

THE AUTOCAR

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

EDITED BY H. WALTER STANER.

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THE AUTOCAR.

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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.

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Messrs. Gordon and Gatch.

Notes.

The Motor Cycle.

As our readers are aware from the announcement which was published last week, we have decided to produce a paper dealing wholly and solely with the motor cycle and matters appertaining to it. Owing to the growth of the motor car movement and the consequently numerous claims upon our space in connection with it, we have found it impossible for

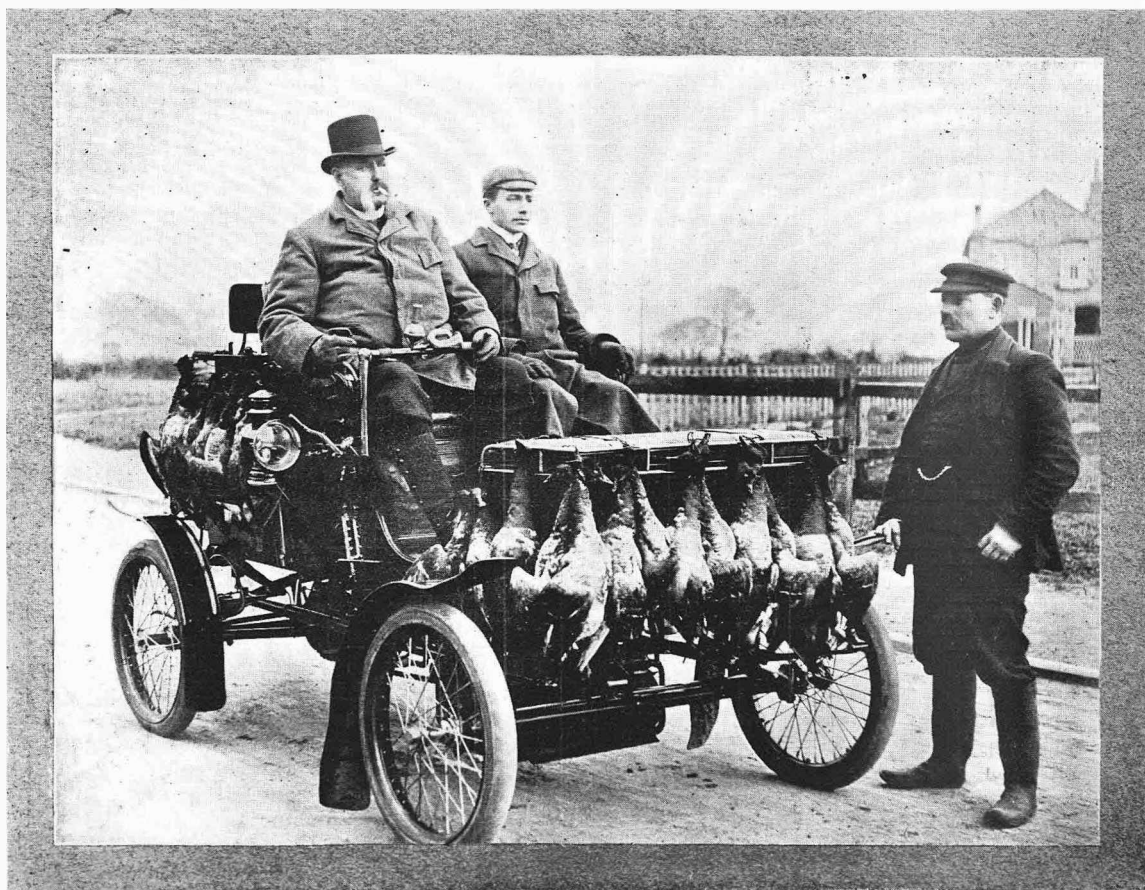
some time past to give the attention to the motor cycle which it undoubtedly deserves. While the motor movement was young we were able to cover it fully, and to give a fair proportion of our columns to the motor cycle, but as time went on the car absorbed so much space that it was impossible to avoid more or less neglecting the cycle branch of the pastime. Not only so, but the two recreations are widely separated by financial considerations. The motor cycle is so much cheaper, both in first cost and maintenance, and the gap between cars and cycles increases daily. The motor cycle is a machine to be ridden, and the car is one to be driven, and this again opens up a wide difference between the subjects of interest to the two classes of users. While it is true that there is much in common between the two forms of locomotion, it is equally certain that the motor cycle pastime demands a great deal more attention than it is possible to give it in the columns of *The Autocar*, and we have had so many requests to devote a journal entirely to the motor cycle that we have not hesitated to establish the new paper, *The Motor Cycle*, the first number of which will be published on Tuesday next, the 31st inst. The great aim of the new paper will be to foster motor cycling in every possible way, and a particular feature will be made of exceedingly clear descriptions of the internal combustion engine and its working, while ignition and other matters will be treated in such a manner that it will be extremely easy for the novice to follow them. In other words, the endeavour will be to make *The Motor Cycle* as indispensable to the motor cyclist as *The Autocar* is to the autocarist.

The Show.

As will be seen from the report which appears in another part of the paper, the statements made in advance as to the success of Messrs. Cordingley's exhibition at the Agricultural Hall have been in no way exaggerated. That is to say, the Agricultural Hall is as full as it can well be, and the number of exhibitors is greater than has ever been known before in a British exhibition. It is true that the firms exhibiting accessories are very numerous, and that a number of the exhibits are unimportant, but there is no denying the fact that the show as an exhibition is a great success. Of course, some prominent makes are entirely absent from the show, as their manufacturers had determined to take part in one show only, the most conspicuous of these absentees, perhaps, being the Daimler, De Dion (except a few 6 h.p.'s shown through agents), Napier, and Wolseley. Several other well-known makes are not directly represented, and a car or a couple of cars exhibited by an agent are the only evidences of their productions. Another noticeable characteristic is the ab-

sence of chassis. The Crystal Palace show was very strong in these, but comparatively few are shown in the Hall. Speaking broadly, we may say that, while the Crystal Palace show was unquestionably a finer one so far as cars and chassis were concerned, the Agricultural Hall exhibition is stronger in accessories and comparatively small exhibits in which one or two cars only are shown; in fact, the agent is much more strongly represented at Islington than was the case at the Palace. No comparison can be made between the two buildings, but we must congratulate Messrs. Cordingley on the manner in which they have made the very best of the Agricultural Hall. Decorations relieve it from gloom as much as possible, and the illumination at night is brilliant; in fact, there is the largest demand which has ever been made for current in the history of the hall as a show building. Concurrently with the show has come the announcement that the Stanley Club has decided not to hold another exhibition at Earl's Court, but to confine their attention wholly and solely to the cycle and motor cycle show which they

run so successfully every November. It is scarcely likely, when the circumstances are considered from all aspects, that any other body will attempt to start a third show, and, this being so, the field appears to be left open to the Crystal Palace and Agricultural Hall exhibitions only; and it remains for the members of the industry to make up their minds whether they will support one or both, though, in the light of previous meetings and discussions on the subject, it seems doubtful whether they will decide on a common course. In other words, the two shows are apparently certain to be held next year. Looking upon this as a recognised fact, it would seem the wisest plan would be that the interval between them should be as great as possible, and the Crystal Palace should be as early as may be. However, there are also the cycle shows to be considered, as both the Stanley and National are held in November. Some exhibitors have actually taken part in the National Show in November, the Earl's Court in January, Crystal Palace in February, and the Agricultural Hall in March.



The above illustration is made from a photograph which represents Colonel R. P. Davis, late of the Indian Army, on his Locomobile Touring Car on his return from a day's sport in his steam launch after wildfowl off Brightlingsea. Colonel Davis is an enthusiastic sportsman and motorist, and, like all good automobilists, enjoys driving his car himself. He purchased a Loco Surrey from the Locomobile Company of Great Britain some two years ago, and has lately bought one of the same company's 10 h.p. touring cars, with both of which he has expressed himself as well pleased. Colonel Davis is High Sheriff of Essex, a Justice of the Peace for the same county, and represents the Walton Division of Essex on the County Council. On his Touring Car he can cover from 45 to 50 miles on one tank of water owing to a superheater he had fitted to his car by the makers, and it can carry enough petrol for 100 miles. The car is fitted with steam, air, and water pumps, and has an attachment for inflating the tyres by steam power. Col. Davis finds he can easily travel from 25 to 30 miles an hour, but he prefers driving at about 10 or 12, so that he can enjoy his cigarette whilst on the road. His car is also fitted with commodious back seat and tool box, so that, if necessary, he can carry five friends besides himself, and should any small mechanical derangement happen he has his tools and spare parts with him for repairs.

Numbering Propositions.

At the very successful annual dinner of the Manchester Automobile Club, held last week, several speakers expressed themselves adversely to the numbering proposals; in fact, it is difficult to come across any gathering of automobilists large or small in which adverse opinions concerning numbering are not expressed. We have heard a good bit lately about the prominent legislators who are strong believers in identification, and, as was pointed out in our columns last week, it has even been asserted that certain important people will resign the Automobile Club if it should drop numbering as an article of its propaganda. This would be a pity, but at the same time we think the movement would survive the loss, if, indeed, any support worth having were lost in this way. But this is not the only evil which is prophesied. It is also inferred that the sympathy of the Government will be alienated if the club no longer thrusts numbering under its notice. This is, perhaps, an even more childish statement than the veiled threat concerning the resignation of one or two unnamed personages, as everyone with the least smattering of knowledge of Parliamentary affairs is well aware that the people who are always the best treated are those who give the Government the most trouble. Those who bend the neck, and who point out how moral they are, and who implore new legislation to force them still

nearer to perfection, are the people on whom every Government, irrespective of party, falls unmercifully. There is no need to labour this question, as it is so well known. The moment it is pointed out everyone will recognise it as a thing which has been proved hundreds of times over, and of which numerous instances have been found both in and out of Parliament within very recent times. As we have said before, we are convinced that automobilists will gain more by asking for what they really want than by endeavouring to wrap up their requirements in those which they fondly believe to be disguises loved by the powers that be. Probably, undue weight will be placed on two or three questions which have been asked in the House within the last week about identification, but there is really very little significance in these questions or the replies which have been made to them; precisely similar questions with the same stereotyped answers have been given in more than one session previously; in fact, there are even those who suggest that the questions which have been put lack spontaneity, but into this we need not go, as it in no way affects the issue. The only safe policy at the moment is to wait till the Government moves. Already Mr. Galloway has become an automobilist, and soon the motor party in the House will be stronger than the anti-motor, if, indeed, this is not already the case.

According to a most scientific disquisition in our most excellent contemporary *La Locomotion*, the greatest care should be taken to avoid the contact of oil with mica when the latter is employed as an electric insulator. According to certain careful experiments, it has been found that the contact of oil considerably lessens the insulating properties of the mineral. A plate of mica, which resisted an alternating current of 16,000 volts when dry, allowed leakage of a current of 9,000 volts after it had been soaked in paraffin. In another experiment, wherein the mica plaque resisted a current of 8,000 volts, the same plaque fell a victim to 4,000 volts after it had been soaked in the oil. The same results were observed after the mica had been treated with ordinary lubricating oils.

* * *

As many of our readers are aware, the Mayor of Southport is an enthusiastic automobilist, and has been motoring through France in company with Mrs. Scarisbrick. One can hardly credit, however, that his experiences have been as exciting as the narrative contributed by a provincial journalist suggests. This scribe appears to have allowed his imagination and better judgment to run away with him, and when a slight mechanical defect is transformed into "The Mayor's Motor Smash!" the double attempt to imitate the yellow journalism of our Transatlantic brethren and to discount motoring generally is too palpable.

The Tottenham District Council has resolved to purchase an automobile fire-escape and hose tender.



A striking illustration of the supremacy of the motor in times of danger took place last week. On the occasion of a fire at one of the Leamington schools, delay arose in getting out the fire engine. The telephone call for horses not being readily responded to, Mr. C. Crowden, whose motor works are near the fire station, attached his 6½ h.p. hack Daimler (which has been running upwards of five years) to the engine and speedily towed it to the conflagration, arriving at least fifteen minutes earlier at the scene of action than if the horses had been waited for.

Last week, in summarising the performances of the cars in the recent consumption trials in France in the classification giving consumption per kilometre ton, the 10 h.p. Chenard-Walcker cars were mentioned as voituresses, though it was obvious from the weights that the winners of the voiture class were fully qualified for that category, inasmuch as they were four-seated carriages weighing 1,170 and 1,200 kilogs. respectively.

USEFUL HINTS AND TIPS. On Driving a Car.

(Continued from page 339.)

Driving backwards must be essayed carefully, and thought must be taken to press the clutch well out before moving the gear-striking lever from the free to the reversing notch on the sector. It, of course, will be recognised that we are discussing a car on which all the speed-changing is performed by the movement of one lever. When an auxiliary lever has to be actuated to strike the reversing gear, then care must be taken to leave the forward striking gear lever in the free notch on the sector before the reversing lever is touched. Now, with clutch pedal pressed well down, move lever so that the trigger drops into the reverse notch, and, keeping your foot firmly upon the pedal, turn partially round to the right in your seat, so that you can look square out of the back of your car over the centre of the tonneau door. In this wise, you will find it much easier to handle and steer your vehicle to a nicety when running astern than if you merely turn your head and look over your shoulder. To steer well rearwards in the latter way will come later and with practice; but in your automobile salad days keep a square look-out aft. So—now let your clutch in gently, gently, and as the car begins to go astern ascertain just the amount of helm it is necessary to give it for any desired movement. As your body is turned to the right, you have only your left hand for the wheel, but this will not be found difficult after a few trials. The novice is strongly advised to select a wide and deserted stretch of road, and to practise reversing and steering backwards until he has fairly got the hang of the effect of his lock when going backward. When you have travelled back to the desired position, do not fail to declutch, and if you are going to stop move your gear lever to the free notch, or take your reversing gear out with your reversing lever if your car is so fitted.

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Driving in and out of the coach-house or stable may give the novice some concern, and in this connection we would strongly urge that neither in coming out nor going in to such shelter should the tyro proceed on any other but his first speed. It is because cars have so frequently to be backed out of their shelters that we have already urged the novice to practise steering backwards. Whether he will go into his motor-house backwards and thus leave his vehicle in position to come straight out, or the reverse, must depend altogether upon circumstances; but if there should be a drop into the stable of sufficient gradient to allow the car to run down by its own weight, we should advise him to drop in gently backwards, with clutch out and foot on brake pedal, for it is less troublesome so to steer the car than to drive out backwards up a slope. The writer's own stabling is so situated, and having on one occasion devastated a flower-bed and on another removed the cap from a brick pillar, he now rolls in backwards, and drives out.

x x x x

Now, when the drive is over and the car is to be put away, the man who wishes to keep all things in order and ready for an immediate start will devote a little time to replenishing with lubricating oil and

spirit. As soon as the engine is stopped, and the car is housed, lift the motor bonnet, and with your paraffin oil can give your pistons two or three good squirts of paraffin through the taps in the combustion chambers provided for the purpose. If your engine is innocent of these fittings—and, we regret to say, too many of them are—unscrew your sparking plugs and dose through the ports. The latter method, of course, is somewhat troublesome, but it pays. Some people will tell you to use petrol, but we prefer good paraffin. The effect of petrol in loosening the piston rings vanishes in a very short time, and if your car remains unused for a day or two the engine will not turn so easily when you come to start it up. Before turning off your compression taps, or replacing your sparking plugs, turn the engine round several times by hand. This will cause the paraffin to cleanse the cylinder walls and rings. Fill up lubricators if they require it, and charge both your petrol and water tanks, being careful afterwards to screw down cap and vent screw on former tightly. Do not leave your switch on! If you do, you may find your accumulators run down when you next desire to drive. If you have time at your disposal, it is well to make a careful survey of your car, and to see that no nuts have worked loose and that no bearing has run hot. Further, if you have any respect for your paint and upholstery, get a covering sheet of canvas and cover up your carriage before leaving it. Keep it covered always when standing in the stable.

x x x x

When driving, always bear in mind that in the present state of judicial and public opinion no excuse of any sort will serve you, if you are damaged or cause damage by passing on your wrong side. To do so when a lumbering dray occupies the crown of the highway and your proper section of the road is blocked while there is ample room elsewhere is at times a great temptation, and we do not say that it may not occasionally be taken advantage of. But always bear in mind the risk of vehicles closing in, of children of younger and older growth darting out in front of you, is yours, and yours alone. If you are one jot or tittle in the wrong, no matter how selfish or stupid those whose property or persons you may injure, you will have no consideration whatever when called upon to pay the piper. When overtaking traffic and finding by the time you arrive abreast of the vehicle you intend to pass, that another coming in the opposite direction will be there before you, you should so speed your car that when the road is clear you will be able to go ahead without changing speed or using your brakes. If, however, you are on your top speed and your car has slowed down so that your engine is thumping, change down before you essay to pass the vehicle in front. Do your best to accommodate your speed to the traffic you are negotiating so as to change speed and use your brakes as seldom as possible. By attention to this you will soon find your eye becoming educated to distances and speeds, and you will be astonished to find how nicely these can be timed so as to drive with the least possible fuss.

THE FIRST GORDON-BENNETT CAR.

By the courtesy of Mr. S. F. Edge, we are this week enabled to give broadside views of the first of the set of racing cars turned out by the Napier Co. to do battle for the United Kingdom on or about 7th July next. When we were invited to inspect this speedy-looking vehicle, its first coat of emerald green was still wet, and in that condition it was driven from 14, New Burlington Street, round to the entrance of the garage in Regent Street, in order that the photographer might level his camera at it for the two views we now give. Messrs. Napier and Co. are somewhat reticent as to the details of the mechanism, which is hid from view; but it is enough to say that, save in small details, the engine and driving gear of the new crack do not depart in any essential feature from last year's champion.

The engine, of course, has four cylinders, formed and water-jacketed on the well-known Napier lines with the triple induction valves which have been so much discussed from time to time. This much we do know, for we saw the spares packed in their wooden cases.

In order to allay all French fears as to the possibility of the new English Gordon-Bennett cars being built of such a width that passing on the comparatively narrow Irish roads would be rendered impossible, we may say that, while the wheelbase of the new car is 7ft. 10in., its wheel gauge is only 4ft. 6½in.—2in. less than the gauge of the farm waggon that George Stephenson adopted as the gauge

for British railways. The radiator, which is seen filling in the front panel of the tabernacle bonnet, is, as last year, formed of perpendicular lengths of Clarkson's radiating tube, connecting top and bottom water boxes. Behind this radiator is a fan run off the engineshaft only when the car is standing still or passing at slow speed through controls.

The friction clutch is of new design, and carries three thrust springs so disposed that there is no end thrust whatever on engine or gearshafts.

The force necessary to apply to the pedal to de-clutch is very little more than is necessary for an ordinary light car, and this must assuredly save the driver considerably in so arduous a drive as the big competition is certain to entail.

The vehicle is beautifully sprung, the rear ends of the front springs and both ends of the rear springs sliding in slots in specially-made brackets attached to the frame.

A double silencer is provided, and the universal joints of the propeller-shaft are enclosed in dust and oil-tight aluminium cases.

The aluminium case enclosing the differential and bevel wheel driving gear is of large size, the rear live axle being considerably heavier than in the case of last year's car.

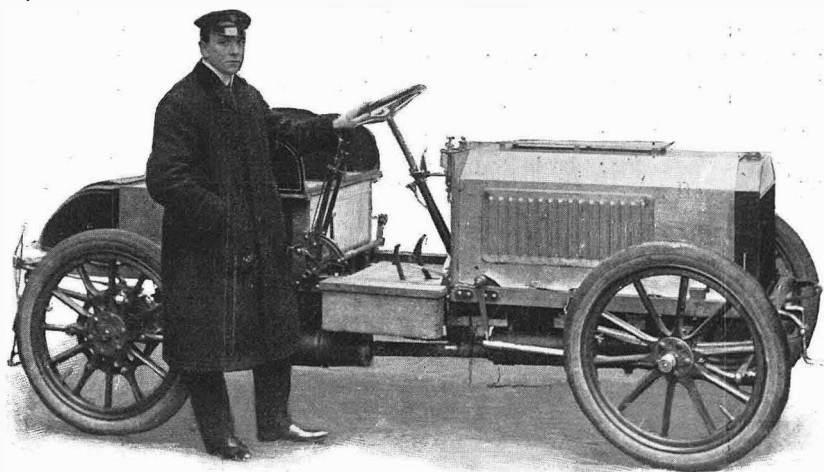
The driver's and mechanic's seats are set upon

the petrol tank, the capacity of which is forty gallons. This, however, will not be sufficient for the whole course, and further supplies will have to be taken on board in one or more of the controls.

Mr. Edge drove the car for the first time on Friday and Saturday last, and tells us that it is undoubtedly a very speedy car, and that he is satisfied with it.

Although the appearance of the car suggests undoubted power and speed, yet for majesty it pales before the old 50 h.p. Napier—a type we are never likely to see again, yet the present machine, though less imposing, is a far more developed car. The 1,000 kilogs. limit for weight has undoubtedly done much to force evolution.

The power is nominally 35 h.p., as it has not been deemed desirable to make an extremely powerful car for the Irish course, which is devoid of



Mr. C. Jarrott and the new Napier racer which he will drive in the Gordon-Bennett race.

excessively long straight stretches, so that nothing above eighty miles an hour need be provided for. However, Mr. Edge informs us that the car can take a hill like Handcross on the Brighton Road on its top speed, so it is evident that there is no lack of power. Last year the Napier was the lightest car in the Gordon-Bennett race, and it appears likely that this will be the case again, as the 1903 machine, though slightly heavier than last year's winner, only scales 17½ cwt.—that is, roughly, 2 cwt. inside the maximum of 1,000 kilogs. This is a point which is worth recollecting in more ways than one, as not only was last year's machine the lightest, but it was the only one which stood the road, so that it was very obvious that strength was not sacrificed to lightness. We certainly think the makers deserve congratulation for their enterprise, as they have the honour of getting the first cup car on the road for the 1903 contest. This is not only good for British prestige, as there is nothing like being first in anything, but it is sound practice, as it gives longer for getting the car thoroughly tuned up, and within certain limits the more time there is for this the better. It is all very well to trust to luck and ready resource, but luck is apt to be on the side of those who put the smallest strain on its fickleness.

THE INDUCTION COIL EXPLAINED.

THOUGH the induction, or sparking, coil is one of the chief components of the high tension electric ignition system, it is really astonishing to find that a very large percentage of practised automobilists are entirely ignorant of its principles and construction. The majority of automobilists regard their coil as a box of mysteries provided with so many terminals, and in some cases a vibrating contact breaker. Beyond knowing how to adjust the trembler and connect up the wires, the coil does not, as a rule, interest the automobilist until something goes wrong. It is useless to attempt to explain the working of a coil without the principles are understood, so we are obliged to commence with some elementary electricity.

The Principles of the Induced Current.

The phenomena of the induced current were first noticed by Faraday, who found that an electric current could be induced in a closed circuit—that is, roughly speaking, a coil of wire the ends of which are connected together—by rapidly passing a magnetised iron bar through the centre of it. Now, so long as the magnet is moving, a current is induced in the circuit in one direction, but so soon as the magnet comes to a standstill the current ceases. When the magnet is withdrawn, another current is induced in the *opposite direction*. The currents so induced are very slight, and are only noticeable by connecting a galvanometer in the circuit. Electricity so generated is known as *electro-magnetic*, or *magnetic electricity*; both terms are synonymous. The same effects are noticed if a coil of wire is

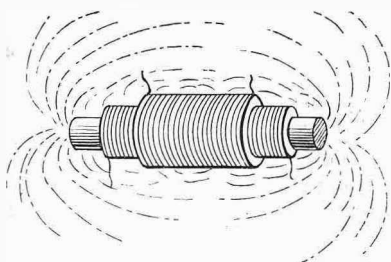


Fig. 1.—Diagram showing the magnetic lines of force.

passed over a magnet. The reason of this current is that there are magnetic waves flowing from the north to the south poles of the magnet (see fig. 1). These waves have an influence within a considerable area between the poles, and are scientifically termed the "lines of force," or the "magnetic field"; this term we shall use in this description.

