SATURDAY, NOVEMBER 12TH, 1910.

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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Notes.

The Show at Olympia.

A cursory glance at our Show Report to-day is more than sufficient to demonstrate that the exhibition of next year's cars and accessories is in advance of all its predecessors. It affords another proof of the truth of Mr. Edge's prophecy that London would become the motor mart of the Eastern Hemisphere. This prophecy was uttered when the Paris Show was in the heyday of its fame, and very few believed it at the time. Not only do we find practically every British maker exhibiting his wares in Olympia, but almost all the leading makes of the world are to be found there, too. In our introduction to the Show Report we deal with chassis design generally, and the advances which have been made during the past year; it will suffice to say here that very real improvements have been made, both in detail and main principles of construction.

Like silence and efficiency, which in themselves cannot be demonstrated within the Show, the improvements which have been made in material are also practically undemonstrable. There is no doubt that as time goes on and design approaches nearer and nearer to perfection, the science of metals will play an even more important part in the construction of the car than it has done hitherto. This is saying a great deal, as there is no question that many of the old troubles which have now been eliminated were simply due to the employment of unsuitable material; not necessarily bad or cheap material, but metal which was really unfitted for its particular purpose.

To turn from the chassis to the bodies, the improvement here both in design and construction is continuous. Instead of being the exception it is now becoming almost the rule for side doors to be provided for the front seats, and we feel that our advocacy of the high-sided body has not been in vain, although when we first put forward its claims it cannot be said that the majority of body designers accepted them with enthusiasm. Each succeeding show, however, goes to prove the truth of our contention that comfort and handsome appearance go hand in hand.

The Need for Research.

One thing which is always brought prominently to mind at the annual motor exhibition is the need for research. In each show we find many ways and methods of doing the same thing, all of which are claimed, and honestly believed to be, the best by the makers employing them. True that in some parts of the chassis it is not possible at present to say which is the best way of attaining certain results, for the simple reason that the science is not sufficiently advanced for a definite statement to be made. This is particularly noticeable in the case of carburation, for, as we have already said, there appear to be more ways of doing this than there are ways of doing anything else connected with the power plant of a motor car. On the other hand, there should be no difficulty in arriving at a final conclusion as to whether a torque rod, not to mention radius rods, or their equivalents, are really necessary. Some makers maintain that they are unnecessary; others that the torque rod alone is sufficient, while some few believe in both or in a combination which gives the results of both. If we went through the chassis from stem to stern we could instance quite a large number of similarly open questions; questions of which no two designers necessarily take the same view. The Technical Committee of the Royal Automobile Club might with advantage take up research work on some of these vexed questions. Though, of course, considerable expense would be involved, it would nevertheless be a good thing for motorists generally if some of these knotty points could be settled. Now that trials are few and far between the technical work of the Royal Automobile Club becomes every day less and less onerous. It is not because the Technical Committee lacks energy or desire to work, but because it is not provided with a mandate or with funds by the Club itself. We say this in no hypercritical spirit, but because we wish to see the technical work of the Club, which has been so valuable in the past, turned again into useful channels, and not allowed to languish for want of initiative or money.

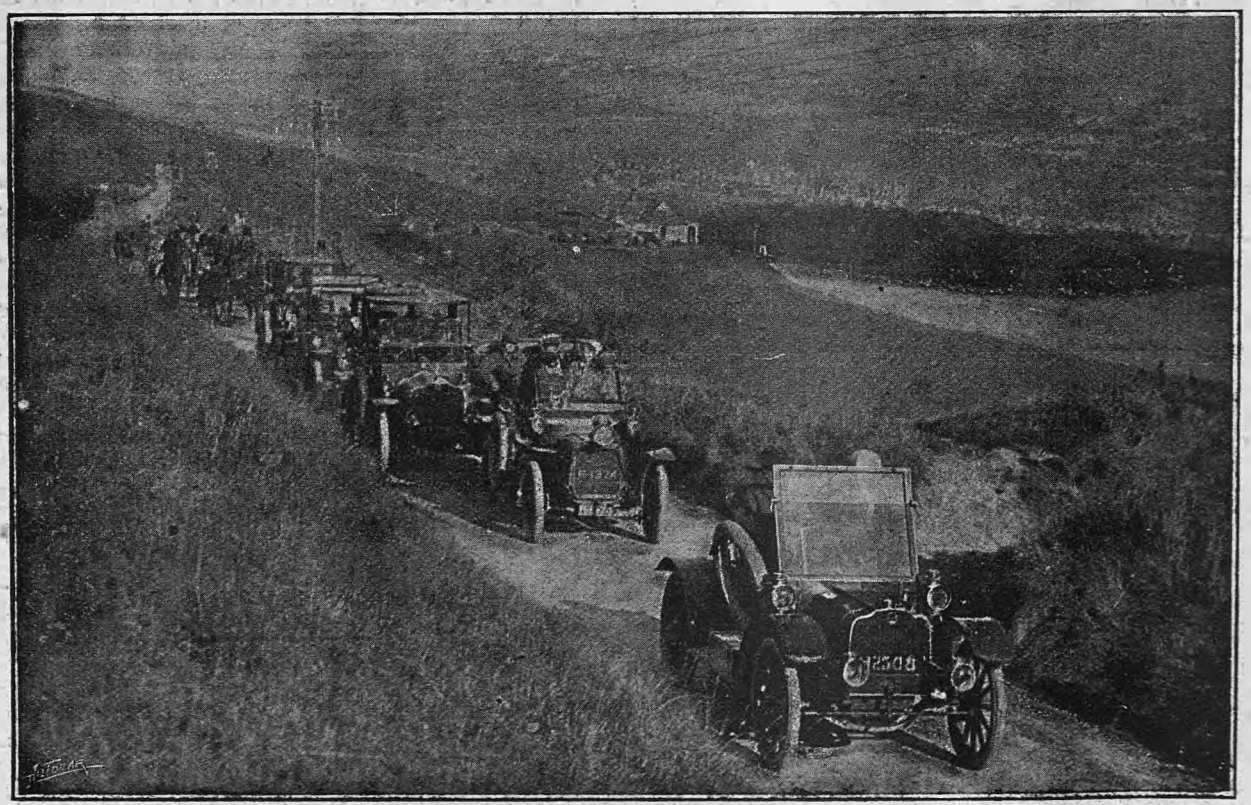
Two New 16 h.p. Class Records at Brooklands.

