise the club on the subject.

Whilst everyone must recognise Mr. Edge's public spirit, I fear it has not occurred to either Mr. Edge or the Races Committee of the club that if he is going to take part in the race his frequent trials of the course may give rise in the minds of foreign competitors to the idea that thereby he may obtain an unfair advantage over his foreign rivals who, I believe under the rules laid down by the club, are liable to disqualification if they go over the course before the race.

SPECTATOR.

Sir,—I think that some short time since I saw a notice in *The Autocar* that a hill-climbing competition would be held in the Co. Kerry immediately after the Gordon-Bennett race. I write a few lines to draw attention to the great suitability of the *Hill of Houth* for this pur-

pose. This hill is within eight miles of Dublin, and is easily got at (to suit the public) both by rail and electric tram. Every class of gradient from one in seven to one in thirty or forty can be obtained around this hill; also long or short inclines.

I may say, in conclusion, that a better-situated hill for testing cars on or more suitable gradients of all kinds it would be almost impossible to find. I need scarcely say that a great number more of the public would be able to see the cars tested on this hill *close to Dublin* than down in the Co. Kerry.

THOMAS L. PLUNKETT.

HODGSON v. SPEEDWELL MOTOR COMPANY.

In the Chancery Division of the High Court of Justice, Mr. Justice Farwell had before him on March 6th a motion by the Speedwell Motor and Engineering Company to strike out the statement of claim of the plaintiff on the ground that it disclosed no cause of action. Mr. T. Terrell, K.C., in opening the motion, said that plaintiff was Mr. Albert Edward Hodgson, of York, and the defendants were the company and Messrs. Hopkins, Gardner, and Leon Serpollet. The allegation in the statement of claim was that there was an agreement between the three last defendants and the plaintiff, dated the 18th of October, 1901, by which the plaintiff was to have the full and exclusive right to manufacture and sell and grant licenses to manufacture and sell in Great Britain and the colonies steam motors and motor cars made in accordance with the Gardner-Serpollet patents. In February last year plaintiff was asked upon what terms. Notwithstanding their knowledge of the plaintiff's agreement, they advertised in *The Autocar* that they could supply the motors, and had a stock in hand. The plaintiff thereupon issued his writ claiming an injunction.—Without calling upon counsel for the plaintiff, his Lordship dismissed the motion with costs in any event, being of opinion that there was a case to be reasonably argued.

FAILURE OF A MOTOR CAR COMPANY.

At the London Bankruptcy Court on the 4th inst., the statutory meeting of creditors and shareholders was held under the failure of the British Power, Traction, and Lighting Company, whose business consisted mainly in the manufacture of motor cars, against which a winding-up order was made on December 16th last. Mr. H. M. Win-earls presided. The Chairman said that a statement of affairs had been prepared as at August 27th last, the date when a receiver was appointed, at the instance of debenture holders. A total unsecured indebtedness of £28,906 was disclosed, and the debenture bonds amounted to £40,000. The assets were valued at £37,548, and were, therefore, insufficient by £2,450 to meet the claims of debenture holders. There was, therefore, nothing available for the unsecured creditors or shareholders. But in addition to the assets returned in the statement of affairs, the directors claimed an exclusive right to manufacture Gardner-Serpollet cars, and were of opinion that it represented a very valuable asset, in which case the prospects of the creditors and shareholders might be materially improved. A resolution was passed for the appointment of the Official Receiver as liquidator, together with a committee of inspection.

The editor of a prominent daily thus overlays a squeaking correspondent: "The J.P. who wrote the ridiculous anti-motoring letter that we print to-day represents a too numerous company of men who ought to know better, but who may be counted upon to obstruct any more or less new form of progress."

* * *

The Dutch Government have hired a large number of motor cars from Belgian and French manufacturers in order to carry on the postal service in case of a general railway strike. The cars will be accompanied by armed soldiers and gendarmes to protect them against attacks on the part of the strikers.

Answers to Correspondents.

QUERIES OF GENERAL INTEREST.

WORN BEARINGS.

Q.—I have a 6½ h.p. foreign car; it has cost me a considerable amount in repairs. The trouble has been the gear seems made of poor material, case hardened, and when the surface wears off, the gear wheels collapse altogether. However, I have replaced them one by one with the very best material; but now I find one bearing that takes the strain of driving will not last. I have replaced this bearing several times with the best phosphor bronze, but it wears away directly. I suggested cast-iron or a steel bearing; but am told such metal must not be put into a motor, so at last I decided upon a roller or ball bearing. This, I was told, would cure the trouble; but I see in last week's *Autocar* that they are looked upon by Continental makers as dangerous things. I should be very glad if some of your readers could give me some advice. Perhaps some have met with the same difficulty.—NOVICE.