A second feature of the electro-magnetic phenomena—and one which brings us nearer to the induction coil—is that if a current of electricity, derived from chemical or magnetic sources, be passed through a coil of insulated wire wound around an iron bar, the bar, at the passing of the current, will be converted into a powerful magnet. This is because the iron bar lies within the "lines of force" produced by the coil of wire. It must be clearly understood that when an electric current is passed through a coil of insulated wire, "lines of force" similar to those occurring at a magnet are produced. The next step is to show that one electric current will produce another current in a closed circuit—or endless coil of insulated wire—placed within its immediate vicinity. This, perhaps, will be better illustrated by the description of one of Faraday's experiments. A bobbin is wound with insulated wire and connected up to the terminals of a battery to form an active closed circuit which is known as

the primary. A second bobbin similarly wound is connected to a galvanometer to give the secondary closed circuit. Now, if the secondary bobbin is moved towards the primary one, it will be noticed that, while movement is being given to it, a current will be produced, or induced, in it. The galvanometer will indicate this, and show the direction in which the current is flowing. If the bobbin is now drawn away, it will be observed by the indication of the instrument that a current is flowing in the opposite direction. Thus, a continuous current in the primary winding induces an alternating current in the secondary winding solely through the influence of its "lines of force." Similar results are obtained by rapidly breaking and making the primary circuit, and it is for this purpose that the contact-breaker is employed.

The Condenser.

The condenser consists of several sheets of tinfoil, between which are placed sheets of insulating material—usually paper soaked in paraffin wax. Every alternate sheet of tinfoil is connected up to form one series of the condenser, while the others are similarly connected to give the opposite series. By reference to fig. 2, it will be seen that one series is connected to the trembler block G, while the other is connected to the bridge carrying the contact

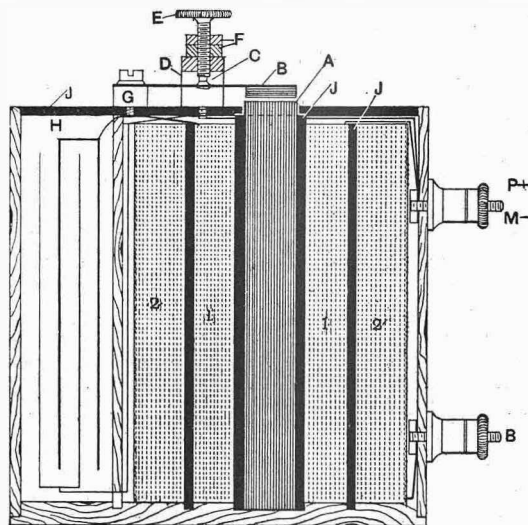


Fig. 2.—Sectional elevation of the coil

- | | |
|--|---|
| A, core of soft iron wire | H, condenser |
| B, iron disc on the contact breaker blade | J, insulating cylinders of ebonite |
| C, platinum contact points | 1, primary winding of the coil |
| D, bridge carrying the contact | 2, secondary winding of the coil |
| E, screw for adjusting the contact points | P+, primary terminal to connect to position of battery |
| F, lock nuts holding E in position | M—, earth terminal connecting the primary and secondary windings to the metallic parts of the car frame |
| G, block to which the trembler blade is attached | |

screw. Before going further, it will be necessary to give the reason for the use of the condenser. In the first place, it is required to dispose of an induced current which is set up by the *secondary* winding in

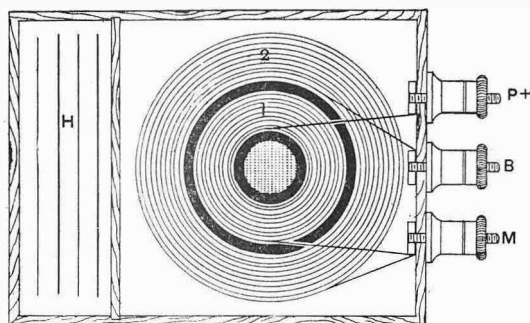


Fig. 3.—Plan of the coil.

the *primary* winding at the moment of rupture by the contact-breaker. The current so induced flows back into the sheets of tinfoil, and is given out again at the next *make*, or completion of the primary circuit, by the contact-breaker, thus assisting in the remagnetising of the core. If it were not for this action, the current would be disposed of in the form of a spark occurring at the platinum contacts of the trembler. In the second place, it assists in the demagnetising of the core by reason of the current flowing in the opposite direction. Of course, when the trembler finally comes to rest, the current remaining in the condenser flows back to the accumulator.

The Coil in Action.

The coil is brought into action by means of a commutator, or mechanical contact-maker and breaker, which to all intents and purposes is an auto-

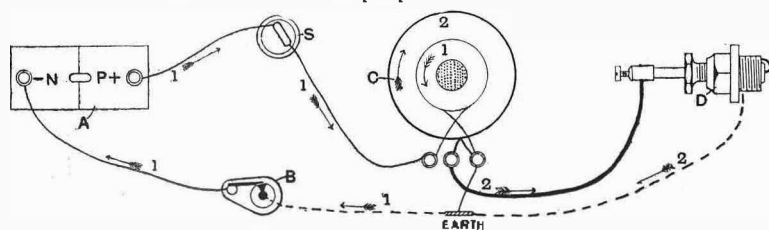


Fig. 4.—Diagram of the wiring of the two circuits.

A, accumulator. B, commutator. C, coil. D, plug. P+, positive terminal on A.
N, negative terminal on A. 1 1, primary circuit. 2 2, secondary circuit.
The dotted lines show a presumed path through the metallic parts of the engine and frame.

matic switch completing the primary circuit at a given moment, which is variable. This variation of timing is usually known as advancing or retarding the spark. Fig. 4 gives a diagrammatic illustration of the wiring of a coil, the arrows indicating the direction of the flow of the current. It will be seen that the current leaves the accumulator A by way of the positive pole +, and runs through the commutator B, thence to the terminal P+ of the coil. A switch is included in this part of the circuit, but is not shown.

The Construction of the Coil.

The induction coil is usually constructed in the following manner, and a reference to figs. 2 and 3, which are a sectional elevation and a plan of the coil respectively—will assist the reader in comprehending the method of manufacture. A soft iron core A composed of a bundle of iron wires is

placed within a vulcanite tube J. Around this tube are wound several layers of thick double cotton covered wire, usually number 16 S.W.G. Each convolution of the winding is separately insulated from the one immediately beneath it. The ends of the wire are connected to two terminals placed upon the wooden casing of the coil. One end is attached to the terminal marked P+, and the other to the terminal M. It will thus be seen that the circuit is entirely closed when the accumulator is coupled up to the two terminals mentioned, and the contact-breaker or trembler is in operation. The winding is known as the primary, and is figured 1 in the diagrams illustrating this article. Over the primary winding is placed another insulating tube of vulcanite, also marked J. Around this is wound a large number of layers of fine double silk-covered copper wire, usually number 36 S.W.G. Each of the layers in this winding is also separately insulated, as in the primary winding. This is known as the secondary winding, and is numbered 2 in the diagrams. One end of this winding is connected to the same terminal (M) as the one end of the primary coil, the other end being coupled to the terminal B, to which the high tension wire to the plug is also connected. On the top of the coil is placed a plate of vulcanite J, to which is attached a metal block G carrying a spring trembler blade B, and a bridge D with adjustable contact screw E. There is at present a variety of trembler blades in use upon different makes of induction coils; but for the purpose of this description we are taking a single trembler blade coil, as it is only our intention to show the working of the coil. Other designs of tremblers act in precisely the same manner, the variation in design being caused by the desirability to obtain a quick action for this part. The trembler

blade B and the platinum adjusting screw E are both fitted with platinum contacts C. To the bridge D, carrying the contact-breaker, is connected a wire from the primary winding terminal P+. The second wire connects the trembler block G to the terminal M. Although one end of both the primary and secondary windings are connected to the terminal M, the two windings are entirely separate and distinct from one another, each

having its own circuit.

The Direction of the Circuits.

To show the manner in which the two distinct circuits, i.e., the high and low tension, are completed, it will be necessary to refer to fig. 4, which shows one method of arranging the wiring. In this, A is the accumulator upon which the positive and negative terminals are marked P+ and N—respectively. The arrows indicate the direction in which the current flows. To P+ the wire is connected which runs to a switch S, thence to one of the three terminals upon the coil, the particular terminal being the one marked P+. The current then traverses the primary winding (1), the coil C being conducted from the terminal M by a wire to some metallic part of the car or the engine, and using earth as a part of its circuit. At the com-

mutator B the primary circuit is established, when the metallic segment of the commutator comes beneath the brush, or when the platinum contacts are put into connection with one another. From the pillar to which the brush or contact-breaker blade is attached, a wire returns the current to the N— of the accumulator, thus completing the primary circuit. Now, a separate path has to be found for the high tension current. This, as before explained, flows in a reverse direction to the primary circuit. It is indicated by the arrows and the figures 2. This high tension current leaves the coil by way of the third terminal marked B. To this the thickly-

insulated high tension wire leading to the plug D is attached. The return path of the current is through earth from the metallic parts of the motor, back to the terminal M on the coil, this being the same terminal to which the primary circuit return wire is connected, both earth wires for the primary and secondary windings being attached to the same terminal as is shown in the plan of the coil, fig. 3. It must be understood that this is but one of the many ways of arranging the wiring of the coil. Further methods of carrying out this method will be fully dealt with and illustrated in subsequent issues of *The Autocar*.



The Queen of Queens in her state coach at the Mi-Careme Carnival. The car used is an electrically propelled one, made by Messrs. De Dion-Bouton. The photograph from which our reproduction is made was taken outside the French Automobile Club premises. The artist's sketch for the scheme of decorating the car is reproduced on page 378.

In August last Mr. C. Sangster, accompanied by Mr. Harry J. Swindley, essayed a non-stop run from Edinburgh to London on an Ariel car, as reported in *The Autocar*, of August 30th 1902, but came to grief through colliding with the open doors of a tramway manhole in London Road, Edinburgh. Last week an action brought against the Edinburgh and District Tramways Co., Ltd., in the Court of Session, has been settled by the payment of £200 and expenses to Components, Ltd., and £100 and expenses for personal injuries to Mr. Sangster. In view of the damage which the car sustained, and the terrible consequences which might have resulted through the carelessness of the company's servants, the sums awarded cannot be considered exceptional.

Mr. Galloway, who, it will be remembered, blocked the Gordon-Bennett Bill not long since, has now become an automobilist.

* * *

The Irish policeman is full of unconscious humour. A stalwart member of the force in conversation with a motorist recently gave himself away, as well as the majesty of the law. Referring to the speed of cars, the legal representative said, "Shure, an' Oi've often been after wonderin' how Oi'd stop one av thim things if Oi wanted to; if Oi thought Oi'd only be hurt enough to have a pinsion Oi'd try, but, shure, Oi might be kilt entoirely, and then the pinsion would be no good at all at all." The unsophisticated Surrey police, please copy.

THE GORDON-BENNETT RACE.

The course definitely decided.

The advisory committee of the Automobile Club, consisting of Messrs. C. Johnston, S. F. Edge, W. G. D. Goff, and R. J. Mecredy, made a tour of inspection of the Gordon-Bennett course last week, in company with the county surveyors of the district through which the course passes. After spending two days in the district, the committee finally fixed on the course and the necessary controls. The starting-point will be at the Ballyshannon cross roads, 1½ miles south of Old Kilcullen, and after reaching the latter place the cars will bear to the right for the Carlow road, *via* Ballytore. From Carlow, the route previously selected is followed up to Maganey Bridge, but here a somewhat better route has been found into Athy. The Ballyshannon cross roads are reached again; and then the larger circuit of the course is followed, *via* Kilcullen, a new road having been selected to the Curragh, in order to avoid the old course through Naas and Newbridge. The course will then run to Kildare, and *via* Monasterevan, to a point near Maryborough. About two miles from the latter town, a winding road will bring the racers on to the route to Stradbally without going through Maryborough. From Athy, Ballyshannon will be reached, and the complete circuit accomplished.

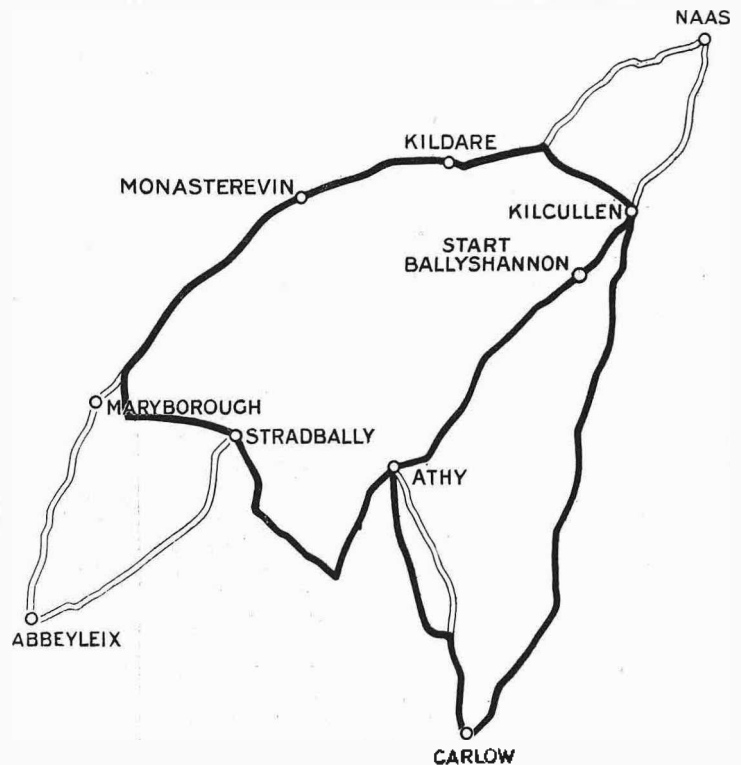
The controls will be at Castledermot, Carlow, Athy, and Kildare, and the finishing and starting points will be at the Ballyshannon cross roads.

The course, on the whole, was found in good condition, and the committee were well satisfied with their inspection.

The Bill read a Third Time in the Lords.

In the House of Lords, on the 20th inst., the bill entered upon its committee stage. The Marquis of Granby had an amendment which, if passed, would have given the county councils power to suspend traffic only on the main roads over which the race would be run; but Mr. Scott Montagu explained to the Marquis the necessity for barricading of by-roads, and he withdrew his amendment. Lord Londonderry, who is piloting the bill through the Lords, moved an amendment to transfer the power for making provision for the temporary suspension and the regulating of traffic from the county councils to the Local Government Board for Ireland, with a view to obviating the possibility of the various county councils imposing different regulations in their respective areas of control. With the Local Government Board as the single authority, universality of regulations would be ensured. On Monday, the 23rd inst., the bill reached its report stage, and the amendment was accepted. On the 24th inst., the bill was brought up a third time, and passed, so that the last element of doubt as to the holding of the race on home territory has now been removed.

While discussing the Gordon-Bennett race with Mr. R. J. Mecredy at the Agricultural Hall on Tuesday last, that genial Irishman informed us that he had



The sketch map given above depicts the altered route for the Gordon-Bennett race. The solid lines show the new route, and the open lines the route first selected. As at present arranged the start will take place at Ballyshannon, the course then running in the following direction: From Ballyshannon to Old Kilcullen, turning thence southward to Carlow, from Carlow to Athy by a slightly altered route, and from Athy past the starting post to Kilcullen. From Kilcullen the course runs through Kildare, Monasterevan, Maryborough, Stradbally, Athy, turning again at Old Kilcullen to Carlow. The course indicated will have to be traversed three times, the finish being at Ballyshannon, at the point from which the competitors started.

gone carefully over the last proposed course for the Gordon-Bennett, and by careful computation had discovered that out of the total 351 miles there are no less than 221 miles of straight, not taking into account any straight of less than one mile long. Those who would desire to obtain such ideas of the course as photography can give should obtain the next issue of Mr. Mecredy's bright little motor monthly, *The Motor News*, wherein a number of such photographs with much descriptive matter dealing with the course will be produced.

* * *

The Date of the Eliminating Trial.

April 25th has been fixed for the date of the eliminating trial to take place at Welbeck, the cars to be at the Automobile Club, Piccadilly, on April 10th, for official identification. For the benefit of those who have not followed the matter closely from the commencement, we may say that each country nominates three cars as its champions through its automobile club. The British club has nominated two Napier cars, and the third position is to be raced for in an eliminating test. For this contest a third Napier and a Star car are entered.

CONTINENTAL NOTES AND NEWS.

The Criterium of Industrial Cars.

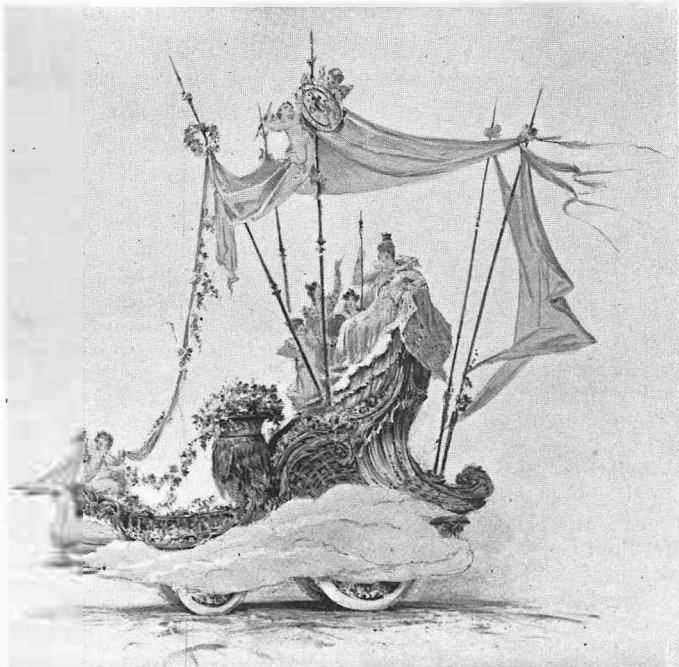
The vehicles taking part in the annual criterium from Paris to Nice organised by M. Paul Meyan, of *La France Automobile*, started on their long journey on Sunday morning, after going through the preliminary consumption test around Lake Daumesnil in the Bois de Vincennes the previous day. Of the twenty-one vehicles entered, only five were ready to take part in the consumption trial. The Daimler Company, of Cannstatt, wrote stating that the lorry they intended running was not completed, and M. Tugan was unable to compete because he had undertaken, at the instance of the Austrian war authorities, to drive his steam tractor from Paris to Vienna. Consequently, the only lorries running in the Bois de Vincennes on Saturday were the Peugeot and the Bardon. There were also a Serpollet omnibus of exactly the same type as that we illustrated and described at the time of the trial run from Paris to Melun in January last, an Ader car, and a De Dietrich omnibus, which is of a very interesting character. Last year the De Dietrich Company competed with their old types of omnibuses, and it will be remembered that it was on arriving at Nice that Baron de Turkheim was struck with the behaviour of the new cars manufactured by Turcat et Méry, of Marseilles, when he arranged for the Lunéville firm to construct these vehicles under license. Apparently, the performances of the Turcat-Méry engine during the past year have given so much satisfaction that the De Dietrich Company have abandoned their old system for the industrial cars, and the omnibus taking part in the Paris-Nice criterium is an extremely elegant vehicle propelled by a four-cylinder vertical motor in the same way as their pleasure carriages. On Saturday the Peugeot lorry (weighing 4,875 kilos., including a load of 3,200 kilos.) went round the lake forty-three times in 5h. 5m., and consumed 18 litres 450 of petrol; the Bardon lorry (weighing 2,457 kilos., including load of 1,550 kilos.) covered the same distance in 5h. 4m., and consumed 7 litres 800 of petrol; the Serpollet omnibus (weighing 3,466 kilos., including 1,070 kilos. load) did sixty-two laps in 4h. 58m., and consumed 77 litres of paraffin; the De Dietrich omnibus (weighing 2,560 kilos., including load of 670 kilos.) covered fifty-three laps in 5h., and consumed 31 litres 430 of petrol; and the Ader (weighing 1,100 kilos., with load of 216 kilos.) covered 115 laps in 5h., and consumed 37 litres 300 of petrol. These results have not yet been worked out on the basis of the kilom. ton. as the promoters have ascertained that there was an error in the measurement of the track. They had relied upon the old official distance of 2,600 metres, but it turns out that during the reconstruction of the road for the exhibition of 1900 the route was shortened by about 300 yards. The route, therefore, has to be again measured to obtain the exact results of Saturday's test. In any event, the consumptions were very low, though it must be remembered that the competitors were favoured by a perfectly level road in remarkably good condition.

An Artistic Autocar.

Art has rarely been applied to the automobile with such excellent effect as in the triumphal chariot of the Queen of Queens which took part in the Mi-Carême procession in Paris last week. Hitherto the chariot has always been drawn by horses, but the students of the Latin Quarter who organised the fête decided this year to be up with the times, and the hippomobile which formerly did duty as a throne was represented by an electric car. The Marquis De Dion supplied the vehicle, and the A.C.F. gave their patronage to this great mid-Lent festival. The car was decorated by the well-known artist, Jambon, who set off the front with the conventional swans, and placed a floral basket at the feet of the Queen, while the graceful lines of the vehicle were conceived in the style of the "new art," and certainly there was no suggestion of this triumphal automobile being what the cynics delight to call a "horseless carriage."

A "Question of Dates.

The fixing of July 1st as the opening day of the Irish fortnight is likely to cause a great deal of embarrassment to the promoters of French meetings to be held simultaneously, and may also perhaps tend to prevent a good many French automobilists from being present at the Gordon Bennett cup race. The interests of the English and French in the matter of automobile meetings is so far identical that it is very desirable to find means of conciliating them, so that these meetings may not suffer from the effects of too much competition. Everyone, of course, likes to see French automobilists in English events, at the same time that the presence of Englishmen in French races has done a great deal to enhance the interest of the sport. Now, if



M. Jambon's design for the "Queen of Queens" car at the Mi-Carême carnival. The car is illustrated on page 376.

the A.C. of G.B. and I. adhere to its date for the Irish meeting, it may prevent a good many Frenchmen from attending, since they may be taking part in the important Aix meeting, unless, of course, the Aix committee should be able to change their fixture. Unfortunately, in view of the large number of big events in June and July, it is really not easy to arrange the meetings without their coming into conflict with each other, and, therefore, it is proposed to reorganise the dates, if possible, so that the meetings will be held serially, with a sufficient interval between them to allow of makers and automobilists going from one to the other. It is to be hoped that the A.C. of G.B. and I. will discuss this matter with the A.C.F. in order to prevent what promises to become a perfect muddle of fixtures.

A German Autocar Trust.

One of the most powerful arms which the Germans possess for carrying on a foreign trade is the "cartel," or a form of "trust," which exists in all branches of industry, and provides special facilities for meeting competition in foreign markets by selling goods at very low prices, very often even below the cost of production. The "cartel" groups together all the manufacturers in a particular industry, and when it is necessary to undersell foreign competitors the makers are supplied with raw material on special terms, at the same time that the prices of the manufactured product on the home market are kept up at a high level to compensate for the absence of profit on the export trade. It is now intended to apply this system to the automobile industry. The matter was discussed last week at a conference held in connection with the Berlin Show, when all the autocar firms expressed themselves favourable to the creation of a cartel. There are now eighteen or twenty firms in Germany doing an increasingly large export trade in automobiles and parts, including the Daimler Motoren Gesellschaft, of Cannstatt, who are understood to have sold forward the whole of their production of Mercedes cars in England for some months, Benz, Adam, Opel, De Dietrich, of Niederbronn, Cudell, of Aix-la-Chapelle, Eisenach, and Heinrich Scheele, of Cologne. By far the most important market for German vehicles is England, and the "cartel" is being formed with a special eye to a monopoly of the British trade, or, at least, in the cheaper classes of cars and especially industrial vehicles. The Germans are perfectly aware that, with one exception, they have no chance of competing with the French in high class cars, and it was proposed at the Berlin conference that an arrangement should be entered into with the French makers whereby they should have a monopoly of the trade in high class vehicles while the Germans should have a free hand in the supply of industrial and low priced cars. This is easier said than done. The French will not be so foolish as to tie their hands for the sake of giving pleasure to the Teutons, and makers in Germany will have to rely upon their own resources if they are to create a monopoly of European trade. This proposed organisation, however, is sufficiently serious for British manufacturers, who will have to make strenuous efforts to resist this threatened invasion of cheap German vehicles. There is not the slightest doubt that with their high protective tariffs the Germans

will be able, if they build up a large home trade—for this is essential to the success of the scheme—to sell cars in England at prices far below what can be accepted by British makers. It only remains to be seen if these imported cars can give satisfaction to users. If they do not, the British maker can very well regard the threatened competition with scepticism, but this is, nevertheless, a matter which he cannot afford to treat too lightly, for it may be necessary in time to take serious measures to stop the invasion of cheap German cars. The simplest remedy would be for Britain to impose a tariff on all imported cars, but the Germans do not consider she has sense enough to take so obvious a remedy.