THE 16 h.p. Singer, "Bunny Junior," with Mr. G. O. Herbert in charge, was down at Brooklands on Friday morning, November 4th, after the 16 h.p. Standard Class Records, which fell at the first attempt. The weather was perfect, and there was no wind, but the track was in a very wet condition from the previous heavy rains. The Singer racer with its narrow wind-cutting body is the same chassis which scored so heavily at the last meeting, but with the new 80 mm. by 130 mm. bore and stroke White and Poppe engine installed in place of the 20 h.p. 90 mm. by 110 mm. engine. The same "40 mm." White and Poppe carburetter was used again. Twelve laps were covered in all from a standing start, and the acceleration was something phenomenal for so small an engine, whilst the laps were reeled off at about 80 m.p.h. with the utmost regularity. A 3½ to 1 gear ratio was used on the direct fourth speed, so that the little engine "turned round some," approximately 3,000 revolutions per minute, and the speed of the car proves that it also delivered high power. The piston speed approached 3,000 feet per minute; it was over 2,750 feet per minute. The official figures were announced by Major Lindsay Lloyd as 1290.558 seconds for the ten laps from a standing start, which is at the rate of 77.182 m.p.h. This sets up a 16 h.p. long record which will take some beating, whilst the best speed over the flying half-mile was 22.152 seconds, or 81.257 m.p.h. This beats the previous record of 25.016 seconds, or 71.953 m.p.h. set up by Mr. L. C. Coatalen on the 16 h.p. 80 × 120 mm. Sunbeam by nearly ten miles an hour. The 815 mm. by 105 mm. Palmer cord tyres used were almost unscratched and quite cool at the end, whilst the cooling water seemed hardly hot enough, in spite of the narrow radiator which was fitted to the car.

Directly after the record the cylinders were dismantled for the official measuring process, and found to be exactly 80 mm. bore, whilst the stroke was verified as being 130 mm. Mrs. Herbert was an interested spectator. We hear that nothing under ninety miles an hour will satisfy the makers, so that some further phenomenal figures may be expected in the near future.

Later on in the afternoon the 27.8 h.p. Imperia (106 mm. by 130 mm.) attacked the 40 h.p. Class Records. Mr. R. W. H. Kane, its erstwhile driver, was down to watch over things, whilst Mr. S. M. Joynson was at the helm. Some practice laps were clocked at close on 90 m.p.h., which augured well for success, as the engine was roaring round with a rich booming hum, and got off the mark very quickly. The car struck some of the large puddles with a splash like a liner taking the water. However, an ominous spluttering set in soon after the actual start, and one cylinder struck work altogether, which was traced to a broken valve cotter, so the attempt was abandoned for the time being, as it was getting late and misty. The engine was only re-assembled the night before, so that the long record looks like a gift for the Imperia when finally tuned up.

A Colonial model 15 h.p. Napier was under test during the afternoon for petrol consumption and speed. There were some interesting doings by the Zenith-Gradua and Indian single-cylinder single-tracker, which are fully described in *The Motor Cycle*. These included a new acceleration record, which is believed to beat all previous bests.



MOTORS AND SPORT. *Cars following the Eastbourne Hunt.*

Useful Hints and Tips.

Engine Knocks. Their Cause and Remedy. By Ambrose O'Ferrall.

(*Concluded from page 627.*)

Loose Bearings.