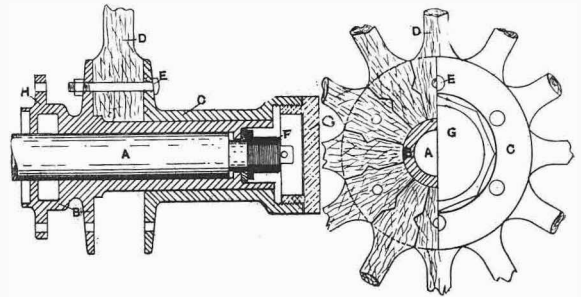
A.—As you do not state the make of car or its approximate age, it is rather difficult to understand the bearing to which your query refers; but we take it that it is the bearing carrying the bevel pinion of a gear-driven car. Unless very well designed and given ample measurements, these bearings are very liable to give trouble, wearing quickly, and creating a great deal of noise. Unless particularly well looked after, the bevel pinion is liable to override the bevel gear wheel, and cause a bad smash. This we ourselves have experienced. As we are more or less in the dark on account of the meagre particulars which you give, it is a rather dangerous thing to advise you; but we should say that the best bearing would be one made out of mild steel, case hardened, and ground to correct diameter. A bearing of this description, of course, would have to be well supplied with lubricating oilways, and, moreover, the shaft itself would have to be case hardened, otherwise the bearing would simply cut through the shaft.

ARTILLERY WHEELS.

Q.—I am much obliged by your reply to my question about artillery wheels, and I venture to trouble you further on the subject. It seems to me that motor wheels are built quite different from those for horse carriages; in the latter the spokes are driven into a wooden hub, but motor wheels seem to have a solid wooden ring, which is a part of the spokes. Would you kindly explain their construction?—C. B. B.

A.—The ordinary horse-drawn road vehicle wheels are constructed with a wooden nave or hub, into which the spokes are fitted by taper square shanks, suitable holes being prepared in the hub for their reception. The bearing is formed by a cast-iron box inserted into the hub. The artillery or motor car wheel is constructed on an entirely different principle, which will be better understood by reference to the drawing given herewith. In this, A A is the ordinary solid axle, one end of which is turned down and screwed to receive the keeper nut. At a convenient distance up, a boss is formed (not shown)

against which the hub bearing abuts. This bearing is formed by a steel casting B B, having formed upon



A A, stationary axle.
B B, steel casting forming the bearing and one flange of the hub.
C C, sleeve fitting upon and keyed to A, forming the second flange of the hub.
D D, spoke of wheel.
E E, bolt holding spokes in the hub.
F F, adjusting and locking nut.
G G, cap covering the end of the hub.

it a flange. The outside of the bearing is turned down, and over that fits a sleeve and flange C C. Both flanges are drilled with holes to come opposite alternate spokes of the wheel. For instance, the one shown is a twelve-spoke wheel for a light car. In this, the number of holes are six, as shown. The spokes of the wheel are formed with a taper, so that one lies close up against the other, and are further dovetailed into one another in the manner shown in the drawing. The spokes carrying the abutments of the dovetail are those through which the bolt passes. It will be seen that by this construction a very solid wheel is obtained, and that it is absolutely impossible to pull any one of the spokes out on account of the dovetailing of the one into the other. The bearing is lubricated either by means of a lubricator screwed into the hub and distributing the oil through channels cut into the bearings, or by filling up or oiling the end cap. The lubricant then works its way along the bearing, where it is collected in a well which is seen on the left-hand of the hub. The drawing depicts the ordinary type of plain hub bearing. Many makers are now fitting either ball or roller bearings to their hubs, chiefly the former.

SPARKING PLUGS.

Q.—Does it matter if the cement burns away in porcelain plugs? The Bristol Motor Co.'s head engineer told me it causes short circuiting under pressure. On the other hand, I am told that, as long as the porcelain is sound and the platinum points clean, the fact of the cement wearing away does not cause short circuiting.—J. T. H.