The Consumption Tests.

Following upon the fuel consumption tests carried out last month over a sixty-two miles course from Suresnes to Corbeil and back, the organisers promoted the usual supplementary trial among the winners of the different categories, when, instead of measuring the amount consumed over the course, they were required to cover the longest possible distance with a stipulated quantity of spirit. The amount of petrol allowed in each category was calculated according to the quantity consumed by the winners in the previous trial, plus a certain percentage to provide for contingencies, such as the state of the roads and the weather. As the conditions were favourable last week, only ten per cent. additional was accorded, making five litres for the voiturettes, six litres for the light carriages, seven litres for the cars, and 8.4 litres for the vehicles weighing more than 1,000 kilogs. The cars had to run from Suresnes to Corbeil and back, and then continue around Longchamp until the tanks and carburettors were completely empty. The results all round were strikingly good. The longest distance was covered by a De Dion-Bouton 6 h.p. voiturette, which piled up a total of 90.7 miles with 8.8 pints of petrol. Another De Dion voiturette of the same type covered 76 miles, the consumption per kilometre ton being .0989 pint and .1214 pint respectively. In the light carriage class the two Peugeots with 10.5 pints of petrol and alcohol covered respectively 69.74 miles and 73.2 miles, the consumptions per kilometre ton being .0978 pint of petrol and .0996 pint of carburetted alcohol, so that there was only a small difference between the two spirits. The Chenard-Walcker got the best results among the carriages, for with 12.32 pints one covered 75.35 miles, and the other 70.28 miles; and the consumptions per kilometre ton were .0846 pint and .0929 pint respectively. The big Mors covered just 62.1 miles with its supply of 14.78 pints, the consumption per kilometre ton working out at .1249 pint. The lorries were required to go over a course of 37½ miles and finish up around the racecourse. The quantity of petrol supplied was calculated according to the load carried, the 8 h.p. Peugeot with a load of 3¼ metric tons receiving 26.42 pints, and the 5 h.p. Bardon with a load of 1½ metric tons having 13.48 pints. The Peugeot lorry covered 41.79 miles and the Bardon 43.23 miles, the consumption per kilometre ton of load being .12249 pint and .12724 pint respectively. The Bardon lorry could not be classified because it exceeded the stipulated time by a minute and a half on account of punctured tyres.

Correspondence.

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

BRITISH CAR DESIGN.

[2895.]—Your correspondent, Mr. Weigel, starts his letter in your last issue with an incorrect statement in suggesting a Mercedes car took part in the Gordon-Bennett race of 1902. It is known to any readers of the papers that no Mercedes took part at all. I am sorry Mr. Weigel objects, as he says, to the "Napier car always doing wonders," but I cannot prevent it making history—and I should not do so if I could. S. F. EDGE.

[2896.]—I think Mr. Jarrott is mistaken when he says that the early Napier engines had no water joint in the cylinders. I had one of these 9 h.p. cars, and it most certainly had the water joints, and they leaked too, as they usually do.

I think that it is time makers and agents were stopped from mentioning their cars in your correspondence columns; they should be gently but firmly referred to your advertisement space. LOOKER ON.

[2897.]—In last week's *Autocar* I find Mr. D. M. Weigel says, "I fail to see a single person who praises the German, Otto, who invented the internal explosion engine."

Allow me to enlighten Mr. Weigel from the article in the tenth edition of the "Encyclopædia Britannica," by Dugald Clerk, M.I.C.E., F.C.S.:

1794.—First proposal in Great Britain. Street's patent, where an explosion engine is suggested.

1823-1826.—Samuel Brown's patent, proposed to fill a closed chamber with a gas flame, and so expel the air; then he condensed the flame by injecting water, and operated an air engine by exhausting into the partial vacuum so obtained. Brown's engine is said to have been actually employed to pump water, drive a boat on the Thames, and propel a road carriage.

1833.—L. W. Wright described an explosion engine working at atmospheric pressure and exploding on both sides of the piston. The cylinder is shown as water jacketed.

1838.—William Barnett's engine was so constructed that the mixture of gas and air was compressed to a considerable extent in the motor cylinder before ignition. The method of igniting the compressed charge was also effective, thus. . . by means of a hollow plug cock having a gas jet burning within the hollow. In one position the hollow was opened to the atmosphere, and a gas jet issuing within it was lit by an external flame, so that it burned within it. The plug was quickly rotated, so that it closed to the external air and opened to the engine cylinder. This mode of ignition is in essentials the one adopted by Otto about thirty years later. To Barnett belongs the credit of being the first to realise clearly the great idea of compression before explosion in gas engines.

1860.—Lenoir's patent. . . was the inventor of the first gas engine that was brought into general use. The piston, moving forward for a portion of its stroke. . . drew into the cylinder a charge of gas and air. . . at about half stroke the valves closed, and an explosion, caused by an electric spark, propelled the piston to the end of its stroke. The engine was double acting. Four hundred of these engines were said to be at work in Paris in 1865. The Reading Iron Works Co., Ltd., built and sold one hundred of them in Great Britain.

1862.—To M. Alph. Beau de Rochas belongs the credit of proposing, with perfect clearness, the cycle of operations now widely used. . . published in Paris in 1862 the conditions requisite: (1) The greatest possible cylinder volume with the least possible cooling surface. (2) The greatest possible rapidity of explosion. (3) The greatest possible expansion. (4) The greatest possible pressure at the beginning of the expansion. The sole arrangement capable of satisfying these conditions. . . he stated. . . (briefly): (1) suction, (2) compression, (3) ignition, (4) forcing out the burnt gases.

1867.—Otto and Langen exhibited their free piston engine.

1876.—To Dr. Otto belongs the honour of independently inventing the same cycle (Beau de Rochas), known as the

Otto cycle, and at the same time overcoming all the practical difficulties.

Beau de Rochas contemplated and stated clearly the theory.

Dr. Otto independently invented the same cycle and made it a commercial success.

Many other names are mentioned, but the above are the principal. GEORGE ADSHEAD.

[2898.]—I must apologise for appearing in your pages for two consecutive weeks without giving Mr. Edge a chance to reply. As he thinks it is necessary to have one of his agents to aid him, I am forced to answer the agent—Mr. Jarrott. Mr. Edge first began his advertising (in the form of letters) by the introduction in the first place of Mr. Jarrott, his principal agent, which he himself backed up; he brought into the argument Mr. Bidlake, one of his employees, and Mr. Stocks, manager of a company of which he is the moving spirit. I repeat, Mr. Edge, in his great desire to push the name of Napier to the front, seemingly obtains the aid of all those in his employ, and I state again distinctly, there was no necessity for Mr. Jarrott to join in the argument at all, as he is only putting in print the desires of Mr. Edge.

In answer to Mr. Edge's letter, I will deal with it as shortly as possible.

Re ball thrust bearings.—Mr. Jarrott and I agree that ball thrust bearings are splendid. Mr. Jarrott states Mr. Edge copied them from the Mors, therefore I thank him for upholding me in my argument against Mr. Edge.

Third. Aluminium water jackets.—Mr. Jarrott once more says the Mors Company used them, and I repeat that they used them in 1900; I again thank Mr. Jarrott for upholding my argument.

Under his fourth heading Mr. Jarrott brings in a new subject that Mr. Edge never raised in his letter; as Mr. Edge does not raise the point, I must wait until he does; there is no necessity for Mr. Jarrott to continue seeking things.

As regards self-generating ignition appliance, I will not argue about what people recommend. Mr. Jarrott purely states that the Napier Company use the high-tension electrical system; I have never said they did not, but I most distinctly said they never originated it, as Mr. Jarrott says they did.

Beehive coolers.—The definition of a beehive cooler is very simple. It is an amalgamation of many tubes soldered together, between which tubes the water flows, giving the advantage of an enormous cooling surface. I am really astonished that Mr. Jarrott is ignorant of what a beehive cooler is.

Re compressed steel frames (I am using the English term), it is rather a poor argument to profess ignorance. If Mr. Jarrott wants a proper term, let me call it a "chassis embouti." I am sorry if the English dictionary is not sufficiently rich to permit of a proper definition, but Mr. Jarrott knows what I mean. The Napier car never has used the "chassis embouti," but has used a common channel steel frame, which is a very different thing. Might I suggest to Mr. Jarrott that if they used a section of channel steel as thin as it is possible to obtain the metal of the "chassis embouti," it would soon be smashed to pieces.

As regards the Napier car, I refer Mr. Jarrott to the Patent Office, where he will find a patent under which the Motor Power Company was incorporated under a capital of £1,000 for the purpose of exploiting this patent, in which the water jacket is described in as near as possible the exact terms as that under which the Panhard water jacket was made.

The ninth remark is perhaps the most extraordinary. Mr. Jarrott has the effrontery to cover his attempt to assert that the Napier Company did things that they did not do, by saying this company existed before I myself was born, and in making that statement he suggests that they made motors also before I was born. I challenge Mr. Edge, Mr. Jarrott, and Mr. Napier to state that the Napier Company made a motor for a motor car as early as 1898, and in so doing I am making it with a certitude that I am correct.

Your readers will have the pleasure to appreciate the reliability of any statement contained in Mr. Jarrott's letter by the attempt of the fictional suggestion as to when the Napier Company made motor cars.

Finally, let me congratulate Mr. Jarrott on his letter. He has successfully mentioned the name of the car he

advertises fifteen times in one letter. May I once again suggest to you, sir, that you bring these gentlemen to at once answer my questions, and thus stop their "advertising" letters appearing in the future.

D. M. WEIGEL.

P.S.—The Napier Motor Co. was registered in Somerset House on the 18th November, 1901, under the No. 66,949, at a capital of £100. It was apparently wound up and ceased to exist on the 8th of April, 1902. I am pleased to give Mr. Jarrott this information.—D. M. W.

MOTOR TYRE PATENTS.

[2899.]—In view of the widespread misunderstanding as to this company's position on the subject of motor tyre patents existing amongst a large section of those interested in automobilism, we would ask you to afford space for a short explanation. We have already taken steps to publish the facts as widely as possible, but, nevertheless, the company's position is still somewhat misunderstood.

The Bartlett patent, which covers the most widely used type of pneumatic motor tyre, did not originally belong to this company.

The patent was purchased by us from the North British Rubber Company for £200,000, and the conditions of sale were that the North British Rubber Company was granted a license, and that only one other license, in addition to an existing one, was to be granted—that is, three in all. These conditions were duly carried out.

The terms of the purchase agreement provided that no further license should be issued, and that this company should take action against all persons infringing the Bartlett patent.

This agreement was entered into many years before the advent of automobilism.

Since the development of automobilism, this company has been obliged, in pursuance of the agreement with the North British Rubber Company above referred to, to adopt an uncompromising attitude towards private users and firms in the trade who imported foreign cars fitted with foreign tyres infringing the Bartlett patent, and has, unfortunately, in consequence incurred a great deal of unpopularity.

This company recognised from the beginning of the movement that automobilism was entitled to every encouragement and support, and at an early stage the company gave permission to its licensees, the Clipper Pneumatic Tyre Company, to have their motor tyres manufactured for them by the best known foreign makers, thus placing these tyres at the disposal of automobilists in Great Britain, but even this concession failed to meet all the difficulties of the situation.

Private users—many of them prominent and influential gentlemen in the world of automobilism—still complained that the company's refusal to permit them to import unlicensed foreign tyres, even though they were willing to pay any royalty that might be demanded, was an arbitrary and vexatious restriction.

This company accordingly laid the whole of the facts before the North British Rubber Company, Limited, and urged them to agree to a relaxation of the agreement, to enable this company to deal reasonably with a situation which was not contemplated when the agreement was entered into.

The North British Rubber Company, however, refused to relax the agreement in any particular, and hence the company has had no alternative but to carry out the terms of that agreement in its entirety.

This company being aware that many of the gentlemen who held strong views on this question were prominent members of the Automobile Club, the company felt that the proper course to take was to lay the whole of the correspondence before the club. The correspondence was, therefore, sent to the club for this purpose in July last, in the belief that, however strongly members of the club might feel on this matter, they would not intentionally do this company injustice, and that the facts would be made known as of general interest to British automobilism.

The correspondence was kept by the club for five months and was returned to us without comment, and having ascertained that many gentlemen prominently connected with the club were still unaware of the facts and had never heard of the correspondence, we felt ourselves bound to make them known.

You will understand that we do not cast any reflection

on the club, nor are we, indeed, complaining. We believed the club took an official interest in the matter as being one of importance to the British trade, but finding ourselves mistaken, our desire now is that the company should be exonerated, by the publication of the facts, from responsibility for an unfortunate state of affairs which they have taken all possible steps to modify in the interests of the trade and sport.

For the DUNLOP PNEUMATIC TYRE CO., LTD.

LOUIS M. BERGIN, Secretary.

LIGHT STEAM CARS.

[2900.]—In your edition of March 14th, I notice an article by Mr. Filson Young on "Recent Developments in Light Steam Cars."

Mr. Filson Young's "ideal steam car equipped with a water tube or flash type boiler" is to be more than found in the Toledo steam car. In this car we have a water tube boiler, with shell and flash combination, having all the advantages of a flash type in its ability to generate steam rapidly, with the advantages of the shell type in having great capacity to draw upon. Moreover, there is no hand pumping necessary in order to start.

One boilerful of water will be sufficient for 4½ miles, thus it is not necessary to keep one's eye fixed on the water



gauge, for even with an empty boiler there is no risk of "scorching" or "burning out." With regard to the construction of the engine I find it a great advantage in having piston valves in place of ordinary slide valves, the valves being fitted with rings which effectually prevent leaking. In fact, I consider it the finest constructed engine hitherto put into a steam car.

The Toledo is a heavy substantial car, very strong frame, chain, and fittings, and the whole of the workmanship is, in my opinion, second to none of its kind.

The price places it well within the range of a man of moderate means, and as Mr. Filson Young writes on cars for men of moderate means, I cannot do better than suggest to him to call either at the London or Liverpool depot and have the car thoroughly explained. He will find that a purchaser of the Toledo possesses a fully-equipped car, and not consisting merely of "little more than boiler, engine, wheels, and seat."

Having driven practically one of the first Toledo cars introduced into this country, and having run it through all weathers, and some of the greatest gales recently experienced, I have never found it fail me once by firing back, or any other fault. I can safely recommend it to doctors for simplicity and reliability.

BURTON ROBINSON, M.B.

[Our correspondent kindly sends a photograph of his car on the summit of Parhold Hill which we reproduce above.—Ed.]

[Several letters of interest are held over till next week. Notably two dealing with "Supplementary Ignition for Magneto Ignited Motors."—Ed.]

Flashes.

We have a vacancy upon our editorial staff at Coventry for a practical journalist thoroughly conversant with motor cycles. The vacancy is in connection with our new paper *The Motor Cycle*.

* * *

The Kaiser has set an example to other monarchs once again, as he visited in person the German automobile show, and took the greatest interest in the exhibits. We do not wish to draw invidious comparisons, but it is somewhat disappointing to remember that the King has not at present visited a motor show. Possibly it is due to the fact that there have been so many, and he does not know which is the chief one.

* * *

Last week, in referring to the recent meeting at the Automobile Club to discuss legislation, we mentioned the fact that the members of the industry and trade, with the exception of Mr. Cohen, did not take part in the arguments for or against the numbering propositions, though they were necessarily vitally affected by anything which would have a damaging effect on the pastime. In this reference we inadvertently did Mr. C. Jarrott an injustice, as he is a very strong believer that the numbering enactments would injure the movement very considerably, and he spoke very much to the point at the meeting referred to. He urged that the energies of the club should preferably be conserved till Government proposals were brought in, and that they should then be directed entirely to inducing the Government to remove the speed limit. He also pointed out that, quite apart from numbering being a failure in France, it was very necessary to remember that English people regarded these matters very differently from the Frenchman and the German. They were ruled in quite a different way, the country was a free one, and the individuals were free, and consequently they all felt very differently about anything which affected the privacy and freedom of the individual. He concluded by expressing his strong conviction, as a member of the trade, that the numbering of private carriages would very seriously affect business, and would result in the loss of a large volume of trade.

* * *

The spring edition of the list of agents stocking petrol has come to hand from Messrs. Carless, Capel, and Leonard. For those who remember the first edition of this valuable booklet, the latest will afford an example of the growth of the movement. The list contains nearly 1,000 names, some 120 having been added since the last edition was printed. It is not a mere directory, however, as some useful information is given concerning petrol, its nature, storage, and the regulations for its carriage by the railway companies.

Mr. Shrapnell-Smith has returned from the Grand Canary completely restored to health by his month's rest.

* * *

The Hon. J. Scott Montagu will be the guest of the Society of Motor Manufacturers and Traders at their first annual banquet at the Grand Hotel, London, on Friday, April 3rd.

* * *

We hear that Mr. A. F. Wallis is about to make an extended European tour on a 20 h.p. Wolseley which he has had specially built with covered-in top, so that he can face all weathers and carry plenty of luggage.

* * *

"The Civil Service Motor and Cycle Agency, Ltd.," is the new title under which the Civil Service Cycle Agency of 292, High Holborn, London, will transact future business. The change has been necessitated by the increased motor business.

* * *

The last addition to the ever-growing catalogues of the United Motor Industries, Ltd., is a sheet dealing with the Castle horns and a new air pump or bulb, known as the Carsig, for blowing all kinds of horns. This enables the operator to utter his warnings with greater ease and more appropriate modulation than the ordinary pear-shaped bulbs.

* * *

The club committee of the Automobile Club have decided that in future the title of the chief clerk, Mr. Radford Cooke, shall be "assistant secretary." It is a gratification to those who have business relations with the club staff to realise that in the rearrangement Mr. Cooke takes an even more responsible position than before, and that he will be present and as desirous as ever of aiding where aid is required.

* * *

We hear that a well-known firm of bicycle manufacturers are so thoroughly satisfied with the behaviour of the E.I.C. plugs that they have decided to use no other pattern.

* * *

The makers of the Argyll cars—the Hozier Engineering Co., Ltd., of Glasgow—have decided to further extend their works. They commenced by standardising the manufacture of their cars, and, of course, this greatly facilitated construction. Then they put on a night shift, and by working night and day kept pace with their orders for a while; but now the demand for the 1903 patterns is so great that they have found it necessary to extend the works, and have acquired extensive premises adjoining their present factory, with a view to increasing their output to keep pace with their orders. A large instalment of automatic tools is being put in, and the first principle of the firm's manufacture—absolute interchangeability of parts—will be maintained, so that users can always be certain of obtaining any duplicate part on the shortest possible notice, which will be certain to fit their car.

"THE AUTOCAR" DIARY.

- Mar. 21-28.—Messrs. Cordingley's Show at Agricultural Hall.
- " 21-28.—Paris-Monte-Carlo Delivery Van Trials (1095 kiloms).
- " 28.—Nice A.C. Competition of Brakes.
- 29-April 6.—Nice Automobile Week.
- April 1.—Last date of entry Stockholm Automobile Exhibition.
- " 10.—Cars must be ready for Eliminating Race for Gordon-Bennett Cars (British).
- " 11.—Competitive Test for Gordon-Bennett Cars (America).
- " 15.—Last date of entry at ordinary rates for Paris-Madrid Race.
- " 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, Callander.
- " 27.—Society of Arts Lecture, "Mechanical Road Carriages. First Cantor Lecture, by Mr. W. W. Beaumont.
- May 4.—Society of Arts Second Cantor Lecture, by Mr. W. W. Beaumont.
- " 13-14.—Scottish A.C. (Western Section) Glasgow to London Non-stop Trial.



The Passe Partout being towed to the Agricultural Hall, where it was on exhibition in the yard. Messrs. Friswell, Ltd.

The words Victoria Garage, which appeared in our leading "Flash" of last week, should have read "The Victoria Carriage Works, Ltd."

* * *

The Wolseley Motor Co. have secured a contract from the North-Eastern Railway Co. to supply them with two 80 h.p. horizontal Wolseley motors to be used on the motor railway coaches which the company are building. We understand for this purpose the vertical petrol engines which have been tried have not proved satisfactory. Another interesting Wolseley item is that four orders have been given the firm for the 50 h.p. racing cars, one of which was shown at the recent Crystal Palace Show with the engine only in position, the transmission not being finished in time for the exhibition. These machines will compete in the Paris-Madrid and other great Continental competitions.

* * *

A few months since we briefly described the works of Messrs. Panhard and Levassor at Kimberley Road, Willesden Lane, N.W., which were specially constructed for the repairing and general tuning up of Panhard cars. These have now been further extended, and over the two lengths of inspection pits, which have been specially constructed and which are fitted with electric light, there is accommodation for thirty cars. Besides accommodation for cars over the pits, there is room for one hundred others in various processes of repair at one time. In the case of a large overhaul job, the engine and gear are removed bodily from the car and taken into another department, where all the fitting work is done. These parts are then erected on frames, tested, and placed back on the car again. One staff of men take the parts down, another execute the fitting and erecting, and another the adjusting and testing. A separate staff of engineers is kept for outside work and driving, and a car for towing purposes is always ready. An electric installation has been fitted up for the charging of accumulators. Besides the extensions referred to, the machinery and staff have been correspondingly increased, and everything has been done to facilitate matters so that the utmost expedition can be assured.

THE LONDON CHAMBER OF COMMERCE.

A Discussion on Motors.

Presiding at the monthly dinner of the London Chamber of Commerce at the Trocadero on Wednesday last week, Sir Vincent Kennett-Barrington predicted a better state of things in the statute law regulating the speed of motor cars by the suggested co-operation of the Liverpool Chamber of Commerce with the London Chamber and the Automobile Club. Their gentle suasion when brought to bear upon His Majesty's Government was bound to tell sooner or later. The restrictions as to the speed of motor waggons were equally ridiculous, and resolutions had been passed by the Liverpool Chamber with a view to their modification. Mr. Sidney Straker, who took part in the discussion which followed, said he had had four or five years' experience of motor waggons, and unless some drastic measure of reform was introduced into the law the enterprise among users and constructors alike would be seriously crippled. There were 700 motor waggons in this country capable of dealing with several tons at a time. The industry was entirely British; it was one in which the Americans had not come to the front. Customers had been telling his firm that by the adoption of the motor waggon in their business they had been saving as much as £400 a year, when compared with their former outlay upon horse traction. He echoed the chairman's hope that the consolidated action of the chambers would lead the Board of Trade to make such amendment in the law as would tend to encourage, and not hamper, an important growing industry.

Mr. Hutchinson remarked that what they wanted now for motor cars was roads—roads that might in a measure compare with the great military highways of the Continent. They desired straighter and wider roads, with their surfaces kept efficiently repaired; and he advocated the pursuit of means to that end by the formation of one great central body, who would stimulate the powers that be to action till they got such roads. As to the freaks played by motor cars recounted by a previous speaker, Mr. Hutchinson set it all down to "ignorance." The first principle with motorists should be to master the working of the car; and this could only be done by practice and study.

CLUB DOINGS.

The Manchester Automobile Club.—Annual Dinner.

The third annual dinner of the Manchester Automobile Club was held at the Albion Hotel, Piccadilly, Manchester, on Wednesday, 18th inst., when eighty members and friends were present, under the chairmanship of Mr. Fred Smith, the president of the club. The Chairman, in proposing the toast "Automobilism," stated that the strength of the club was now 150 members as against eighty last year; the leading topics of automobilism were touched upon in a lighter vein. The usual toasts were duly proposed and honoured during the course of a very pleasant evening.

A Club for Cheltenham and the County of Gloucester

At a representative meeting held at the Queen's Hotel, Cheltenham, on Monday evening, March 16th, a motor club was formed for the county of Gloucester, with Cheltenham as headquarters, under the title of "The Cheltenham and County of Gloucester Automobile Club." The club has a very promising outlook, there being a very large number of motorists in the county. Full particulars as to membership, etc., can be obtained from the secretary, Mr. H. Dyer, Juniper Cottage, St. Mark's, Cheltenham. The owner of any description of motor vehicle is eligible for membership.

A misunderstanding has arisen in some quarters with regard to the recently-authorised Motor Volunteer Corps. The corps is not a military unit of warriors, which will drive into battle after the style of the ancient Britons. It is an organisation of owners of cars, who will be prepared when called upon to act as special messengers between any corps or to officers commanding divisions, and to carry out any suitable duties requiring speedy despatch.

REPLIES TO QUERIES OF GENERAL INTEREST.

CARBURETTER ON DE DION ENGINE.

I have a 4 h.p. De Dion car, which is fitted with the usual "Viet" carburetter. Some days the car runs powerfully and well and at other times only moderately. As there is not any way by which the supply of air can be regulated to suit the day, as in some of the makes, will you kindly let me know if I could obtain far better results if I were to have another carburetter fitted? If so, what pattern would you recommend?—J.A.

We should say that very possibly the carburetter you mention does not suit your engine, but before going to the expense of buying a new one, we should advise you to have your old one examined thoroughly by an expert to see that it is working properly. If no good results follow this, then thoroughly examine your ignition, particularly for broken ends of wire which may possibly cause a short circuit during the alterations in position of the insulated contact plate when advancing and retarding the spark. Also assure yourself that the contact plate has not too much play, as this often causes irregularity in the running of a car. It may require rebushing, or, possibly, only tightening up, which may be done by placing two washers under the two split pins which attach it to the cover of the two to one gear. If after carrying out these suggestions you still find the car to run irregularly, then try the effect of a new carburetter. The Longuemare will be suitable for your purpose.

CARBURETTER DERANGEMENT.

I have a 5 h.p. Peugeot phaeton with three speed gear, the engine having tube and magneto ignition, a spray Longuemare carburetter, the governor acting by cutting out the exhaust valves. Everything appears to be in perfect order, but directly I put the car on to the top speed the motor runs for a short distance only and then stops. I have cleaned out the carburetter and fitted a new nipple, but still the trouble remains. I have tried fitting new inlet valve springs, thinking that the trouble might be there, but with no satisfactory result. I should be glad if you could suggest anything which would help me to overcome this difficulty.—W.M.

The position of your carburetter is probably accountable for the trouble which you are having with your car if the air inlet is towards the back of the carburetter. When the vehicle gets on to the top speed and its velocity is considerably increased the rush of air creates a vacuum at the mouth of the air inlet pipe, thus preventing air being drawn into the carburetter to form an explosive mixture. If you alter the position of the carburetter so that the air intake is forward, and make sure that a good current of air is running round the carburetter for it to draw upon, your trouble should then be overcome.

CONVERTING IGNITION.

I should be much obliged if you could inform me if you have had experience of converting a tube ignition car to electric, say wipe contact and Carpentier coil, and, if so, whether satisfactory? The car I am thinking of altering is a 7 h.p. M.M.C. (old pattern), with tube ignition; speed on level good surface road, about twenty miles per hour. The car is two-cylindere, and governs on the exhaust with a Daimler governor of the hit and miss pattern. My fear is that the increased acceleration of the engine and consequent vibration (solid tyres) may prove too much for the old car, and cause very much increased wear on engine bearings, etc. I presume it would be necessary when advancing spark to cut out governors altogether? Would there be much gain on hills, and how?—ERSILON.

You will be able to convert your engine to electric ignition if there is sufficient metal in the cylinder at the point where the ignition tube is fitted. To the best of our recollection, there is sufficient strength at the point mentioned to admit of the hole being enlarged and retapped to fit a sparking plug; but to be on the safe side you might

enquire of the manufacturers or their local agent. You will find that you will obtain an increase of power in consequence of more complete combustion and a higher rate of speed. The latter will not injuriously affect the engine bearings, as it is generally the hammering action that wears out the bearings rather than the rate of speed. You, of course, would have to cut out the governor with the spark advanced, when you would find the hill-climbing capacity of the car greatly increased owing to the higher speed at which you could run the engine.

LICENSE FOR MOTOR CAR ENGINEER.

In reply to the query of a reader who asked whether it was necessary for him to take out a license for a motor engineer whose sole duty was to attend to and drive a motor car, and who did not live in the house, we replied that the employer was liable to pay license, even if the man were only engaged for part of the day. In reference to this a correspondent writes as follows:

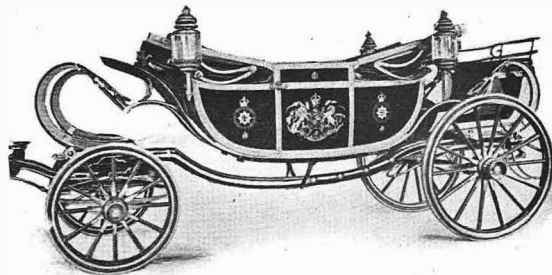
"As you will see, my business connection brings me in almost daily touch with the excise authorities. I have owned cars now for a period of two years. The first year never questioning the point, I took out a license for my motor engineer (whose sole duty it is to look after my cars). This year in conversation with an excise officer I put the question if I required a license for a driver, and his reply was if employed for the cars only it was not necessary. In sending in my return of servants employed I added a special note that I employed an engineer whose sole duty was to look after my cars. The return was made to a different collection from that in which the officer with whom I had the conversation was stationed. By return I got a note that I was liable for the license in question. I handed the note to the supervisor of our district here, who corroborated the opinion of the first officer, and said he would reply to same. He did so early in January, and I have heard nothing further on the point.

"I asked him one day recently if there was any further word as to the license, and he said I would never hear more about it.

"It would be interesting to know the correct reading on the point."

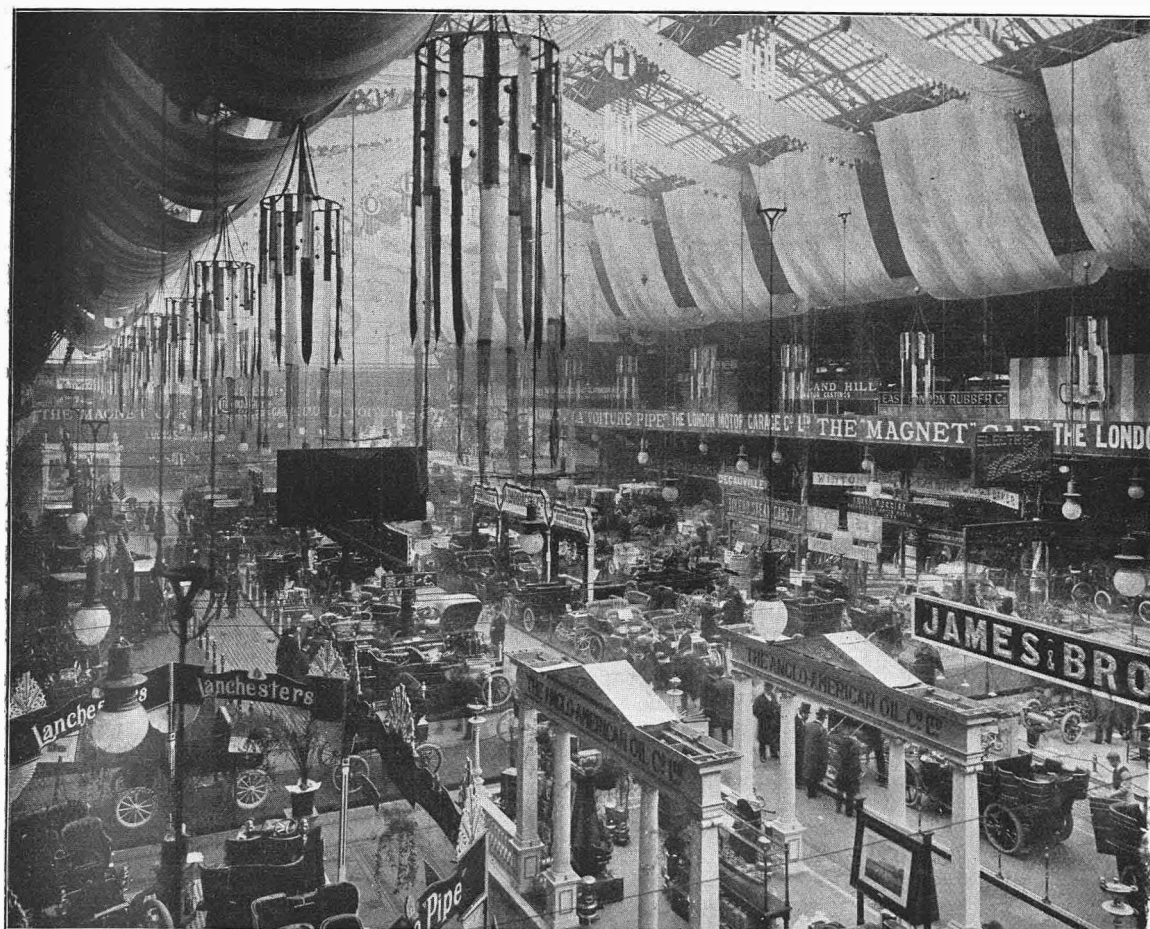
We agree with our correspondent that it would be interesting to have the correct and final decision on the matter, but it appears to be somewhat difficult to obtain it. The opinion we gave was that of a legal specialist, but when the excise officials appear to be doubtful it would seem that the matter at the moment is puzzling the authorities themselves.

We have received a letter signed "Ruralist," referring to our reply to "Why so Much Power" appearing on page 358 in the last issue of *The Autocar*. As our correspondent's arguments are not at all clear, and as his name is not given, we do not print his letter.



We have the greatest respect for things which are really old and for old customs when they are worthy of perpetuation, but we must say that the State carriages and similar equipages have never appealed to us, as they are not really old enough to be historic and more or less suggest the circus caravan. It is only a question of time before the Monarch will dispense with horses for State processions as well as for ordinary driving. In the meantime a step towards this has been made in the late State carriage of His Majesty, which is fitted with Buffer motor tyres. They are 2½ in. in diameter.

THE AGRICULTURAL HALL SHOW.



Argent Archer, Photo.

High Street, Kensington.

A general view looking west. This shows about three-quarters of the length of the Main Hall.

Messrs. Cordingley's motor show opened at the Agricultural Hall, Islington, N., on Saturday, the 21st inst., and closes to-day, the 28th. The exhibition was by no means ready for inspection at the opening hour on Saturday, but, by a judicious avoidance of the late areas, there was plenty to interest the visitor, and by the time he had inspected the stands which were ready, the minority of late-comers had put their exhibits in order. We refer elsewhere to the excellent scheme of decoration and light provided by the show promoters, and, although the cars on the generality of the stands are packed somewhat too close to allow of facile inspection, yet, on the other hand, the decorative efforts on the part of many of the exhibitors serve to make the interior of the Agricultural Hall a bright show indeed. Chief amongst those marked out for notice by their decorative splendour are the British Automobile Commercial Syndicate, whose gay surrounding signs and links and festoons of flowers looped in profusion to the huge Earl's coronet, which dominates the centre of the stand, make one of the most original as well as tasteful settings for automobiles in the show. The Motor Manufacturing Co. also make a brave show.

realising that good cars are none the worse for good setting. Friswell, Ltd., are bold in announcement, while the Clingoe Automobile Syndicate show discrimination and choice in the manner in which their cars are staged. By the example of the Star Motor Co., we are inclined to the opinion that a mistake has hitherto been made in raising cars six inches or so off the ground on to a platform. The Star cars are only about two inches above the gangway level, and are unquestionably much better displayed thereby.

As a large number of the exhibits in the present exhibition have been dealt with in our reports of the Crystal Palace, Earl's Court, and National exhibitions comparatively recently, we have decided to devote our attention as far as possible to those exhibits which have not been shown elsewhere within the last few months. In the event of one great annual exhibition, a stand-to-stand report is undoubtedly of very great interest; but, under the circumstances, we think it will be better in the present instance to drop this feature and confine ourselves to the most striking items in the show, as many of the stands, while displaying goods of very great in-

terest to the automobilists who actually visit the exhibition, can only be described in semi-catalogue fashion.

It should be clearly understood that the following report is intended to be taken as an impression—it does not profess to cover everything new or meritorious—it is merely an individual account based on a careful inspection of the exhibition. Many excellent exhibits are entirely ignored for the time being, though we shall return to them subsequently and describe in greater detail than is possible in a show report the motors, mechanism, or appliances which are worthy of special treatment. When necessary drawings will accompany the descriptions.

PETROL CARS.

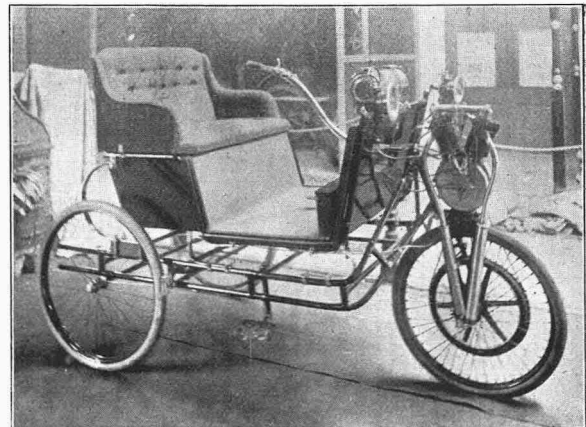
A car embodying some new features, which, unfortunately, cannot be described in detail at the moment owing to foreign patents pending, is shown by the United Kingdom Inventions Association, Ltd., on Stand 221 in the Main Hall. The engine fitted to the car has four cylinders, these being arranged in pairs oppositely inclined to one another, having a bore and stroke of $4\frac{1}{2}$ in. and 5 in. respectively. Both valves are mechanically actuated, and governing is by the usual centrifugal motion acting upon the throttle valve. High tension system electric ignition is employed, and forced circulation for the cooling cylinders. A new departure is seen in connection with this system, as the usual gilled or honeycomb radiator is dispensed with, and a large number of plain copper tubes employed. These are headed up into four small tanks, one placed over the engine at centre of the dashboard, and in front, and the others on either side of the frame, close to the dashboard. To ensure an equal distribution of water through these tubes double inlets and outlets are provided to the force pump. Power is transmitted to the back axle through a clutch and type of gearing which for patent reasons mentioned before cannot be described in detail. Briefly, the clutch consists of three parts, a phosphor bronze ring bolted to the flywheel having cone surfaces, with which the inner and outer clutches engage. The outer clutch is also made to act as a brake by coming in contact with a bridge piece which forms a stay member across the frame. The change-speed gear of the epicyclic type gives two speeds forward and a reverse operated by a single lever. The band brakes upon the back axle are double-acting and caged; within the ring of the drum are cut teeth, with which a pawl engages to act as a sprag in case of the car stopping on a hill. Another feature is the movable steering column, which may be set at any angle to suit the driver, and this without in any way affecting the adjustment of the steering or the actuating levers thereon. The whole of the operations of the control of the motor are carried out by means of Bowden wires, the levers of which are mounted upon the steering column. The wheel-base of the car is 7 ft. 9 in. and track 4 ft. 7 in.

In the matter of change-speed gears in which the gears are always in mesh, a very neat and ingenious arrangement is to be seen upon the stand of the Langdon-Davies Motor Co. Ltd., (Stand 23), which

At the end of each section into which we have divided the exhibition a list of exhibitors under that particular heading is given, so that the report will be useful to the show visitor who uses *The Autocar* as a guide. When the name of a previous show is given, it will be understood that a description of the car was given in the issue of *The Autocar* dealing with that particular show, and for the convenience of our readers we give the dates of the show issues: *Nat.* (National Show, see November 29th, 1902); *Paris* (Paris Show, see December 13th and 20th, 1902); *Stan. M.* (Stanley Motor Show, Earl's Court, see January 24th, 1903); and *C.P.* (Crystal Palace, see February 7th, 1903).

should be studied. In this gear, as we have already hinted, the change-speed gear wheels are always in mesh, but the driven wheels run loosely on gun-metal collars, and are only connected for drive to one or other of the driving gear wheels by a sliding key moving in a slot in the driven shaft. This key, having dipped under the curved web of the collar dividing the arms and gear wheels, shoots up into a pocket formed in the boss of the gear wheel, and is subsequently locked in position there by a sliding key moving under the locking key itself. The loose wheels rotate on the gun-metal collars, and are clear of the shaft itself, so that any chance of damage to the edge of the pocket or the edge of the slot in the shaft is avoided. We shall be giving a detailed illustrated description of this gear shortly.

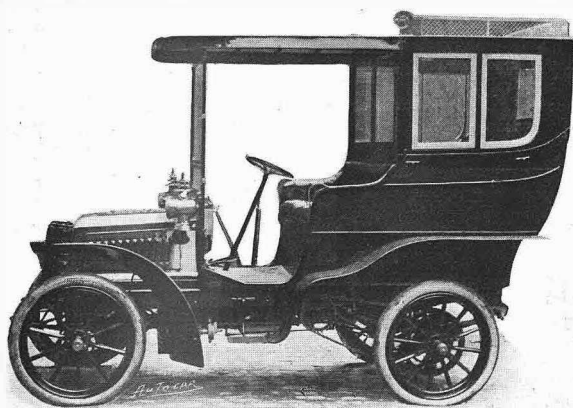
A bold attempt to meet the undoubted demand for a simple vehicle to carry two riders side by side is exhibited by the Crown Car Co., on Stand 144 in the Gallery. It is a three-wheeled vehicle driven and steered by the single front wheel. A two-cylinder motor is fitted on the front fork and drives the wheel through a single chain gearing. As the vehicle is very light and the motor is guaranteed to develop 5 h.p. it is not anticipated that a variable speed gear would be required for climbing any ordinary hills. There are several points which we think might be improved upon, but as the vehicle is confessedly the first of its type, and has been constructed hurriedly, we forbear to criticise.



Argent Avenue, High Street, Kensington.
The Crown two-seated car.

We do not think we have met the Phoenix Motor Co. before at a show, but their 13 h.p. car is worth inspecting. It is driven by a two-cylinder motor of their own make through a reversed cone clutch, between which and the first motorshaft there is a joint, so that risk of binding is avoided. The governor is fitted on the crankshaft itself, and controls the amount of gas admitted to the cylinders. The main brake—that is, the brake operated by the foot—acts upon the road driving wheels, so that the gearing is not subjected to this strain. The frame is built up of channelled iron, and the body is of the popular tonneau type. Judging from the look of the car, the weight of 15 cwt. is by no means excessive. (Stand 137).

Mechanically-actuated induction valves, which with the exhaust valves are all driven off one shaft, are now fitted to all the "Pipe" engines, and can



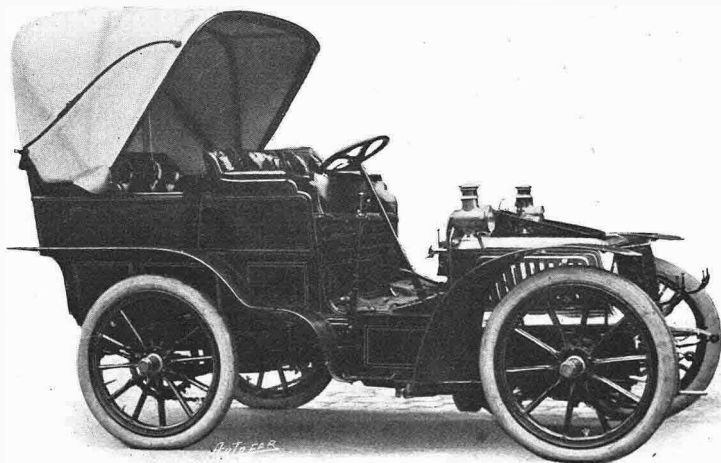
The Magnet Limousine.

be seen at Stands 19 and 38 of the London Motor Garage Co., Ltd. The carburetter also fitted to this engine is hot water-jacketed, but otherwise the "Pipe" engines are in detail as have been shown at both Earl's Court and the Crystal Palace. The 20 h.p. four-cylinder "Magnet" car is shown here for the first time in this country. The cylinders are 100 mm. \times 140 mm., and the engine is governed on the induction valve, and it is throttle governed on the admission pipe. Except for driving direct on the highest of the four speeds, this car answers to the general description of heavy cars as given in our illustrated typed description to the report of the Crystal Palace show.

An interesting feature (shown by the British Germain Motor Car Co., Ltd., on their Stand H in the Great Hall) in the shape of combined mechanically actuated and automatically actuated (at will) inlet valves is to be seen on the 15 h.p. four-cylinder engine driving the "Germain" car. The layshaft, which is set on the left-hand side, and outside the crank chamber, is fitted with additional cams, actuating two rocking levers set on a short shaft, one of which is actuated by a tension rod to a lever set across the top of the induction valve dome. This lever bears upon the spiral spring and the top end of the induction valve stem,

which is brought through to accommodate it. If it is desired to run the engine with the induction valve working automatically, the valve depressing levers are pushed down, and the tension rods slipped off their ends. The valves are then automatic in action. They can as easily and as simply be changed back to operate as mechanically actuated valves. A neat dust-proof lubricator is set in the valve dome for the purpose of introducing paraffin. This, though simple, is a particularly convenient fitting. A special self-governing carburetter fitted to this car was illustrated and described in *The Autocar* of January 31st, 1903, page 120, the number following Earl's Court show report. A well-finished example of a 40 b.h.p. Germain engine, as fitted to the Paris-Berlin cars, is now shown for the first time.

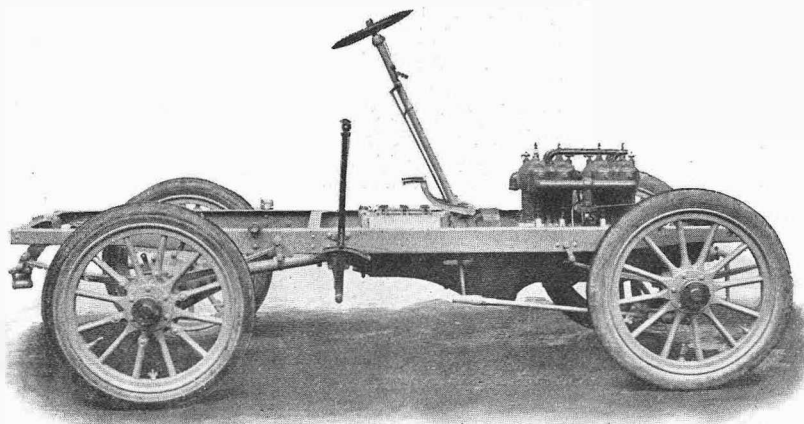
The "Grand" car is shown by the Motor Vehicle Engineering Co. (Stand 173) in both complete and chassis form. It is fitted with a 10 h.p. two-cylinder motor, and one of the special features is the ignition gear. Broadly, it is on the accumulator system, but the high tension wire is built up on a special system. In the centre is a single steel wire. This is surrounded by a number of copper wires, and this again by a coiled wire, so that if the main wire breaks the current will still be conducted by the coiled wire, which is, of course, extended *ad infinitum* without fracture. Outside the rubber insulation is a sheathing of lead. The lead acts as a condenser, and induces current to be set up through the high tension wire, with the result that a very fat spark of good colour is produced. Special attention has been paid to the articulation throughout, a joint being introduced between the clutchshaft and the first mainshaft, and the joints of the propeller-shaft are also specially constructed. In future the commutator is to be arranged on the dashboard. The radiator is on the Mercedes lines, but is built up with flanged piping, and the fan is arranged immediately behind the radiators. The complete car has a tonneau body, and is a very comfortable specimen of its type. In future it is to be built somewhat longer, so that it will give ample room for the feet both at the front and back. We understand that the first few cars will be distributed over the country at a very low price as an introduction.



The 15 h.p. Pipe car with folded tonneau.