A.—The loosening and burning away of the cement in a sparking plug does not affect it with regard to short circuiting, as this can only occur when the porcelain is cracked. What does happen, however, is that the central wire becomes loose through having no support, and vibrates, sometimes coming into contact with its opposite point and short circuiting, at other times being too far away to admit of the spark jumping the gap. In both cases misfires, of course, result. So long as there is sufficient cement remaining to steady the central wire, the disappearance of a certain amount of it does not do any harm.

TUBE IGNITION.

Q.—I should be obliged if you could inform me when tube ignition was discarded on motor cars, and what firms originally used this system. Was flame ignition ever successfully applied? I shall be very grateful for any data on above queries.—L. W.

A.—Tube ignition began to be generally discarded at the latter end of 1900. It was originally instituted upon motor car engines by the Cannstatt Daimler Co., the origin of all the Daimler companies. The majority of motor car makers used this at one period or another, but all, without exception, have now abandoned it. Flame ignition, so far as we are aware, has never been tried upon motor vehicles, as it will be readily understood that it would be very dangerous if so used. It was originally used in the old slide valve Crossley gas engine, but it has long ago disappeared.

TYRE PRESSURE.

Q.—I have bought a compound pump with gauge to blow up the 750 by 80 Clipper-Michelin tyres on my 9 h.p. Darracq, 1902 pattern, which weighs about half a ton (I believe). I should be glad if you will kindly tell me the correct pressure for front and back wheels, average weight of four passengers thirty-three stone.—A.S.D.

A.—Assuming the weight to be equally distributed over the four wheels, the correct pressure would be about 50 lbs. to the square inch, but you should be guided by considerations. In the first place, the car should be run with the front wheels only on a weighbridge, and the weight taken with its ordinary load, and then the back wheels should be similarly treated. Then the car should be weighed complete. The back and front weights should total the same. You might then give the same proportion of pressure, *i.e.*, probably the back tyres would want about 60 lbs., and the front about 50 lbs. At the same time, you should not take these as arbitrary. If you find that the pressures named are insufficient, give more. As a good rough test, take the spokes of the wheel and move them to and from you. If the tyre rolls materially under this treatment, you will know what more pressure is wanted.

ELECTRIC IGNITION.

Q.—Would you be good enough to inform me what is the most suitable voltage for the high tension current for motor car ignition? Also, what is the best method of testing the insulation of sparking coils?—CAVENDISH.

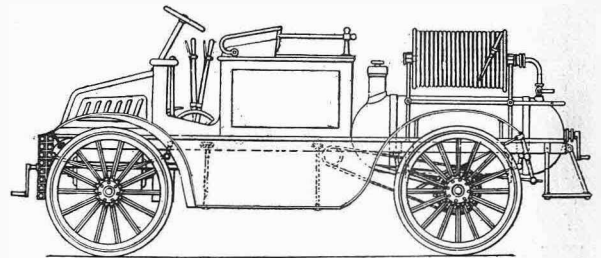
A.—The most suitable voltage for the high tension system of electric ignition with the ordinary induction coil is forty-four volts, and most coils are made to work at this pressure. You cannot carry out any satisfactory tests on a sparking coil without taking it to pieces. It is far better to buy a good coil and trust to the makers to having tested each winding for correct insulation. When the insulation of the wire breaks down internally, it is frequently denoted by a loud ticking sound caused by the spark jumping from one winding to the other through a break in the insulation. Because a coil gives a

slight ticking sound, it should not be taken that it has an internal leak, as this is also due under certain conditions to the discharge from the condenser of the electrical energy stored therein. We should not advise you to take the coil to pieces; rather put it in the hands of a good electrician if you are in doubt as to its efficiency.

TO CORRESPONDENTS.

We publish a selection from time to time of the questions we receive and our replies which are of general interest; the others are dealt with by post. Correspondents are asked to be good enough to bear in mind that they should write on one side of the paper only and should send a stamped addressed envelope for reply. Information as to how to address letters will be found below.

Our thanks are due to the following correspondents for letters, items of news, various topics of interest, or photographs. These will be dealt with in due course, and, when possible, published. In the meantime, the senders will kindly regard this as an acknowledgment: E. G. T., W. T. Warne, H. W. Bartleet, P. L. R., A. G. Moffat, and A. S. H.



Last week we mentioned that Mr. Crowden, of Leamington, had secured an order from the Leicester Corporation for a motor fire tender and chemical engine. The above illustration depicts the design for this vehicle, the drawings of which were placed at our disposal by the maker.

NOTICES.

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