Some attractive looking cars are shown by the Usines Prunel on Stand 198. There is a range of cars varying from 6 h.p. to 12 h.p. The former is fitted with single-cylinder De Dion engine, and Panhard type of gearing, giving three speeds forward and reverse, with direct drive on the top speed on to a live axle in the usual manner. The 9 h.p. car is also fitted with a single-cylinder De Dion engine, and has the same type of change speed gear, but in this case chain drive is used, instead of propeller-shaft and bevel gearing. The third car is one fitted with a 12 h.p. two-cylinder Aster motor. As regards its mechanism, this car is on precisely similar lines to those already mentioned. A neat little delivery van is also shown on this stand. This is fitted with 6 h.p. engine, and is similar to the car first mentioned, excepting that, instead of using the propellershaft and bevel gearing, chains are utilised.

The "Decauville" chassis (the Motor Car Co., Stand 67), which excited so much interest in the Paris Salon, is shown. Almost every part of the engine and mechanism has been cut in section so



The 16 h.p. Decauville chassis.

that the internal arrangement and working can be studied with ease. It is unquestionably the best chassis from an exhibition point of view that has ever been shown. Incidentally it brings out the special features of the car, such as the pressed steel frame, the completely enclosed motor and gear, and the live back axle.

The "Hurst" is among the cars which are seen for the first time in a show (Stand 85). It is fitted with a four-cylinder engine of 24 h.p. The cylinders are $4\frac{1}{2}$ in. bore by 5 in. stroke, and it is claimed that the revolutions of the engine can be varied from 100 to 1,000 per minute. The inlet valves are automatic, and the governor operates on the intake. The cooler is of the multitubular type, with belt-driven fan. The gear shaft is connected to the live balance-gear back axle by universally-jointed propeller-shaft. A special design of tonneau is shown with a large amount of overhang, so that the dust is kept down as much as possible and the occupants of the back seats protected from it. The 12 h.p. car is driven by a two-cylinder engine, and, of course, is a smaller vehicle than the 24 h.p., but the main details are the same.

Capt. H. H. P. Deasy, on Stand 197, is exhibiting a 16-20 h.p. "Rochet-Schneider" as described in last week's issue of *The Autocar*.

The "Oldsmobile" car, which has made such a name for itself in small car circles, and which we described in detail in *The Autocar* of September 13th, 1902, is to be found on Stand 83. It will be remembered that its main features are its extreme silence of running and great comfort, owing to the system of springing. The "Oldsmobile" is a conclusive proof that a small car for two people can be made which is absolutely silent. On the same stand will also be found that leading American petrol car, the "Winton," of which we recently spoke so highly of after a trial. (Anglo-American Motor Car Co., Ltd.)

The Canterbury Motor Co. make their bow to the public at Stand 130, in the Gallery, and introduce a four-seated car savouring both of the phaeton and tonneau types, with very much shaped and scalloped seats. The engine is a 12 h.p. Aster, having throttle governing and forced lubrication. The radiator is of the honeycomb type, connected up with flexible tubes. The clutch is of the expanding pattern, and the gearing on Panhard lines; but the balance gear is outside the gear box, and, like the clutch, may be readily detached without disturbing the other parts. A neat little voiturette with tonneau body of French construction is also exhibited. This is driven by a 6 h.p. De Dion motor, and has three forward speeds as well as a reverse. Both vehicles look very good value for the prices asked for them.

On Stand 94 Mr. L. A. Beckett, of 33, Marchmont Street, W.C., shows a "Beckett

and Farlow" car similar to that exhibited at the Crystal Palace. This has a 9 h.p. single-cylinder governed Mathieu engine. The governor is of the caged ball type, acting upon the throttle valve placed close to the valve chamber. The carburetter has a constant air inlet, the petrol supply being variable by means of mushroom valve, with screw adjustment. The cylinder dimensions are 110 mm. bore and 130 mm. stroke. The contact breaker is mounted at the end of the two-to-one shaft bearing by bayonet joint, so that it may be removed readily for cleaning purposes. Beyond these the car does not present any remarkable features.

The "Boyer" car, with 6 h.p. De Dion engine, three speeds, and gear drive. The price asked for it is particularly low, and it appears to be remarkably good value. It is shown by the Steam Car Industries Co. (Stand 207.)

The Clarendon Motor Car Co., Earlsdon, Coventry, show a 7 h.p. single-cylinder car with three speeds and reverse for the first time at any motor show. This car practically conforms to the light type standard given in our report of the Crystal Palace Show.

A number of well-known cars are shown by the Clingoe Automobile Syndicate, Ltd. (Stands 80 and 81), such as the "Panhard," "De Dion," and "Clément."

The "Salisbury" car is a new make shown by the Motor Traction Co., Ltd. (Stand 84). It is turned out in 7 h.p. single and 10 h.p. two-cylinder patterns. The single-cylinder machine has three speeds and a reverse, and the two-cylinder four. The gear is of the Panhard type, and the last drive is by outside chains. They are smart-looking vehicles. The "Germain" cars are also to be found here.

The latest model "M.M.C." 20 h.p. car is well shown in chassis form. Most of the features are those which have already proved themselves satisfactory in the company's standard patterns, but those exhibited on Stands 43 and 44 introduce one or two new features such as the honeycomb radiator with forced draught, and the Eiseman ignition, this being fitted, in addition to the ordinary high tension system. The finish of this chassis does the makers great credit.

On Stand 39 is shown for the first time in this country the "Crouan" cars, propelled by 6-7½ h.p. horizontal, two-cylinder motor. The cylinders are opposite each other across the car, with connecting rods working on one crank. According to the description given, the gear box contains five speed changes, the drive passing thence to live axle in the usual way. The car has several ingenious and somewhat novel features in the matter of throttle and engine control. The two vehicles are staged by Messrs. C. Isler and Co., Bear Lane, Southwark, London, E.C.

The 12 h.p. "Meteor" car shown at Stand 28 by Messrs. Pritchetts and Gold, of Feltham, Middlesex, is now staged with stamped steel frame in lieu of the tubular frame as shown at the Palace, and 32 in. wheels instead of 30 in. The wheelbase also has been increased to 8 ft.

In the 12 h.p. two-cylinder "Darracq" car exhibited on the stand of A. Darracq et Cie., Suresnes, France, and "Automobilia," 532, Oxford Street, Marble Arch, London, W., the engine is shown for the first time fitted with mechanically-operated inlet valves, in the details of which there is nothing out of the common, save that the exhaust lifting rod guides are secured in position in bosses in the crank chamber by means of a dog made with semi-circular ends to embrace the outside of the guide. This dog is secured by one nut in the same manner as the dogs holding down the induction valves. This method of securing the valve-lifters is also applied to the exhaust valves.

The "Swift" chassis (Stand 88), which was shown at the Crystal Palace, again excites admiration for its remarkable finish. Next door (Stand 89) a 10 h.p. and 16 h.p. "Ariel" are shown. These are splendid specimens of British work, but as we have dealt with them fully in our Crystal Palace show report we need not refer to them in detail here.

The Victoria Carriage Works, Ltd. (Stand 55), certainly scored in purchasing the "Humber" chassis exhibited at the Crystal Palace Show, as it proves as great a centre of attraction here as it did there, and well it may. Though it tempts one to enlarge upon its merits, we must refrain, having dealt with it so recently.

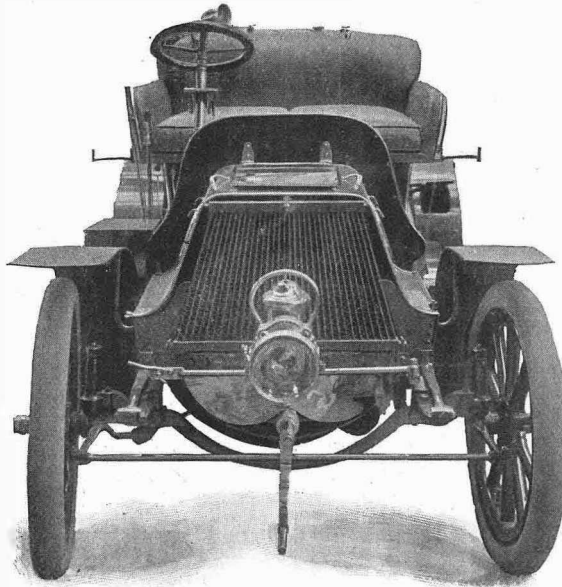
The 9 h.p. two-cylinder "Rochet" car shown on

Stands 20 and 21 by the New Automobile Co. is a new introduction in this type of car. It may be briefly described as a perfect replica of the 16 h.p. car driven by an engine made up by utilising two of the cylinders of the engine of the larger car. Otherwise the details are similar to the "Rochet" car and mechanism described in *The Autocar* of September 27th, 1902, page 317.

Exhibited by G. Braulik (Stand 104) is an 8½ h.p. single-cylinder car, two-speed gear forward and reverse; central chain drive to rear live axle. The stays to the back axle are centred to about the middle cross member of the frame, where they work upon an universal ball joint, allowing for the

swing of the car in passing over rough roads. This arrangement permits of the axle being supported under the worst running conditions.

The "British Peerless" (Stand 65) is a new 8 h.p. single-cylinder car entirely of English manufacture. The cylinder is 4¼ in. bore by 4½ in. stroke, speed 1,200 to 1,300 normal revolutions per minute. A modified Sthenos carburetter is used, and the engine is well considered throughout. The valves are readily accessible. A ball cock is used for compression release at starting, and all the gear for the layshaft and pump driving is entirely enclosed. The pump is easily detachable, and cannot be replaced in the wrong position, while a mud pocket at the bottom of the circulatory system is another evidence of the careful manner in which all practical driving details have been considered. A sliding gear of the modified Panhard type gives three forward speeds and reverse, and the drive through to the live axle is by universal shaft. The frame is tubular, with tension braces where required. The car with tonneau body complete weighs 9½ cwt., and it strikes us as being a particularly sound piece of work throughout. It is made by a well-known firm of machine tool manufacturers.

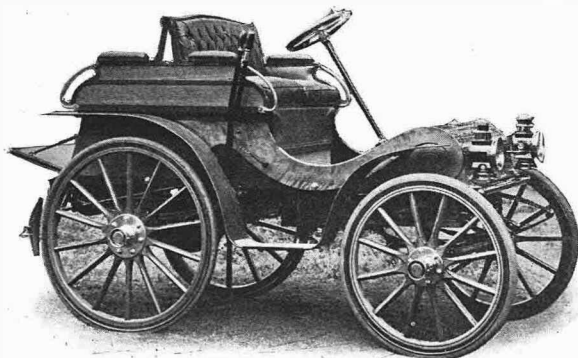


Front view of the 10 h.p. M.M.C. car showing the new radiator.

E. W. Hart, Lorne Gardens, Park Road, London, N.W., exhibits (Stand 91) two 9 h.p. "Renaults" and one 16 h.p. "De Dietrich." These are standard pattern cars, and therefore require no particular description.

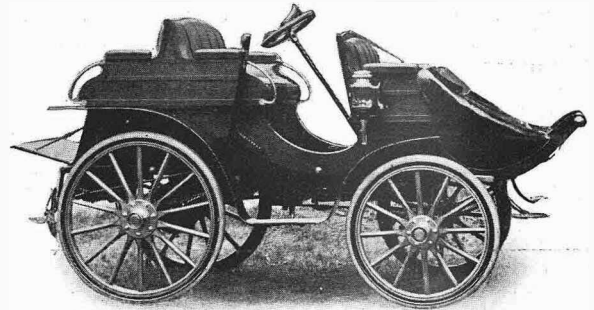
Some of the heavier "Rex" cars (Stand 39) are fitted with the duplex back axle consisting of two members, one above the other. The road wheels are mounted on the lower axle, and are driven by spur gearing from the upper axle, which is fitted with a balance gear. This takes a good deal of strain off the balance gear, and makes a very strong back axle.

The four-cylinder 20 h.p. "Dechamps" engine, to be seen fitted to the chassis at the end of Stand 18 (the Graphic Motor and Engineering Co., Ltd., of Peckham, S.E.), exhibits several features novel to this firm's construction. This engine is fitted with mechanically-operated induction valves. Both induction and exhaust valves are identical, and are carried on one side of the engine, and worked off one shaft. Forced feed lubrication by air pressure feed from tank on the dashboard is employed to engine and crank chamber. The oil is delivered to the valve lifting rod guides, and through leads in these on to the lifting roller cam, and thence into the crank chamber. The pump of this engine is gear driven, and forced draught is employed for cooling by means of a fan delivered off the pump spindle. The pump delivers from the bottom of the radiator to the underside of the valve chamber. A large forced feed grease lubricator is fitted behind the dashboard, and is used to serve all the gearshaft and differential shaft bearings through leads. By an ingenious arrangement controlled by a needle moving over a dial plate, additional lubrication can be delivered to any desired bearing. In this 20 h.p. car the clutch is mounted in a novel manner. The engineshaft is prolonged right through the flywheel and clutch boss, and has at its rear end a driver engaging with another on the forward end of the primary gearshaft. The clutch spring thrusts against a boss on the elongated engineshaft, and, of course, against the rear face of the clutch boss itself. The result of this obviously is that the thrust of the clutch spring is nullified, and is delivered neither to the engineshaft bearings nor to the bearings of the primary gearshaft. The steering axle to this car is also of new design, being of the double pivoted type, with steering rod and steering levers forward of the axle.



The Arrol-Johnston dogcart.

The "Arrol-Johnston" car is exhibited for the first time, and presents many interesting features. The main frame is of angle steel, and the inner frame, which is on the same level, is of T-section. The motor is carried above this frame towards the back of the car, and has two cylinders running fore and aft, each containing two pistons. These work through rocking levers on to a single shaft. A variable speed gear giving four forward speeds and reverse transmits the motion through a chain to a short countershaft carrying spur wheel gearing with the balance-gear axle. An impulse is obtained on both crank pins at every revolution of the crankshaft. This runs in an oil-bath, and lubricant is forced through all the bearings in the crank



The Arrol-Johnston six-seater car.

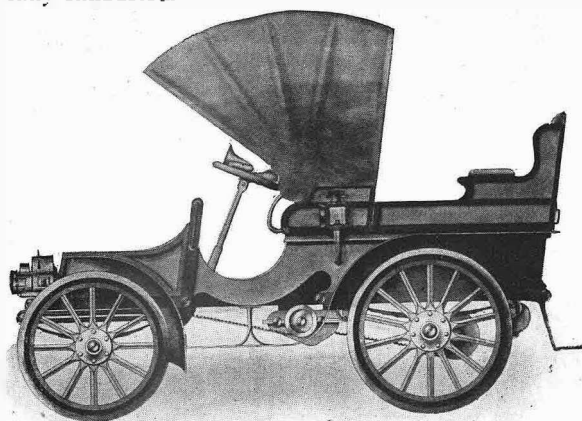
case. Magneto ignition is employed, and the control is effected through a single hand lever. Rotating this handle operates on the exhaust valve through the governor. We were pleased to notice that this car was fitted with a starting device operated from the driver's seat—a point which is much too generally neglected. The "Arrol-Johnston" car we described in some detail in connection with the Glasgow Exhibition, since when the system has not been materially changed, though it has been improved in some details. The cars present a most distinctive and, we may say, most distinguished appearance with their natural wood bodies and open-fronted seats forward of the driver. The back part of the car usually partakes of the double dogcart type, which is well adapted to the elevated position of the engine and mechanism. (Stand 45.)

The "Hermes" motor is shown for the first time at the Agricultural Hall by John L. Sardy, 8, Snow Hill, London, E.C. It is a four-cylinder 25 h.p. motor, but the details are precisely the same as those illustrated and described in *The Autocar* of February 7th, page 155. A 15 h.p. engine is shown fitted to a delivery van, in which the drive passes from the countershaft to the differential-shaft axle by means of a heavy pitched chain by the Coventry Chain Co. (Stand 9.)

Hewetsons, Ltd., at Stands 63 and 64, show a sample of the new "Benz Parsafal" car, with two cylinders, vertical motor driven through ordinary friction clutch change-speed gear, and propeller-shaft on to the live axle. A cellular radiator fills in the forward panel to the motor bonnet. The pump is driven off an extension of the layshaft, and a gear-driven rotary magneto supplies the low tension current for ignition. An ample silencer is fitted to each cylinder. The work in the vehicle is well up to the usual Benz standard.

On Stand 51, in addition to the 80 h.p. racer which holds the Welbeck record for the flying kilometre, Messrs. C. S. Rolls and Co. show a luxurious aluminium tonneau with armchair seats, as supplied to His Majesty the King of the Belgians. This firm also has a 7 h.p. Panhard engine fitted with the new Krebs carburetter.

The Beaufort Motor Co. introduce their new 10 h.p. two-cylinder car at Stand 30. This is the new 1904 machine, and has two or three valuable features, such as a cleverly-arranged filter for the petrol, which should check any foreign matter whether in the way of dust or water, thus only allowing the pure essence to pass to the carburetter. The magneto ignition machine is driven by spur wheels instead of a chain, and is coupled up in such a way that it cannot be set incorrectly. The grease for the pump, which is also gear-driven, and for the back axle, is fed from a hand pump on the dashboard. Although the 1904 pattern cars are being already introduced, they can be delivered earlier than some of the 1903 patterns, which are practically exhausted.



A new design for the Arrol-Johnston car.

The Lancaster Motor Garage is another new firm, and will be found in the Gallery at Stands 131 and 132. There is a good display of "Panhard" cars, which are very moderately priced, considering their up-to-date design. One of the most interesting exhibits is the "Milde" coupé. This is a combined petrol and electric vehicle. A 6 h.p. De Dion motor drives a dynamo, which is coupled up to accumulators, and these again feed an electric motor, which drives the road wheels through a balance-geared axle and internal spur gearing. The range of the batteries is some forty to fifty miles, and, of course, when these are getting low, the petrol motor can be switched in, and, recharging, started forthwith. It will be understood that the car is always driven either from or through the batteries. The "Mass" cars are certainly wonderfully convenient and moderate in price. The 6 h.p. has a De Dion engine, having both forced and natural water circulation. There is a three-speed forward change-speed gear; also a reverse. The body is of the tonneau pattern, and the wheels are shod with Dunlop tyres. The "Baby Mass" is fitted with a 4½ h.p. Aster motor and a two-seated body, and has the same speeds as the larger vehicle. The price should ensure a ready sale. The manager's desire is so to deal with his

customers that they will come and come again, and he certainly seems to be working on lines which should produce this result.

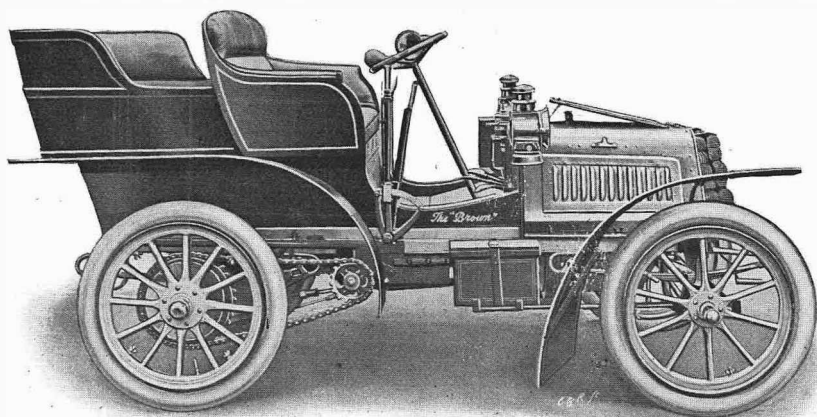
A new pattern of control lever is shown on one of the "Duryea" cars (Stand 36). This is of the cross variety, and, beside moving to and from the rider for steering purposes, also rises and falls to change the gear. Rotating the handle on the bar adjusts the throttle. This control is fitted to a waggonette, and is provided with a detachable canopy and very serviceably arranged curtains, which can be used to exclude wet or dust, as may be required.

The "Horbick" cars which are shown upon Stand 24 by Horsfall and Bickham, Manchester, are for the first time fitted with motors of 10 h.p. and 8 h.p., both having two cylinders. The car respectively corresponds to the light petrol car of the standard type given as an example in our Crystal Palace report. We may say that it has a tubular frame and expanding internal drum brakes on driving wheels. The chassis shows evidence of great consideration, thought, and careful workmanship in production. A noteworthy feature of the driving mechanism of these vehicles is an ingenious form of spring drive, in which two small laminated springs are mounted on the rear end of the clutchshaft and embrace between their ends a driver carried on the forward end of the primary gearshaft. This appeals to us as a neat little fitting to avoid all shock and vibration either from the engine or road.

The new 14 h.p. "Brooke" car, which we illustrated last week, is exhibited by Messrs. F. F. Wellington, Ltd. (Stands 70 and 71). It is only in its rough coat of works grey, but it is an exceedingly up-to-date-looking vehicle and excites great interest. The three cylinders are 3½ in. bore and 4¼ in. stroke, and the normal revolutions are 900 per minute. The diaphragm governor illustrated in *The Autocar* of February 28th, 1903, page 259, is used, and in this car the Brooke system of transmission is not used, but a modified Panhard change speed is employed. The car is low built, but the lowest point gives 9½ in. clearance.

The "Chenard-Walcker" (Stands 46 and 47) is such a thoroughly up-to-date vehicle that one hardly expects to find any improvement would have been introduced since it was exhibited last month at the Crystal Palace. However, one feature has been added, which will appeal especially to those who are obliged to travel much through traffic. The hand regulator on the dashboard fixes the time of lift of the inlet valve, which, it will be remembered, is controlled by a special cam. In addition to this control, the driver can always slack down from the maximum fixed for the time being with the hand arrangement by depressing a pedal, so that the car is slowed, instead of accelerated, in this manner. A further advantage is that when the car is thus slowed down it is particularly quiet, and does not buzz and throb, as too many motors do when temporarily held in check. Of course, one of the principal characteristics of these cars is their consumption, or, more properly, their lack of consumption, and the vehicle which acquitted itself so well in the recent French consumption trials is on view.

The "Lipscomb" light car, exhibited by the English Motor Co., is a good specimen of the type of vehicle which is now very popular. It is driven by an engine of standard make of about 6 h.p., fitted with scooped seats for two, and having three forward speeds and reverse, and selling at about £200. The "Oilmobile" car, with tiller steering and off set tubular spoked wheels, is on view at the same stand, viz., 136 in the Gallery.



The Brown 8 h.p. car, chain driven.

Messrs. Friswell's exhibit is confined to cars of the "Peugeot" build, the "Baby" being, of course, prominent. The "Baby" has now got a big sister in the form of a $6\frac{1}{2}$ h.p. tonneau. The engine is governed on the inlet valves. In this car the change-speed lever is placed at the side of the driver. (Stand 54.)

On Stand 96 (Stirling's Motor Carriages, Ltd.) is shown a public service vehicle, as illustrated and described in *The Autocar* of May 24th, 1902, page 545, a single-cylinder "Racine" motor launch, fitted with propeller and having variable throw, being also exhibited.

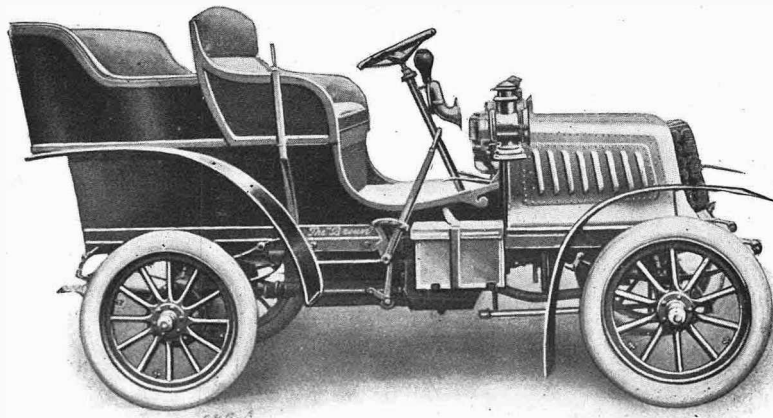
The new "Delahaye" car, which is now built on accepted lines, is shown by the Chief British Depot (Stands 68 and 69). It is a 20 h.p. vehicle, and an excellent example of the type which was dealt with at some length in our Paris Salon report of December 20th. The four cylinders are 100 mm. bore by 140 mm. stroke, and the full power is developed at from 900 to 1,000 revolutions. The governor on the throttle is both hand and pedal controlled. The engine can be set to govern at any speed from two hundred revolutions upwards, and the governor can be cut out by pedal in the usual way. The hand setting is by a little milled nut on the steering column, and can be instantly performed when driving. In place of the usual side lever, a single lever under the steering wheel is used to effect the speed changes. It is an extremely simple and handy arrangement, and should be particularly appreciated by those who do not find the side lever system all that could be desired. With the change lever

on the steering column and immediately under observation the operation of changing is simplicity itself.

On Stand 142 Messrs. Brown Bros., Ltd., of Great Eastern Street, E.C., exhibit their 8 h.p. car in two forms, one having chain and the other live axle transmission. The engine used is a two-cylinder Daimler type, governed, and provided with the usual accessories. The change-speed gear is of the sliding type, and gives three speeds forward and reverse, actuated by a single lever. As we said before, one of the cars exhibited is provided with a live axle transmission of the usual form, while the other has the usual balance-gear counter-shaft and side chain drive. The two illustrations which we give convey an excellent idea of the design of the vehicles; therefore, no comment is necessary upon this point. The workmanship is good and the price moderate—two points which will appeal to the prospective buyer. As a matter of further detail, we may mention that the framework is

built of channel steel and carried upon very substantial springs and axles. The wheels are artillery pattern, and shod with Clipper-Michelin tyres. The wheelbase is 7ft. 3in., and gauge 4ft. 3in.

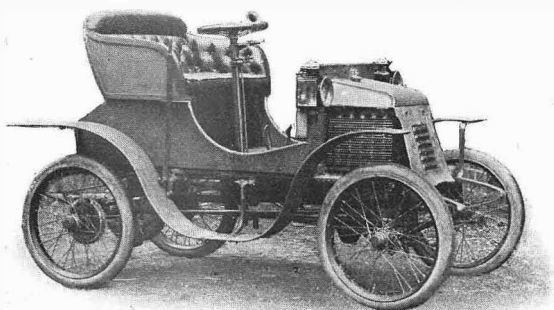
The "Carpeviam" was entered for the Crystal Palace show, but was not ready when we made our report there. However, it is to be seen in full force on this occasion at Stand 156 in the Gallery. Broadly speaking, it is on Bollée lines—that is to say, it has a pair of front wheels steering on the Ackerman principle, and a single rear driving wheel. The body, however, is constructed to carry two passengers side by side. The engine is a $2\frac{3}{4}$ h.p. De Dion, set vertically in front of the driving wheel, which it rotates at either of two speeds through chain gearing. Though not without its advantages, the machine strikes us as being short in the wheelbase, and a more powerful engine might be fitted with advantage. Still, it is an attempt to meet an undoubted want.



The Brown 8 h.p. car, propeller drive.

A very fine exhibit of 6 h.p., 12 h.p., and 24 h.p. "Portland" cars, in which single-cylinder, two-cylinder, and four-cylinder Aster engines are fitted, is shown at Stand 82 by the International Motor Car Co., of 76, High Street, Marylebone. In addition is exhibited a 6 h.p. "Charette," with two speeds forward and one reverse. This is the first show at which this company have exhibited the "Portland" cars, and we are bound to compliment them upon the excellent appearance and finish they present. So far as the driving mechanism goes, this is designed upon sound accepted lines, and takes the form of drive through friction clutch change-speed gear and propeller-shaft to live axle. The two lower power cars have three speeds forward and reverse, driving direct on the top speed. The 24 h.p. has four speeds forward and reverse, and also drives direct on the top speed. A frame radiator of Loyal type closes the front of the bonnet, and gives a very neat finish thereto.

One of the nicest little cars in the show is to be seen on the stand of the Ridley Autocar Co., Coventry (No. 230). One of the two cars shown is fitted with a $4\frac{1}{2}$ h.p. Buchet motor. Transmission gear is the feature of this car. It consists of a direct drive on to the live back axle, through a double bevel gear; that is to say, there are two bevel gear wheels, which, by the way, are cut on the skew, and mounted upon a solid live axle running in ball



The Ridley $4\frac{1}{2}$ h.p. voiturette.

bearings. Upon the end of the propeller-shaft, which runs right through the gear case, are mounted two bevel pinions, which are constantly in mesh with their respective gear wheels, being locked thereto by means of jaw clutches which have three positions—first to throw out of gear, the second the slow speed gear in, and third high speed gear in. There is no balance gear fitted to the axle, it being fitted with free-wheel clutches on to the road driving wheels. It will be remembered that this gearing was described and illustrated in *The Autocar* of October 26th, 1901, and it remains to-day the same as then described. The accompanying photograph depicts this neat little car, which is sold at a very moderate price, which should appeal to a large class of purchasers.

The "Jackson-Covert" car, a light car of American construction, is shown upon Stand 116 by R. R. Jackson and Co. It is fitted with 3 h.p. motor with air-cooled cylinder and water-cooled head, electric ignition (usual system), dry batteries, Longuemare carburetter, engine placed forward of back axle, and driving by chain on to countershaft placed

about the centre of the car. This countershaft is provided with two clutches, attached to which are chain sprockets of different diameters. From these sprockets power is conveyed to rear live axle by chains to other sprockets of different sizes. The low gear drives from the small size sprocket on the countershaft to the larger chain wheel on the back axle, the high speed sprockets being of nearly equal size. The change-speed lever has three positions—one neutral, one giving the slow speed, and the other high. The clutches are of the expanding type, and should give a smooth change. The petrol and water tanks are located beneath the seat, which accommodates two passengers. Steering is by tiller operated by the left hand, the right hand controlling the ignition lever, while the levers regulating the carburetter project from beneath the seat. The wheels are of the suspension type, shod with Dunlop motor tyres. The frame is of tubular construction, carried on four elliptical single plate springs, a single brake acting on a drum being placed between the two rear sprockets on the live axle, which is fitted with ball bearings. No mudguards are fitted, which has the effect of making the vehicle look unfinished and unworkmanlike. A second type of American petrol car is to be seen on this stand. This is fitted with a 9 h.p. single-cylinder horizontal motor, with the usual water-cooled cylinder and electric ignition. The inlet and exhaust valves are mechanically operated. A large diameter outside flywheel is employed to ensure steady running. A two-speed gear of the Crypto variety is provided, the top speed being direct to the rear live axle by a single chain. The reverse speed is also obtained by means of a Crypto gear. Two hand brakes are provided, both operating on the back axle, being applied by means of a pedal. The framework is of built-up T-section, the engine being mounted upon it directly and beneath the seat. A second seat for two passengers is provided, and this is so arranged that it may be placed behind the fixed seats, so that the passengers face rearwards; or it may be placed in front, so that the passengers face towards the driver. To provide a substantial-looking front to the vehicle and to admit of the fixing of the front seat, a large toolbox is built up which gives plenty of room for luggage and spare parts. The control of the machine has been reduced to the simplest limits, and should be easily learned. There are also to be seen upon this stand examples of the "Stirling" three-wheeled phaeton, and the latest type of 12 h.p. "Gobron-Brillié" car.

The King Edward's Hall is devoted entirely to two exhibits. On one side is a very fine array of the "Siddley" cars, which were described in some detail in our Crystal Palace report; and on the opposite side Messrs. Hutton have a large range of "Panhard" cars. The "Pognon" plug has been quite a centre of attraction, shown as it is working under the most distressing conditions. The room is a blaze of light and is decorated in such a manner that it looks vastly different from the chilly Annexe it is in its normal state. Not only so, but a number of comfortable chairs are provided, so that would-be purchasers can give their orders at their ease. Considering that it is out of the way to some extent, it is remarkable to notice what numbers of the visiting public manage to find their way to it.

LIST OF EXHIBITORS OF PETROL CARS.

	STAND		STAND
James and Browne (see last week's <i>Autocar</i>)	(C.P.) B	Chief British Depot, Delahaye cars	69, 69
A. Darracq and Co.	(Paris) E	F. F. Wellington, Brooke cars	71
New Orleans Motor Co.	(C.P.) F	Van Toll and Co., Cotteau cars	79
H. E. Hall and Co., Darracq cars	(Paris) G	Clingoe Automobile Syndicate, Clement, De Dion, Panhard, and Boyer cars	80 & 81
British Germain Motor Car Co., Germain cars	(C.P.) H	International Motor Car Co., New Portland cars, Charette	82
H. P. Salisbury, De Dion	(C.P.) 1	Anglo-American Motor Car Co., Winton and Oldsmobile cars	(C.P.) 83
Coxeter and Sons, Abington cars	2	Motor Traction Co., Salisbury and Germain cars	(Stan. M.) 84
J. Cockshoot and Co., Northern car	(C.P.) 8	Firefly Motor and Engineering Co., Firefly cars, Renault and Panhard chassis	(C.P.) 86
J. L. Sardy, Hermes cars	(C.P.) 9	Swift Motor Co., Swift voitures	(C.P.) 88
Gobron Motor Co., Gobron cars	11	Ariel Motor Co., Ariel cars	(C.P.) 89
A. W. Ganage, 6 h.p. voitures	(Stan.) 12	E. W. Hart, Mercedes, Panhard, Darracq, Renault, De Dietrich, Peugeot, and Hart petrol electric cars	(C.P.) 91, 140
Highgate Motor Car Co., Darracq and Continental cars	17	Great Central Garage, Renault, Darracq, Panhard, Earl, and Charron, Girardot, and Voigt cars	(C.P.) 92
Graphic Motor and Engineering Co., Dechamps cars	(C.P.) 18	General Motor Car Co.	(C.P.) 93
Louison Motor Garage Co., Magnet, Lanchester, and Pipe cars; 18 h.p. Mercedes expected before the close of the show	(C.P.) 19, 38	L. A. Beckett, Beckett and Farlow cars	(Stan. M.) 94
New Automobile Co., Rochet cars	(Stan. M.) 20, 21	Stirling Motor Carriages, Ltd., public service vehicles and motor launches, electrical cars	96
Langdon-Davies Motor Co., Soames car	(C.P.) 23	G. Brault, Protos cars	(M.H.) 104
Horsfall and Bickham, Horbick car	24	Salmons and Sons, Stoeveer chassis, motor car bodies, etc.	(M.H.) 105
Haynes and Son, Warburg cars	(C.P.) 26	Velo Motor Co., Velo cars	(C.P.) (M.H.) 113 & 114
Pritchett and Gold, Meteor car	(C.P.) 28	R. Reynold Jackson and Co., Jackson cars	(M.H.) 116
O. C. Solbach, Regal cars	(C.P.) 32, 33	Canterbury Motor Co., Canterbury car	130
Petrol Motor Power Co., American Peerless and Rambler cars	(Stan. M.) 34	Lancaster Motor Garage, Panhard and Mase cars, Mide combined electric vehicle	131-132
Roadway Autocar Co., 1903 Mors and Renault cars	(C.P.) 35	English Motor Co., Lipscomb light cars	(Stan. M.) 136
Duryea Motor Co., Duryea cars	(C.P.) 36	C. Isler and Co., Crouan car	139
Maudslay Motor Co., Maudslay cars	(C.P.) 37	Brown Bros., Ltd., Brown cars	142
Rex Motor Manufacturing Co., Rex cars	(C.P.) 39	Crown Car Co., Crown car	144
Mann and Overton, Georges Richard and Mercedes Simplex cars	(C.P.) 40, 60, & 209	Morgan Donne, Martini Simplex car	148
Motor Manufacturing Co., M.M.C. cars	(C.P.) 43, 44	Bradford Motor Car Co., Panhard, Clement, and Spyker cars	149
Mo-car Syndicate, Atrol-Johnson cars	45	C. Peacock and Co., Carperian 2½ h.p.	(C.P.) 156
Weston Motor Syndicate, Chenard-Walcker cars	(C.P.) 46, 47	Clarendon Motor Car and Bicycle Co., Clarendon Cars	162
Star Engineering Co., Star car, also car built for the eliminating test of the Gordon-Bennett race	(C.P.) 48	Motor Vehicle Engineering Co., The Grand cars	173
Beaufort Motor Co., Beaufort cars (see <i>The Autocar</i> , Feb. 21, 1903, page 231)	(C.P.) 50	Rawlings Bros., Ltd., Belsize and Kensington cars	(C.P.) 174-174a
C. S. Rolls and Co., Panhard cars, also the 80 h.p. racer on which the Welbeck record was recently made	(C.P.) 51	Du Bois Co., Ltd., Du Bois cars	177
British Automobile Commercial Syndicate, 1903 Clements (see Stanley Motor Show report), Panhard-Levassor cars (see Paris Show report)	(Stan. M.) 52, 53	Capt. H. P. Deasy, Rochet-Schneider car	(C.P.) 197
Friswell, Ltd., Peugeot cars	(Stan. M.) 54	Les Usines Prunel, Prunel cars	(Stan. M.) 198
Victoria Carriage Works, Humber cars	(Stan. M.) 55	D. Citroen, Ajax chassis (12, 16, and 24 h.p.), Pandora chassis, 7 h.p.	200-201
Hozier Engineering Co., Argyll cars	(C.P.) 58	Steam Car Industries' Co., Boyer, Stirling, and Magnet cars	207
Hewetson S. Ltd., Benz and Benz-Parsifal cars	(Paris) 63, 64	The Mail Motor Co., Mail cars	220
British Peerless Motor Co., Peerless cars	65	United Kingdom Inventions Association, Ltd., Holcar car	221
Frank Morris, Sandringham car	66	Ridley Autocar Co., Ltd., Ridley cars	230
The Motor Car Co., Decauville cars	(Paris) 67	J. E. Hutton, Panhard-Levassor cars	(K.E.H.) 1
		Siddeley Autocar Co., Siddeley cars	(K.E.H.) 2
		Hyde Park Motor Co., H.P.S. car	125b

STEAM AND ELECTRIC CARS.

The "Moore" pump for steam cars was introduced at last year's exhibition, and, as our readers will remember, it has only two working parts, and these are of very strong and simple construction with large bearing surfaces, so that risk of failure is reduced to a minimum. The pump is now made in various sizes to be worked mechanically, or by hand, and in some cases it is modified to act practically as a condenser pump also. The makers of the larger steam vehicles particularly seem to have found them satisfactory.

There are no additional variations in the range of "Gardner-Serpollet" cars shown by the Speedwell Motor Eng. Co., of 50, Albert Gate, but one of these presents a novel departure, so far as "Serpollets" are concerned, in being provided with very handsome Roi de Belge body. (Stand 22.)

Messrs. Suffield and Brown show on Stand 7 a 16 h.p. compound steam car which is an extremely interesting vehicle, and which should not be missed by any visitor to the show who is on the look-out for steam-propelled vehicles. The engine is carried vertically on the frame, beneath the driving seat, the countershaft being actuated by means of the chain drive. From the ends of this shaft the car is driven in the ordinary way. The electrically-welded boiler, which is also a speciality of this firm, is carried on the forepart of the frame beneath the motor bonnet. It is 20 in. in diameter and 30 in. high, has 669 fire tubes, and works at a pressure of 300 lbs. to the square inch. It is fitted with a paraffin burner, water lift, etc.

One of the "Weston" cars is exhibited (on Stands 46 and 47) as specially constructed for the Indian market and the Far East generally. It is provided with a coolie seat and canopy to afford a welcome shade; but, more important still, it burns paraffin instead of petrol, the lighter liquid being practically impossible to obtain in some of the districts for which the car is intended.

The Victoria Carriage Works, Ltd., show the "Toledo" steam car in an improved form on Stand 55. As hitherto, this car is fitted with Diamond tyres, but it now has a water tube boiler and increased capacity, the water tank having a capacity sufficient to enable the car to travel forty miles, and the petrol for one hundred miles.

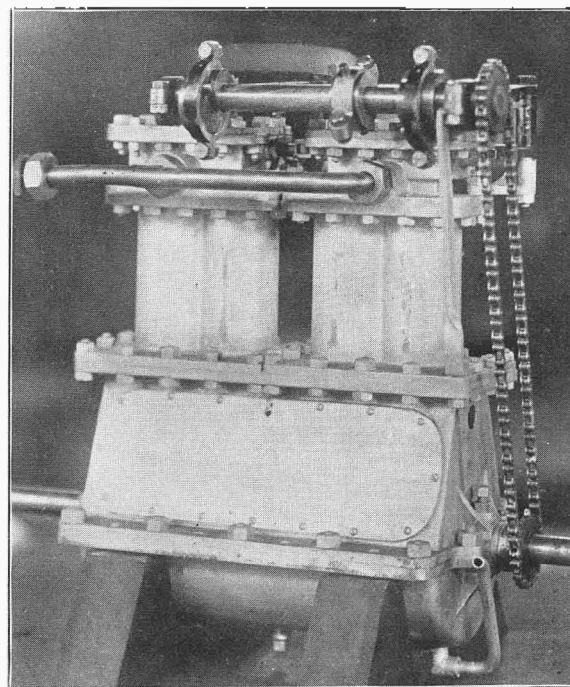
In the "Saracen" steam car, which is shown by Mr. J. L. Sardy, on Stand 9, the only fresh point to be noted is the provision of a single valve to the delivery of the two pumps and the water lift in lieu of the three valves which have hitherto been fitted. This is a step in simplification. There are practically four feed pumps to this boiler, two worked off the engine crosshead, a hand pump, and an independent steam pump. This is entirely independent in suction and delivery pipes. Levers for controlling the throttle, independent steam pump, by-pass from engine pumps, waterlift, and reverse are all set most conveniently at the left hand side of the driver. All steam and water pipes to and from the boiler are provided with stop cocks, so that the boiler may be entirely cut off from the engine or pumps when repairs are necessary.

The "Miesse" cars shown on Stands 20 and 21 by the New Automobile Co. have a fresh feature in the shape of an oil pump for automatic lubrication worked off the same eccentric as the feed water pump. This lubricating pump serves the engine only. An additional feature in the "Miesse" car is the foot-controlled throttle valve, a very simple form of a flat circular rotating valve, the actuation of which must greatly simplify the driving of this vehicle.

The "Stanley" steam car, which is shown by Messrs. Joseph Cockshott and Co., Ltd., at Stand 8, was exhibited at the Crystal Palace, but by inadvertence was not fully dealt with by us in the report of that exhibition. In this car the engine is slung from three pivotal points horizontally below the rear of the vehicle, and drives the live axle by means of a steel pinion meshing with a toothed ring surrounding the differential gear box. The engine is nominally of 5 h.p., but, of course, will develop a great deal more than this when required. The car is fitted with ball bearings to all frictional parts, and is wholly enclosed in a dust-proof copper casing. The main idea which Messrs. Stanley had in introducing this car was to dispense with the chain, and, as can be seen here, in this they have succeeded in a remarkable manner. The fire tube boiler is of the usual type, save that it is wrapped with steel wire heavily plated with copper, and the boiler is provided with a fusible plug, which can be renewed without detaching the burner.

An interesting four-cylinder steam engine is on view on the stand of the Cremorne Motor Manufacturing Co. (No. 15). This engine is fitted with balanced slide valves constructed on an entirely new

principle, the weight of the valves being lifted by the steam itself. It would be impossible to detail this arrangement without diagrams, but we are promised the latter for full description and illustration shortly.



The Cremorne four-cylinder engine.

The Anglo-American Motor Car Co. on Stand 83 show the "Baker" electrical vehicles in various types, and particularly neat machines they are. They are practically a loan collection, as the "Stanhope" has been bought by Lady Ella Russell, and the "Runabout" by Maher, the celebrated jockey.



The Baker electric runabout.

Messrs. Suffield and Brown are exhibiting at Stand 7 an example of Joll's patent controller, which consists of a single drum carrying contact blocks which complete the necessary circuits successively between the insulated spring blocks. In order to give the drum a rapid action between its various positions, a spring roller is fixed in engagement with a cam wheel, and a pair of flat springs are set to hold it in either its normal positions by pressing against flats on the shaft. Those interested in electrical vehicles will find this controller worthy of their attention.

On Stands C and D in the centre of the Hall are seven examples of the "Waverley" electric vehicles now being imported into this country from the States by the Waverley Electric Co. These cars are being shown for the first time in England under these auspices, and visitors to the show who are interested in electrically-propelled vehicles should not fail to pay this stand a visit. The "Model 23," suitable for tradesmen's delivery purposes, is a car which should be examined by those who are on the lookout for vehicles of this kind.

A well-trying electric brougham of a large and altogether commodious type is shown by the Clingoe Automobile Syndicate, Ltd. (Stands 80 and 81.)

LIST OF EXHIBITORS OF STEAM AND ELECTRIC CARS

STEAM CARS.

	STAND
Albany Manufacturing Co. (see <i>The Autocar</i>) ...	(C.P.) 3
J. Cockshoot and Co., Stanley cars ...	(C.P.) 8
J. L. Sardy, Saracen ...	9
Cremorne Motor Manufacturing Co., car fitted with Cremorne paraffin burner and automatic regulator ...	15
New Automobile Co., Miesse cars ...	(Stan.M.) 20, 21
Speedwell Motor and Engineering Co., Gardner-Serpollet cars ...	(C.P.) 22
Weston Motor Syndicate, Weston steam cars ...	(C.P.) 46, 47
Victoria Carriage Works, Toledo cars ...	(C.P.) 55
Shippey Bros., Ltd., Toledo cars ...	(Stan.M.) 56
Hydroleum Motor Co., steam car fitted with Hydroleum system of heavy oil burner ...	(C.P.) (M.H.) 111, 123

Chief British Depot, Gardner-Serpollet cars, Chabos cars ...	68, 69
Du Bois Co., Ltd., Du Bois car ...	177
ELECTRIC CARS	
Waverley Electric Vehicle Co. ...	(C.P.) C & D
London Electric Automobile Synd., Leas electric cars ...	(C.P.) 14
Shippey Bros., electric cars, Shippey-Still system ...	(Stan.M.) 56
Anglo-American Motor Car Co., Baker and Vehicle Equipment Co's. ...	(C.P.) 83
E. W. Hart, Hart petrol electric car, electric vehicle ...	(C.P.) 91, 140
A. Crowds, Crowds electric ...	98
Krieger Electric Carriage Co., Krieger electric ...	98a
Salmons & Sons, Stoewer electric ...	(M.H.) 105
Rawlings Bros., Ltd., Kensington electric car (Milde System) ...	(C.P.) 174 & 174a

HEAVY VEHICLES.

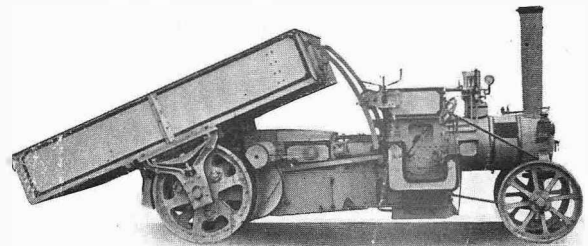
With one or two exceptions, the whole of the heavy vehicles are exhibited in the Minor Hall, where a particularly good show is made of this class of vehicle. Such a method of exhibiting one particular class is a great advantage to the visitor and prospective buyer, as he is able to compare rapidly the various points of the different cars. Just outside the entrance to the Minor Hall is shown a British Germain petrol motor lorry. This is fitted with a 15 h.p. four-cylinder engine, having tube ignition—the only example of this kind of ignition to be seen in the show. The usual type of change-speed gear is employed, and chains from the countershaft to the road wheels are used. The vehicle is capable of carrying a load of over five tons on a very small quantity of fuel. The results by official trials made before a Commission of Engineers show a remarkably low consumption, one of the best journeys made being a run of 38 miles 404 yards with a load of 4 tons 1 cwt. 1 qr. 25 lbs. on a consumption of exactly two gallons.

At Stand 14 in the Arcade is an example of the "Little Giant" steam motor, which is practically a specially-constructed small traction engine weighing under three tons, and capable of hauling from three to six tons. It is shown by W. Tasker and Sons, Waterloo Ironworks, Andover.

The two electric vans shown by the Anglo-American Motor Car Co., Stand 83, are of exceeding interest, as demonstrating the possibilities of electricity for heavy vehicles. The smaller one has a capacity for a load of 1,000 lbs., and will run forty miles on one charge, and a maximum of fourteen miles an hour can be obtained upon the level. The larger machine takes a 2,000 lbs. load, and has a range of thirty-five miles with a maximum speed of eight miles an hour. The frames are of girder section steel, and horn blocks are used for the support of the axles, so that no drive or cross strain is put through the springs. (Stand 83, Main Hall.)

The Lancashire Steam Motor Co., Ltd., exhibit one of their standard steam waggons, suitable for brewery purposes, on Stand 108. To this vehicle a trailer can be attached. A useful steam lawn mower fitted with a pump and hosepipe for watering purposes, which can also be used as a small fire-engine in case of necessity, is included in this firm's exhibit.

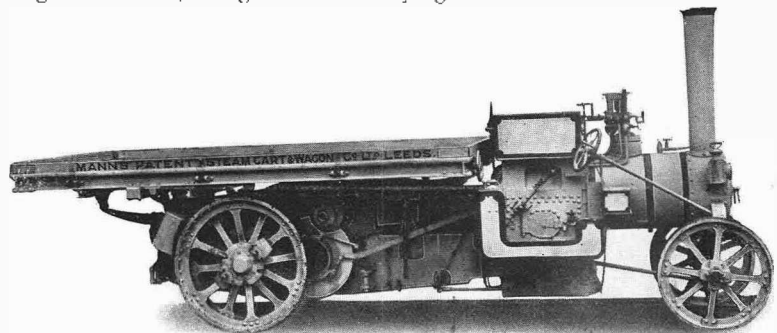
Mann's Patent Steam Car and Waggon Co., Ltd., of Hunslet, Leeds, show upon Stand 117 one of their steam waggons. The forepart of this is very similar to a light traction engine, as a locomotive type of boiler is used, the driver's cab being placed behind the boiler and forward of the carrying plat-



Mann's steam tip waggon.

form. The engine, which is of the compound type, is located beneath the platform, and drives on to the road wheels through a two-speed gear and chains.

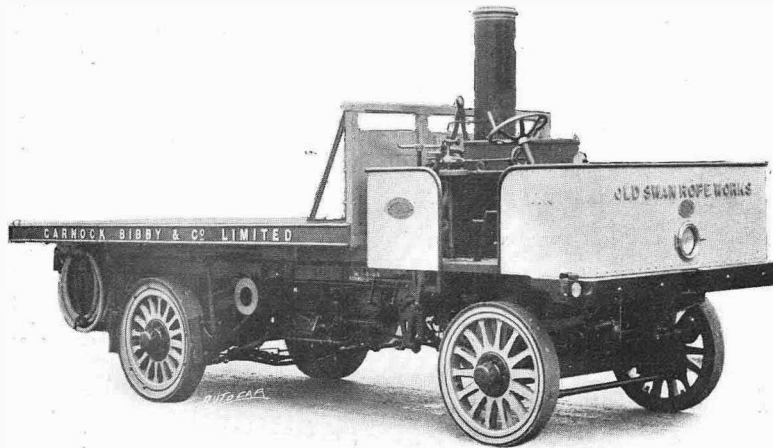
On Stands 118 and 119 are shown the "Straker" steam vehicles, one of which is a well-finished waggon lent for the show by Messrs. T. and W. Farmiloe. A second type is seen in the standard seven-ton colonial waggon, which is capable of drawing a trailer carrying a further load of three tons.



The Mann standard steam lorry.

The vehicle thus being able to deal with a total load of ten tons. A chassis of a standard five-ton waggon enables the visitor to examine the mechanism.

One of the most interesting vehicles among the heavy vehicle class is that shown upon Stand 121 by the Yorkshire Patent Steam Waggon Co., of Hunslet, Leeds, an illustration of which will appear in a later issue. We may say that the boiler, which is of the locomotive type, is placed across the



A Coulthard standard type steam waggon.

front of the car. This boiler is constructed on a somewhat novel principle, and great economy is claimed for it—a claim which is substantiated by a series of private tests extending over a period of three months. We examined the particulars of these records, and the claims are well founded. The fire box of the boiler is placed at the centre, the crown coming to a point just above the horizontal centre line, above which is a second crown forming the smoke box. At both ends of the boiler are placed supplementary smoke boxes, into which the fire tubes lead. From the fire box the heat is drawn outwards to the ends of the boiler by means of forced draught created by the exhaust steam from the engine blowing through the return tubes to the central smoke box and uptake. This draws the heat from the fire box through the tubes to the outer smoke boxes, and the draught caused by the exhaust steam being ejected through a series of tubes whose ends come to the centre of the upper fire tubes of the boiler causes the heat to be returned to the central smoke box, which is in connection with the chimney placed at the centre of the boiler. The engine is a compound one, the cylinders being placed one on each side of the car. The whole of the mechanism, so far as the engine is concerned, is entirely enclosed and runs in an oil bath, and owing to the position

of the cylinders, they are extremely accessible. Power is transmitted to a rear live axle through spur gearing, a novel method being employed to permit of the platform sitting down on its springs and still maintaining the spur gearing in its correct pitch line. We hope shortly to give a more detailed description of this vehicle.

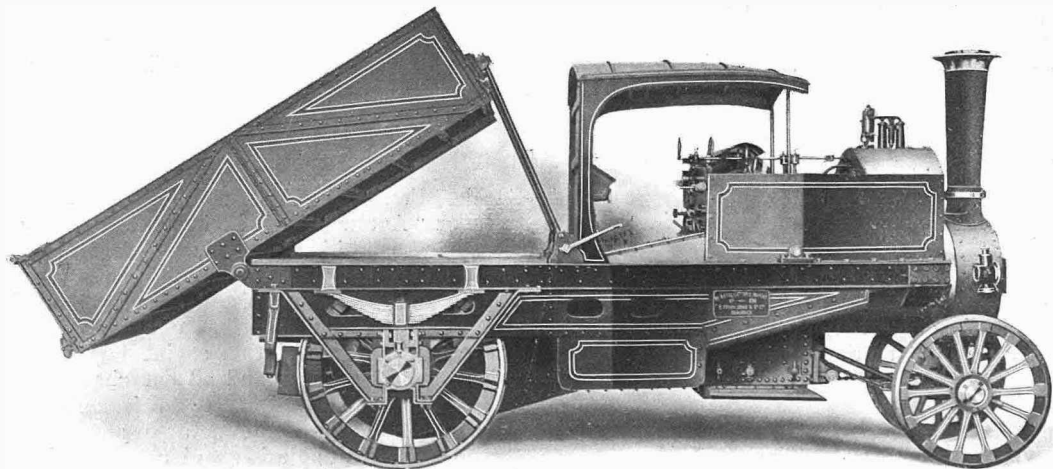
Messrs. Coulthard and Co., Ltd. (Stand 112), are again showing their standard type of steam vehicle. This was fully dealt with in *The Autocar* recently, and therefore no further description need be given here.

The "Brightmore" steam tractor shown on Stand 107, in the Minor Hall, is precisely similar to the vehicle exhibited at the Earl's Court Show, and described in our report at the time.

On Stand 109, Messrs. Savage Bros., of King's Lynn, show for the first time a three-ton universal steam tractor. The boiler is placed across the front of the vehicle, and is of the water tube launch type. The engine is of the compound type, transmitting power to the road wheels through spur gear and countershaft, thence by chains to road wheels. A careful inspection of this tractor gave evidence of good design and excellent workmanship.

Messrs. E. S. Hindley and Sons, Bourton, Dorset, are showing upon Stand 122 a steam lorry of the usual type, that is, with vertical boiler, forward compound engine, two-speed gear and spur transmission, capable of carrying a load of from four to five tons, and drawing a trailer with a further load up to three tons.

Foden's, Ltd., of Elworth Works, Sandbach (Stand 106), exhibit two of their standard size steam waggons. These partake of the form of a small traction engine, behind which is mounted a platform upon which the load is carried. One of the vehicles shown is fitted with a tipping body, as used by many of the municipal authorities.



The Foden tip waggon.

The "Wallis" patent motor, which is practically a small traction engine specially built to come within the three ton tare limit, is an exhibit by Messrs. Wallis and Stevens, Ltd. (Stand 4), which should not be missed by those who are visiting the show for the purpose of selecting motors for haulage. There are several specially designed parts in

this engine which enable it to work in a most satisfactory manner. At the time of our visit to the stand we entered into conversation with Colonel Templar, who was standing by, and who, having had one or more of these engines in trial at Aldershot, spoke in the very highest terms of their efficiency and wearing qualities.

LIST OF EXHIBITORS OF HEAVY VEHICLES.

	STAND
Wallis and Stevens	4
Alf. Dougill, Hargen petrol lorry with friction drive	10
Anglo-American Motor Car Co., Vehicle Equipment Co's cars	(C.P.) 83
Foden's, Ltd.	(M.H.) 106
A. W. Brightmore	(C.P.) (M.H.) 107
Lancashire Steam Motor Co.	(M.H.) 108

	STAND
Savage Bros.	(C.P.) (M.H.) 109
T. Coulton and Co.	(M.H.) 112
Mann's Patent Steam Car and Waggon Co.	(M.H.) 117
Straker Steam Vehicle Co.	(C.P.) (M.H.) 118 & 119
Yorkshire Patent Steam Waggon Co.	(M.H.) 121
E. S. Hindley and Son, steam lorry	(M.H.) 122
W. Tasker and Sons	(C.P.) Arcade 14

MOTOR BICYCLES.

The "Pebok" 2 h.p. motor bicycle engine, shown by the Pebok Engineering Co., of 96, Leadenhall Street (Stand Nos. 18 and 19), is fitted with mechanically-operated inlet valve, an ingenious exhaust lifter, and float feed spray carburetter. A neat friction clutch is also exhibited, and several accessories. The "Hydra" sparking plug has a small perforated cage, protecting the platinum sparking points, and the jump spark gap is made in the body of the plug outside the cylinder. Two or three other forms of jump spark plugs are also shown.

Bayliss, Thomas, and Co., Coventry (Stand 62), show a light wood forecarriage on one of the 2½ h.p. "Excelsior" bicycles. It is extremely neat, and its appearance is very much appreciated by those who object to the wicker seat. Another novelty in finish is shown in a machine in which the ordinary plated parts are lacquered.

The "Eagles" (Stand 72), which are driven by the latest De Dion motor bicycle engine, show some very smart forecarriages, one in particular of the Hooydonk type being worthy of careful consideration, as the details are so exceedingly well worked out. The silencer fitted on these machines is of a much more ample type than that usually provided for the average motor cycle.

Garrard Mfg. Co. (Stand 159) make a really good display with the "Clement-Garrard" motor cycles. These are shown in considerable diversity from the small 1¼ h.p. motor with belt drive to the 12 h.p. four-cylinder racer. The two-speed chain gearing we have referred to on previous occasions, and the company are showing for the first time the new 2 h.p. motor, which, by the adoption of an aluminium crank case, weighs only about one pound more than the smaller-powered engine. Two tandems are shown with lady-back frames—one with a two-cylinder motor of 3 h.p. and the other with a single-cylinder engine. These have the first drive by chain to the two-speed gearing, and thence by belt to the rear wheel. The rear part of the drive is well protected to shield the skirts of the lady rider. The frames of the machines have been redesigned, and are of more powerful construction than hitherto. One of the most attractive machines is a man's single, with two-cylinder motor and a bent bottom tube, which carries the motor somewhat lower, and so dispenses with the necessity of a jockey pulley. Though a 3 h.p., this machine may be run at barely more than walking pace, so that it is by no means unmanageable in traffic. The stand is a centre of considerable interest to the visitor.

LIST OF EXHIBITORS OF MOTOR BICYCLES.

	STAND
H. B. Salisbury, Hunnher chain-driven	(C.P.) 1
New Hudson Cycle Co., New Hudson 2 h.p.	59
Bayliss, Thomas and Co., Excelsior motor bicycles, forecarriages, and trailers	62
Coventry Eagle Cycle Co., Coventry Eagle motor bicycles, trailers, and forecarriages	72
J. McLaughlan, Dickenson Morette	77

	STAND
International Motor Car Co., 2 h.p. Mountaineer motor bicycle	82
Brown Brothers, Brown 2 h.p. motor bicycle	(Stan. M.) 142
Garrard Mfg. Co., Clement-Garrard motor cycles	159
Clarendon Motor Car and Bicycle Co., 2½ h.p. Clarendon motor bicycle	162
East London Rubber Co., Kerry motor bicycle	(C.P.) 167

ENGINES, ACCESSORIES, AND FITTINGS.

A striking example of motor body building is exhibited at Stand 128 by Messrs. Hollick and Pratt. This body has its panels fluted and finished in light mauve, with dark mauve borders, and lined white. It is splendidly upholstered, and is well worth inspection.

The "Umpire" storage batteries shown on Stand 21 in the Arcade by Sutherland and Marcuson, are interesting on account of the manner in which the plates are held together by acid-resisting elastic bands, which keep the active material under pressure and prevent falling away. These accumulators are fitted with porous separators, set in transparent cells, and have screw terminals formed of an acid-resisting alloy.

There is shown for the first time in England by the Société Française d'Automobiles a 16 h.p. four-cylinder "Automotrice" engine, fitted to a chassis. Although exhibiting no special features beyond mechanically actuated induction valves, and pedal and governor-controlled piston throttle to the induction pipe, this engine strikes one as being a very fine example of combustion engine building. The valves, sparking plugs, and all detachable parts are most easily got at; all shafts run in aluminium oil-tight cases, and the whole motor impresses one with the idea of skilful design and careful build. The four change speed gear fitted to the "Automotrice," giving direct drive on the top speed, is also a very fine piece of work.

At Messrs. H. W. Van Raden's stand (No. 73) are to be found several new designs of contact-breakers and gap sparking plugs, together with additional improvements in the well-known "Carpentier" coil, of which Mr. Van Raden is the sole manufacturer in this country. The special coil made for the Wolseley 50 h.p. racer which is entered to compete for the Paris-Madrid race is also shown. This coil weighs but 8 lbs., and is a very fine example of manufacture. A sample of the "Auto" trembler which Mr. Van Raden is arranging to manufacture is also to be seen.

As at the Palace, Mr. O. C. Selbach has a very large and varied display of parts and accessories, but nothing beyond the examples of the "Mutel" motors which he did not show at the Palace. These are shown in two-cylinder 10 h.p. and four-cylinder 24 h.p. patterns, and are throttle-governed on the mixture pipe, and have cylinders and water-jackets cast in one, with exhaust valve set in the crown of the combustion chambers. Both induction and exhaust valves are extremely get-at-able, and compression taps are fitted to each cylinder end. A separate throttle is also fitted to the induction pipe, actuated altogether independently of the governor by Bowden wire mechanism from the steering wheel. The pump is gear-driven, the gear wheels concerned with the driving thereof and the layshaft being cut with helical teeth. The driving pump gear wheel is in vulcanised fibre. (Stands 32 and 33.)

The "800 F. Occentoline"—a new high flash-point oil specially manufactured by Stern Bros. for Serpollet and similar steam cars—is shown in the Arcade. Other Stern products, which are too well known to need mention, are shown on Stand 22, Arcade.

Madame Lockert, who is found at the top left hand side of the hall (Stands 28a-31), shows a two-cycle motor for cycles, in which the mixture is drawn from the carburetter into the crank chamber, and thence forced by the movement of the piston in its downward stroke into the combustion chamber above. The piston uncovers an exhaust port, by which the burnt products escape, and a fresh charge fills the vacuum so caused in the cylinder, and is compressed by the return stroke of the piston after the latter has closed the exhaust port. This motor is somewhat roughly produced, but is comparatively light for a bicycle, being, as far as we could judge, about 27 lbs. or 28 lbs. in weight.

At Stand 41 Louis Gianoli shows an interesting voltmeter for attachment to the dashboard, which is also adapted as a double switch when a spare accumulator is carried. This voltmeter can be employed to test dry batteries as well as accumulators without any damage to the former. It is a very neat fitting. On this stand is also shown a new form of accumulator, in which the plates are formed of depending ribbons of lead with an oxide of lead paste served between them. These plates are the invention of M. D'Arsonval, and it is claimed that they can be charged in half the time necessary for the charging of the ordinary form of accumulator. There are several other interesting electrical fittings which are calculated to smooth the path for the automobilist who has adopted high tension current electrical ignition. A very neat adjustable form of external spark gap is also exhibited.

On the stand of the British Automobile Commercial Syndicate (No. 52-53), which is undoubtedly the handsomest and most original in the show, will be found two or three very fine examples of body building and upholstery. The exhibits on this stand comprise those of the well-known types of Clément cars and several Panhards variously bodied.

The "Gallia" accumulators are seen upon Stand 61 of the Société Française d'Automobiles, for which several points are claimed. They are filled by means of a new process with acidulated gelatine, which takes the place of the ordinary dilute sulphuric acid electrolyte.

On Stand 51 Messrs. C. S. Rolls and Co. show a simple and practical form of jump spark connection, in which the gap is enclosed in a vulcanised tube with glass window inserted. This was illustrated and described in *The Autocar* of the 7th inst., page 302.

At Stand 164 in the Gallery, the Artillery Wheel Works show some very interesting samples of spoke cutting. This is performed by special machinery designed to cut any required shape of boss or block on the spoke. Manufacturers building cars of particular design and requiring special wheels should see the exhibits at this stand.

The Bowden wire (Stand 188) bids fair to be very widely used in the motor car world. As most of our readers know, it is almost universally adopted in cycle construction, and the Clément car shown with both ignition and throttle operated by the wire is a striking demonstration of its applicability. In fact, it can be used for almost any purpose in which motion is to be conveyed from one point to another, and that without rods or levers, as the desired movement can be transmitted at right angles without difficulty so long as the wire is placed properly at a moderately easy curve, and there is no difficulty in doing this.

The "Salsbury Flario" lamps (8, Arcade) are too well-known to need description, but a recent improvement is worthy of notice. One lamp, which is known as the "Ovalite," has an oval front glass, which the makers claim gives an improvement in the light. However this may be, there is no doubt that the appearance of the lamp is considerably enhanced. The reflector of this lamp is detachable for cleaning. The height of the burner can be adjusted, so that if at any time when touring a new burner is put in it can be set so that the light is properly focussed in the lens. The gas tubes are now straight, so that there is no difficulty in cleaning the lamp, and, if possible, the finish is better than ever. Of course, besides these, every sort of lamp is shown, and accessories in profusion, last but not least being the "Salsbury" spark gap.

The Britannia Foundry Co. are exhibiting for the first time on Stand 129a, though the business is by no means a recently-established one. They make a speciality of castings both in iron and aluminium, and these appear to be light and clean and well produced generally. Another important line is in enamel stoves, and these are made in a much more workmanlike manner than hitherto. Tyre levers and the Ajax tyre pump are also lines in which the company do a considerable business. The tasteful sign is a good indication of the up-to-dateness and ingenuity of the firm.

Armstrong, Stevens, and Co. show (on Stand 179), among other parts, fittings, forgings, etc., a radiator somewhat on the honeycomb principle, but built up with a multitude of short copper horizontal tubes running from front to back, and having a fan immediately behind their rear ends to force a draught through same. The bonnet is of the plain type, and is of approximately semi-cylindrical form.

The "Polkey" paraffin head lights (Stand 204) are shown for the first time. They have circular wicks, a glass chimney, and very large reflector; in fact, may be roughly described as a reproduction of the tram head lights which have proved so satisfactory for electric tram cars. A number of other lamps are also shown down to quite diminutive sizes.

The "Simms" engines applied to various types of Ransomes, Sims and Jefferies lawn mowers are to be seen on Stand 78.

A very large space is devoted by Gamage (Stand 7) to an assortment of requisites of all kinds, these including the parts of many well-known cars. They need not be referred to in detail here, but, as an instance of the up-to-dateness of the goods shown, we may mention that there is a large variety of spark gaps, one in particular being noticeable as made for dashboard use. It is extremely neat and can easily be fitted to the dashboard, while the spark gap is protected by glass, so that there is no possibility of harm occurring through a naked spark.

Among the variety of accessories shown is what appears to us to be a useful fitting for summer use in the shape of a collapsible dust screen. This consists of four arms in aluminium hinged to a plate of the same material, which fixes by means of two thumbscrews on to the top back of a tonneau door. These arms are extended, and over them is fastened a light canvas cloth fixed at an angle of about 45° with the road. This rises to a sufficient height to prevent dust pouring over and smothering the occupants of the tonneau. When out of use, the whole apparatus folds up and fits into a neat brown canvas bag, which permits of its being readily stowed away and withdrawn for use, as occasion requires. It is made by the Dust Screen Co., and is shown on Stand 195.

Mr. H. Blake, at Stand 13, shows a simple and ingenious form of trembler, which consists of a straight tape of manganese bronze tensioned across the end of the soft iron core and below the platinum upon the adjusting screw. The tensioned band carries the iron button beneath the platinum bulb in its centre. The adjustment of this coil appears to be extremely simple, and we understand that when once adjusted it remains so for any length of time. All interested in ignition will be pleased to examine the new break current distributor in which the contact maker serves for making and breaking delivery of the primary current to a single coil, and distributing the induced current to two, three, four, or any number of cylinders. It is difficult to convey the exact construction of this ingenious instrument without some illustration, but we recommend all visitors to the show who are interested, as we have already said in the vexed question of ignition, to pay a visit to this stand and examine the distributor for themselves.

Some excellent work is displayed by W. and F. Thorn on Stand 217. A bus body in natural wood with forward hood deserves special comment.

Samples of motor castings in iron and aluminium, cylinders for both air and water-cooled engines, brass castings for carburettors and suchlike parts, and phosphor bronze castings for bushing bearings are shown by the Carlton Motor Co. on Stand 227.

To many motorists the storage of petrol presents some little difficulty under certain circumstances, but one effective way of getting over the difficulty is to invest in the stamped steel petrol casks made by Messrs. T. J. Pease and Co., and exhibited on Stand 229. These cases are stamped out of two pieces of sheet metal, and are then spun together at their centre in such a manner that leakage is absolutely impossible, and no damage can arise through evaporation of spirit, as a well fitting tap is let into the drum, whereby the contents may be withdrawn as required. For still further safety, one could sink the barrel below the level of the ground, the spirit being pumped to the surface by means of a hand pump, which forms part and parcel of the petrol holder. A new departure in the way of wheel construction is also to be seen upon this stand. It consists in stamping out of sheet steel wheels of various diameters and strengths, the halves are spun together, the tyre being held in position by the halves being drawn together.

Horns are exhibited on Stand 143 by Messrs. F. Lacoste and Co. having an improvement in the bulb. Instead of being exposed to the light and air, it is enclosed in a casing, and terminates in a kind of neck, over which a plunger fits. This plunger may be operated either by hand or foot, and it is calculated that the apparatus will work satisfactorily for several years—in fact, the rubber bulbs are guaranteed for two years.

A full range of accessories and, indeed, everything in the automobile line from the rough casting to the finished car may always be found at the stand of Messrs. Brown Brothers (No. 142). As indicating the up-to-dateness of the firm, we may mention that two forms of external spark gap devices or intensifiers are shown, one being unadjustable, the other, on the contrary, being readily adjustable.

In addition to the "Aster" engines of all types, from the little 2 h.p. upwards, there is a new radiator of the honeycomb type. This is made up with brazed joints throughout, and gives an immense cooling area with a very small circulation of water. The tubes are round with hexagon shaped ends, and the difference between the two sections provides just sufficient room for circulation. This is made by the Begbie Manufacturing Co. (Stand 216).

Several fresh forms of intricate aluminium castings are to be seen at Stand 184, where the Birmingham Aluminium Casting Co. have a very large range of their productions.

"Mauzels" patent automatic lubricator, in which a positive feed pump delivers oil in any desired quantity, and which has not before been shown in connection with automobile construction, is exhibited by Messrs. G. Skudder and Co., on Stand 183, amidst a very general exhibit of accessories and lubricants.

At Stand 172 Messrs. Peto and Radford are to the fore with an array of their various well-known electric fittings for motor cars, showing their new dry paste accumulator, in which the electrolyte is formed of a paste of sulphate of lead and sulphuric acid poured into the accumulator, in lieu of the diluted sulphuric acid, as at present used. Mr. Peto assures us that this electrolyte prevents all sulphating of the plates, so that the accumulator may be put on one side for an indefinite period without damage. It, of course, prevents all splashing of the electrolyte, and there is no necessity, accordingly, to seal the accumulators. The plates can be withdrawn for inspection, and, altogether, this invention makes accumulators more handy and certain in every way. Accumulators filled with this new electrolyte are found to give a slightly higher voltage than when acting with diluted sulphuric acid in the ordinary way. There is no doubt that Messrs. Peto and Radford have made a step in advance in this invention—one more step and that a long one—towards the simplification of electric ignition. Another interesting feature on this stand is a new intensifier, which, to put the matter comprehensibly, may be said to act as a Leyden jar across the plug. It is fitted on the side of the coil, and an actual demonstration is given of the extraordinary intensification its use gives to the spark. It will work most efficiently at two volts, so that its attachment to the electrical apparatus for firing would frequently enable a man to get home with a partially run down accumulator, when in the ordinary way he would be stopped on the road.

It will be noticed on examining the exhibits at Stand 27, where the well-known watchmakers and jewellers, Messrs. S. Smith and Sons, show their various motor watches and timepieces, that the metal case enclosing the well-known motor timepiece is now made of wedge form, in order to throw the face of the watch upwards at an angle with the dashboard, and render the dial more easily legible to the occupants of the vehicle.

The motor castings which are shown by Rowland Hill, at Stand 166, although presenting no specially novel features, are, nevertheless, of great interest to visitors to the show, as evidencing the special progress made in the production of these parts from the foundry.

A new firm to enter the accessories arena are Messrs. Mann and Overton (Stand 209). They have a very fine array of lamps and other requisites, which are well worth examination.

Apart from a number of different patterns of motor jacks, Messrs. Lake and Elliot (Stand 211) have some useful tools for motorists, which will be appreciated by those who wish to fit up a few requisites for executing simple repairs themselves.

Mr. A. A. Godin has tackled the lighting of motor bicycles in a very efficient manner, and exhibits a modification of the Ducellier lamp, which should certainly give a very brilliant light. The generator is of reduced dimensions, while the lantern is also a miniature of that constructed for cars, but retains a large burner. (Stand 125.)

LIST OF EXHIBITORS OF ENGINES, ACCESSORIES, AND FITTINGS.

	STAND		STAND
Albany Manufacturing Co., radiators, condensers, burners and steam car accessories	(C.P.) 3	F. Lacoste and Co., electrical accessories	143
Hopton and Son, wheels	4a	W. Vincent, motor car bodies, jacks, mudguards, and fittings	145
Sunfield and Brown, frames, gears, pumps, boiler shells, roller bearings		J. E. Stator and Co., pumps, lamps, and jacks	(C.P.) 146
J. Cockshott and Co., lock regulator, engines, and accessories	(C.P.) 8	A. Baedeker, Helios motor lamps, etc.	(C.P.) 147
F. C. Blake, Blake petrol engines; also the Collier two-cycle petrol engine, electric ignition, and other accessories	13	Phoenix Motor Co., Phoenix engines	150
Cremorne Motor Manufacturing Co., fire tube and flash boilers, steam car parts and accessories, carburettors	15	Patcho, Ltd., tyre repairing material	(C.P.) 151
Duchess Motor Co., Motors car fitted with Duchess body	(C.P.) 25	Philipp and Co., axles, gears, etc.	(C.P.) 153
S. Smith and Son, motor timepieces, watches, and speed indicators	(C.P.) 27	Ross, Courtney, and Co., electrical and general accessories	154
Madame Lockert, motors, Longuemare carburettors, etc.; also the French fortnightly <i>Le Chaffeur</i>	28a, 29, 30, 31	Doherty Motor Accessories Co., bonnets, radiators, and fittings	155
O. C. Selbach, sparking plugs and ignition accessories, oils, axles, springs, radiators, gears, etc.	(C.P.) 32, 33	C. Peacock and Co., ignition and other accessories	156
Louis Giacomoli, electric ignition, apparatus and carburettors	(C.P.) 41	Motorgear Engineering Co., tooth gearing of all kinds	161
Anglo-American Oil Co., Pratt's motor spirit	(C.P.) 42	The Artillery Wheel Works, Artillery wheels and solid rubber tyres	164
Joseph Lucas, Ltd., acetylene and oil lamps, motor horns, lifting jacks, and many accessories; Wells-Lucas motor oils	(C.P.) 49	Chiswick Soap Co., metal polish, etc.	165
Société Française d'Automobiles, Automotrice and Abeille engines	61	Rowland Hill, motor castings and forgings	166
Frank Morriss, Sandringham engine parts, gear sleeves, etc.	66	East London Rubber Co., motor car fittings and accessories	(C.P.) 167
H. W. Van Raden and Co., ignition appliances of all kinds	(C.P.) 73	F. A. Pullen & Co., steam car pumps, lubricators, fittings, etc.	169
Bliss & Sons, <i>The Autocar, The Motor Cycle</i> , maps, hand-books, etc.	74, 90	Peto & Radford, accumulators and electric accessories	(C.P.) 172
J. McLachlan, paraffin engine, etc.	77	Nugget Polish Co., Ltd., polishes	(Stan. M.) 170
Law Accident Insurance Society	99	Motor Vehicle Engineering Co., lead sheathed, earth cable wiring	173
Parsons Non-skid Co., Parsons's non-skid attachment	100	Page Manufacturing Co., polishes and enamels	(Stan. M.) 178
Peter Patent Union Tyre Co., solid tyres and rims	(M.H.) 104a	Armstrong, Stevens and Son, radiators, tanks, and parts	179
Laurie & Marner, various cars fitted with Laurie & Marner carriage bodies	(M.H.) 115	Cordingley & Co.	179a
Auto Machinery Co., roller ball bearings of all descriptions, motor castings, nuts, bolts, etc.	(M.H.) 120	G. Skudder & Co., lubricants, accumulators, coils, injectors, and other requisites	183
A. A. Godin, paraffin and acetylene lamps, horns, etc.	(C.P.) 125	Birmingham Aluminium Castings Co., Ltd., motor castings	(C.P.) 184
Société d'Éclairage et de Application Électriques, accumulators	125a	Binney & Son, gears, lubricators, lubricants, belting, etc.	186
Hyde Park Motor Co., Wilkinson non-slipping treads and general accessories	125b	E. M. Bowden's Patent Syndicate, Ltd., various levers and mechanisms for adapting Bowden patent to transmitting power	(C.P.) 188
General Accident Assurance Corporation, Ltd.	126	Boulton & Paul, motor car and cycle houses	189
Coventry Chain Co., Ltd., driving chains	(C.P.) 129	South British Trading Co., Ltd., lamps, tools, and hubs	(C.P.) 193
Britannia Foundry Co., Ltd., motor castings, enamelling stoves, etc.	129a	Smith, Pallfrey & Co., Ltd., motor wheels, axles, springs, and rims	194
Anderson Motor Tyre Co., tyre repair specimens	133	Dust Screen Co., collapsible dust screen for motor cars	195
J. Liversedge & Son, Ltd., motor wheels	134	D. Citroën, Minerva and Romania motors and accessories, car sets	200, 201
Elephant Chemical Co., lubricants, lamps, etc.	137	J. Holden & Co., Max accumulators and lamps	202
Hollick & Pratt, motor bodies	138	Automotor Accessories Co., lamps, Tunklen roller bearings, coils, etc.	203
Charles Bardsley, Blieriot lamps, etc.	141	George Polkey, Ltd., Polkey lamps	204
Brown Bros., parts and accessories	142	Steiner and Co., motor horns, lamps, sparking plugs, etc.	(Stan. M.) 206
		International Rubber Co., motor bodies, rubber tyres	208
		Mann and Overton's, Ltd., motor car accessories	(C.P.) 209
		W. J. Bishop, ignition coils, accumulators, etc.	210
		Lake and Elliot, motor jacks, stands, and tools	211
		T. F. Braine and Co., Ltd., Braine's oil feeders, lamps, stampings, etc.	212

LIST OF EXHIBITORS OF ENGINES, ACCESSORIES, AND FITTINGS (continued).

		STAND			STAND
Begbie Manufacturing Co., Aster engines, radiators, pumps, spare parts, etc., chassis ...	Begbie-Audin	(C.P.) 216	Forward Engineering Co., "Forward" engines	Arcade	4
W. and F. Thorn, motor bodies ...	Begbie-Aster	217	Joseph Kaye & Son, seamless oilcans	Arcade (C.P.)	5
W. Skidmore, wheels, axles, springs, etc. ...		217a	Price's Patent Candle Co., Ltd., lubricants	Arcade (C.P.)	6
Julius Matton, accumulators, etc. ...		217b	A. W. Gamage, accessories	Arcade	7
D. Shepperd, goggles and glasses ...	(Stan. M.)	218	Salsbury & Son, Salsbury, Flario, Dietz, Ovalite, and other lamps, and many accessories	Arcade (C.P.)	8
Bransom, Kent & Co., Ltd., glass encased spark intensifier, motor fittings, and accessories generally ...		219	Dowsing Radiant Heat Co., Ltd., warmers	Arcade	10
The United Kingdom Inventions Association, Ltd., accessories, rotary steam engine ...		221	Garlio, Garlio polish	Arcade (Nat.)	11
A. H. B. Sharpe, Sharpe's patent pulleys		222	Robert W. Coan, aluminium castings	Arcade	17
British American Optical Co.		226	Pebok Engineering Co., Pebok engines and accessories	Arcade	18, 19
The Carlton Motor Co., engines, castings, tanks, etc.		227	Moebius & Son, Moebius oils	Arcade	20
J. F. Pease & Co., stamped steel motor wheels		229	Sutherland & Marcussan, Umpire batteries	Arcade	21
J. E. Hutton, Pognon plugs, etc.	(K.E.H.)	1	Stern Bros., lubricants	Arcade (Stan. M.)	22
Anti-Lubrine Co., lubricants	Arcade	3	P. Lawrence, lubricants	Arcade (C.P.)	23
			Carless, Capel, and Leonard, petrol and storage tanks, lubricants, etc.	Arcade	27
			Argent Archer, official photographer to the exhibition	Arcade Gal.	

TYRES.

Messrs. Shippey Bros. make a special feature of the "Diamond" tyre (Stand 57), which for driving wheels is fitted with a series of transverse crescent ridges on the tread. These look very effective as preventers both of skidding and side-slipping. This tyre is largely used by American motor car manufacturers.

In the Gallery at Stand 128 are shown various examples of the "Clincher-Michelin" tyres as now manufactured by Michelin for sale by the Maison-Talbot.

The "Collier" tyre, shown in its various sizes at Stand 168 in the Gallery, cannot now be referred to as a novelty; but the firm are showing a very useful bevel rubber band, 1 7/8 in. in width, for stretching round the bed of the rim to save the chafing of any portion of the inner tube which may touch it between the edges of the cover.

Two interesting tyres made in accordance with Seddon's patents are shown by the British Motor Tyre Syndicate, Ltd., Manchester, at Stand 176. One is flange retained, and the other is secured to the rim by an internal band of aluminium made into an inlying lip of the tyre and secured to the felloe by set screws screwing up from underneath between the spokes. This tyre is made with an airtight lip between the edges of the cover, and no inner tube is necessary, although one can be used, if preferred, in case of mischance. The covers are made with non-slipping treads, for which perfect immunity from sideslip is claimed.

The "Buckingham" armour-faced tyre, on Stand 223, was fully described in our report of the Crystal Palace Show.

The "Dunlop" tyre, even for motor cars, is too well known to need a description in a report such as this; but visitors to the show will be interested in the new non-slipping device which is publicly exhibited for the first time. On the same stand (135) are shown some very useful motoring overcoats, which present both a neat appearance and look thoroughly serviceable.

Messrs. J. W. and T. Connolly, Ltd., whose name is second to none for solid motor tyres, introduce a new pattern on Stand 157 under the name of the "Firestone." This has a flanged base with endless wires resting on the flanges, and so hold the tyre in position on the rim. There are cross wires at frequent intervals in the base of the rubber, so that the rings really rest upon the ends of these wires, and the rubber is completely anchored in position. Tyres on this system are constructed for vehicles up to 5 cwt., and appear to give good results.

At Stand 158 in the Gallery the well-known rubber firm, Messrs. W. and A. Bates, of St. Mary's Mills, Leicester, show for the first time a specially-constructed single tube motor tyre. This tyre has an internal fixed tube of pure rubber, which is surrounded by spiral turns of fabric with rubber intervening, above which on the tread is quite a quarter of an inch again of pure rubber. These tyres are constructed of a special quality of rubber which Messrs. Bates consider particularly adaptable for motor tyres. They also show an excellently well-made non-slipping band for motor tyres, the tread of which consists of two somewhat high shoulders, including seven diamond-shaped ridges running circumferentially round the tread. The motor patches shown are novel in the sense of being curved and tapered.

LIST OF EXHIBITORS OF TYRES.

		STAND			STAND
Shippey Bros., Diamond tyres	(Stan. M.)	57	Martin Pneumatic Tyre Co., Ltd.		171
Maison Talbot, Clincher Michelin tyres		127	Goodyear Tyre & Rubber Co., Goodyear pneumatic and solid tyres	(C.P.)	175
North British Rubber Co.	(C.P.)	128	British Motor Tyre Syndicate, Seddon's motor tyre		176
Anderson Motor Tyre Co., tyre repair specimens		133	Clipper Pneumatic Tyre Co., Ltd., Clipper Continental tyres	(C.P.)	199
J. Liversidge & Son, Ltd., the "Wing" rubber tyre	(C.P.)	134	International Rubber Co.		208
Dunlop Pneumatic Tyre Co.	(C.P.)	135	Buckingham Patent Steel-faced Rubber Tyre Co.	(C.P.)	223
J. W. & T. Connolly, Ltd., "Firestone" solid tyres		137	Gare Patent Tyre Co., tyre shields for motor wheels		225
W. & A. Bates, Ltd., tyre covers and rubber goods		158	Imperial Tyre & Rubber Co., Ltd., tyre repairs	Arcade	26
General Guarantee Association, Ruckertyre		160			
Collier Twin Tyre Co.	(C.P.)	168			

CLOTHING.

One despairs of attempting to do justice to the display of the great clothing firms' exhibits, and we might easily devote half an issue to a description of the various and well-nigh endless variety of the exhibit of A. W. Gamage (Stand 7, Arcade). At the same time, those in search of a little innocent

amusement should listen by this stand to the remarks which are made by the "evening gate," when they see some particularly hideous mask and goggles or notice the expressions of wonderment when a headwrap with mica insertion for use comes in view.

Several novel forms of weather-resisting motor garments are to be seen at Messrs. Andersen, Andersen, and Andersen's, Ltd., Stand 24, in the Arcade, while at Stand 25 some very fine examples of cloth garments, which have evidently been designed by a practical motorist, are shown by H. J. Nicoll and Co., Regent Street West.

To say that Mr. Holding's goods (Stand 127) are excellent borders on the insult, for should not the Editor of the principal leading tailor's journal, and a practical sportsman, know how to turn out a garment suitable for the automobilist? The "Ayrshire" coat, lined in leather or fur, or unlined, is a leading article; and for summer use—and maybe wanted soon—the "Garbette" and silk dust wraps. The "Holding" patent apron is also another speciality.

Notwithstanding the immense assortment of goods already put on the market by Mr. Alfred Dunhill, he makes several new departures at this exhibition on Stands 181 and 182. These are mostly of the lighter class for summer wear, and include straw caps in black and white of the approved motor pattern. Some other caps in light tweed and silk, with or without water-proof lining, are also introduced, and some new patterns in vests, such as a sleeveless leather to be worn under the ordinary waistcoat, and another of buckskin with sleeves to be worn over that garment. The ladies have a department all to themselves, where some tasteful goods in Tussock silk in various shades are shown. On the other hand, there is a coat of thick fur-like material called Zibeline. A hand screen with mica window is also a convenience for protecting the complexion from the ravages of dust, wind, and wet. In accessories there is a convenient stem wind clock with wires for connecting up to the accumulator, so that the time may be readily ascertained at night.

Hoare and Son (9, Arcade) have, in addition to their well-known descriptions of clothing, several of the new things which have not been seen before. Among them may be mentioned the motor sac coat, which is made on the same lines as the well-known Autocoat and Autocloak, but in an easier style, and one which will appeal to those who do not care about the stiffer lines of the Autocoat. Another useful thing is the slipover, made in woollen materials, as well as in thinner ones for use at those times when an ordinary motor coat is not wanted, but when the temperature is scarcely sufficient to warrant the very thin materials used for the dust wraps. A rubber poncho, which buttons in the front, is shown. The idea of the design is to dispense with the rubber neck, and yet to give its advantages in the way of absolute watertightness. The front buttons up and the collar overlaps in such a way that this end is claimed to be attained. If this is the case, it is certainly an advantage, as the wearer is absolved from the trouble of springing the rubber neck over the head.

Messrs. Abbotts's shaped apron (on Stand 191), which has been on the market for some time, is now turned out in the new form, with commodious foot-pieces, which enable the driver to operate his pedals effectively, and plenty of room is left for the steering column. It is finished in various styles, some resembling leather. A new driving coat is constructed with a deep gore down each side, which may be undone while the rider is driving, so as to give plenty of room over the knees. It couples up with button fasteners for walking purposes, thus preventing any untidiness in appearance. Some water-proof gloves with all the fingers accommodated in one stall, and with or without gauntlets, look eminently serviceable, and are quite moderate in price. The ladies are well provided for, and also the machinist, the grease-proof driving aprons being very suitable for use by the last named.

The "Aquascutum" motor coat, which is advertised as worn by the King, can be seen on Stand 13 in the Arcade. It is a comfortable, well-designed garment, and while porous, is rendered waterproof without the aid of rubber.

Among the exhibits of clothing is one by Messrs. Salsbury and Son, Ltd. (Stand 196), who show a full range of the special make of clothing known as "Komilfo" both for ladies and gentlemen.

A very ingenious idea in caps is introduced by Mr. C. R. Base (Stand 163), whose motor clothing is so well known to our readers. Though presenting the appearance of the ordinary tweed cap, it is capable of assuming a very different appearance, as should rain come on, by a simple manipulation the cap is practically turned inside out, and a water-proof material is presented to the elements. This will be found a very excellent article for those who are prepared to face the weather, fair or false. Mr. Base's well-known apron has been considerably improved in the way of simplifying it, that is to say, it is now made in a lighter form, and in using it as trousers the legs are only encircled once by the material, so that it is much more presentable in appearance and comfortable in use. The wants of motor cyclists have received very careful attention, and almost every description of protective clothing can be obtained.

At Stand 190, Gallery, Messrs. J. W. Lovegrove and Co., we find amongst this firm's other numerous patterns of motor garments the "Drimosit" rug, still further improved than when it was shown at the Crystal Palace, by means of a buttoning flap which encircles the legs, and gives them more freedom than in the original pattern. A new dust cover for lady automobilists is the "Mandarin" cloak, fitted with hood, very light and fresh looking, and made of Tussock silk. An excellent garment for driving is the "Styrian Loden" smock, which is well suited for cool evenings.

LIST OF EXHIBITORS OF MOTOR CLOTHING.

	STAND		STAND
T. H. Holding ...	(C.P.) 124	British Automobile Commercial Syndicate ...	192
C. R. Base ...	(C.P.) 163	Salsbury & Son ...	(C.P.) 196
East London Rubber Co. ...	(C.P.) 167	A. W. Gamage ...	7
Burberry's ...	(Stan. M.) 180	Hoare & Son ...	9
Alfred Dunhill ...	(C.P.) 181, 182	Aquascutum, Ltd. ...	13
J. W. Lovegrove & Co. ...	(C.P.) 190	Anderson, Anderson & Anderson, Ltd. ...	24
Abbotts (Abbott, Anderson, and Abbott) ...	(C.P.) 191	H. J. Nicoll & Co. ...	25

SOME SHOW ITEMS.

The Hon. Rupert Guinness's 16 h.p. De Dietrich car, shown by the Victoria Carriage Works, Ltd., at Stand 55, is one of the finest examples of body building in the show. The finish, which is exquisite, is in emerald green, with bold black mouldings, the frame and wheels being in old coaching yellow lined dark green. The whole combination is both striking and artistic, particularly as the front and tonneau seats are upholstered in green morocco to match the body colour.

* * *

Since our report was completed, the Beaufort Motor Co. have staged a new 14 h.p. two-cylinder Beaufort on Stand No. 50, which presents several interesting features, particularly with regard to the actuation and hand control of the throttle in combination with the governor. The throttle lever, which is placed on the steering standard, when so moved that the throttle valve is held right open, shuts off the governor action, but when placed mid-way on its sector the throttle is still held open, but the governor has full effect. When the lever is drawn right back the throttle valve is quite closed. The construction of the foot brake on this car is also worthy of inspection. When the pedal is depressed two cast steel semicircles are caused to embrace a steel drum on the rear end of the secondary gearshaft, one end of the block forming the fulcrum for the other, the two being hinged together on the upper side. When the pressure on the foot pedal is released, the brake blocks stand quite clear of the drum.

* * *

The Baby Peugeot three-speed gear, with direct drive on the top speed and secondary gear shaft running on beautifully-made ball bearings, is one of the best things in the show. The Baby's back axle is also worthy of attention. The ball bearings, in which the live axle is mounted, are now adjusted in a particularly efficient and simple manner. The inner ball races of the outer bearings are carried solid in the sleeves, the latter being made to screw on to projections of the differential gear case. When it is desired to take up any shake in the bearing the collar is rotated by means of a spanner, and when sufficiently turned is held fast by a small locking tongue engaging in slots cut on a ring on the case extension.

* * *

On Stands 52 and 53, where the British Automobile Syndicate display a fine range of Cléments and Panhards, there may be seen a full-sized model of an ingenious non-slipping apparatus, invented by Captain B. D. Corbet (late 1st Life Guards). This fitting, which is peculiarly ingenious, is so made that it is readily attachable to and detachable from the road wheel. A light steel flange is made to fit over the outer end of the road wheel hub, and from this flange is secured, by guides and spiral springs, a concentric aluminium ring (light, but stiff), which carries about 9 in. apart tongues or blades of steel, the outer edges of which just touch the road surface as they pass over the ground. Should the car be running over rough or stony surfaces, no concussion is felt if the steel tongues should strike a stone, as the spiral springs by which the aluminium ring carrying them is suspended from the flange

allows the ring to raise the tongues over the obstacle. But should the car show the slightest tendency to side-slip, these rapidly-recurring steel tongues just nip into the road surface, and offer just enough lateral resistance to prevent the back of the vehicle from swinging. The aluminium ring of this non-slipper is hinged in such a way that, after detachment, it can be folded up into quadrant form and packed away in a small compass. We hope to give an illustration of Corbet's patent non-slipper in an early issue.

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Mr. Astell, of the New Orleans Motor Co., has been most modestly reticent with regard to the new change-speed gear fitted to the fine 15 h.p. New Orleans car shown upon Stand F in the body of the Agricultural Hall this week. As a change-speed gear it is, from every possible point of view, all that one could wish, having big short shafts, ample length of bearings, and splendidly robust and well-cut gear wheels. But the feature which particularly distinguishes it, and which, we believe, is singular to it, for we can recall no gear exhibiting the same characteristic, is the fact that when the gear is struck to the direct drive on the fourth speed there are no toothed wheels in mesh between the primary and secondary gear shafts. On the top speed the latter is entirely at rest. The manner in which this result is obtained, while quite simple, is particularly ingenious. It is, however, hopeless to endeavour to convey a clear idea of this clever mechanism, but as we are promised a drawing which shows this clearly, we hope to be able to describe it for our readers' benefit in our next issue. The rear axle of this car is also a very fine piece of design and work. The sleeves of the differential gear case project beyond the springs, and form plain bearings, upon which the driving road wheels rotate. The ends of the live axle pass through these sleeves, running in long roller bearings close up to the differential gear case, but passing through the case sleeves to the outer end of the wheel hub without further contact. The ends of the live axle are flanged and squared, and as to these portions fit within the outer ends of the wheel hubs, which, however, rotate upon the extended portions of the differential gear case sleeve, which takes all the road shock and wear. The wheel hub is secured to the live axle by nut and washer, which draws an internal shoulder in the hub hard up against a small flange formed on the end of the live axle just clear of the end of the sleeve bearing. Both the New Orleans gear, bevel drive, and live axle drive are worth inspection.

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.

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: R. A. C., E. H. C., F. Coop, and others.