WE now come to a comparatively different class of knock from any we have yet considered. It is perhaps best described as a heavy thumping or pounding, which appears to proceed from the lower part of the engine, and is often quite audible even when the engine is running light with the car stationary. Such a noise can always be taken as an indication of more or less serious trouble, and should on no account be neglected, for if allowed to continue it will have a most injurious effect upon the portion of the engine from which the sound arises. The most usual cause of such thumping is wear of the big end bearings. Such wear, when once a little slackness has developed, increases very rapidly indeed, even when the lubrication is perfect. The remedying of such a fault should not be undertaken except by the expert amateur-mechanic or a qualified repairer, for the readjustment of engine bearings is a matter that requires very careful workmanship, otherwise the last state may be worse than the first. In order to carry out a test for slackness in the big end bearings it is either necessary to take the engine to pieces, or utilise inspection holes in the crank chamber if such holes be present. Further than this the engine should always be slightly warm when a test for slackness is made, for very often the "shake" or vertical movement of a slack bearing is not apparent when a film of thick cold oil is in position between the crank pin and the bearing. The same necessity for a warm engine is apparent when a test for "shake" is being made in the bearings of the crankshaft itself—for slackness in any one of the main engine bearings is sometimes the cause of a bad knock. The same if not more careful workmanship and experience are necessary when refitting these main engine bearings as in the case of big end bearings, for the filing up and scraping in of engine brasses is a job which requires great accuracy to ensure a perfect bearing surface.

Small End Bearings.

A similar species of knock, though somewhat lighter and more harsh, is produced by wear at the small end bearings, either the gudgeon pin itself or the bush in the connecting rod. A new gudgeon pin and a new bush to the connecting rod will as a rule correct this trouble, but sometimes it will be found that the true cause is looseness of the gudgeon pin in the piston. This will necessitate reboring the hole in the piston, and the fitting of a larger gudgeon pin.

Another form of knock which is usually very pronounced and develops very suddenly, is caused by the flywheel becoming loose upon the end of the crankshaft. It is comparatively difficult to test for such slackness, for although a flywheel may be sufficiently loose to cause a very bad knock it is rarely apparent when the flywheel is turned in either direction against compression, or against the effort of a second individual holding the starting handle. The removal of the crankshaft and the making of a bench test are usually necessary.

The majority of the knocks which have been mentioned earlier do not occur at each impulse of the engine; that is to say, they do not arise from every cylinder. In the case of a flywheel being loose a clue is often obtained, as such a defect gives forth a knock at every impulse of the engine.

The "Melt-out"

The knock caused by a white metal bearing having melted, owing to insufficient lubrication, is one that the merest amateur cannot miss, and the noise so caused is so pronounced that only the most brutal of drivers would attempt to drive a car with a melted bearing. Usually a melt-out occurs very suddenly and completely, but occasionally it is only partial, and it may be possible to reach home by over-dosing the engine with oil and driving very slowly.

In a multi-cylinder engine it must be borne in mind that a pronounced knock will be produced by one of the cylinders becoming inoperative through, for instance, a sparking plug failing. The writer has often encountered novices who have mistaken a misfire, either continuous or intermittent, for an engine knock in the ordinary sense, but, of course, to those who know their engine sufficiently well such missing will be diagnosed by the distinct loss of power which always accompanies the irregularity.

A distinctly audible knock is often caused by the nuts securing the cylinders to the crankcase becoming loose and allowing the cylinder to lift at each explosion and compression. This fault is easily traced by an examination of the nuts in question, but at the same time it is one often overlooked until every other possible cause has been sought.

In referring to engine knocks the writer has not attempted to treat of such sounds as those caused by worn valve tappets, ill-fitting valves or slackness in pump or magneto drive. These defects hardly come within the range of this inquiry.

Square Treaded Steering Wheel Tyres.

We have had some complaints of late concerning the steering of a certain make of car which is justly famed for the excellence of its steering. We confess these adverse reports puzzled us, as we knew that each car of the make in question that we had owned or driven had steered exceptionally well. This interested us so much that we arranged with an owner, who told us he had bought his car on the strength of our high commendation of the steering, to bring it to us, so that we could carefully examine it and try it for ourselves. He did this, and every examination showed that the steering as such was in good order; but the fact remained that the car was very heavy to steer—not really bad, but heavy enough to be very tiring on a long drive. We were almost driven to the conclusion that the working joints of the steering must be binding when loaded, when we noticed that the front tyres were of the square-treaded variety, and as the wheels were somewhat canted we suggested the substitution of round tyres for the flat-treaded ones. The change instantly cured the trouble. It does not matter if the tyres be cross-grooved, but circumferential grooving seems to have some bad effect, though nothing like so bad as that of the square-treaded cover. Round studded tyres, too, have little or no ill-effect. We do not say that all cars steer heavily with square-treaded tyres, but all we have tried do so, if the wheels are much canted.

Motor Union Notes.

(Communicated by the Assistant Secretary.)

The Union has under consideration at the present time the question of the attitude of a certain corporation in the South of England, which is endeavouring to compel a member to pay an extra rate for the water used in washing his car. It appears that the local authority contends that it has power to make an extra charge for each *hose* used. In connection with this subject it will doubtless be remembered that a few years ago the Union successfully fought an action against a corporation in the North of England, when a local member was proceeded against in respect of an extra rate for the water used in washing his car.

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At the meeting of the Highways Committee of the Motor Union, held on November 3rd, the committee had under consideration several applications received from local authorities for the Union's support to be given in connection with suggested road improvements upon which the Road Board had been approached. The various applications were carefully gone into, and the following are among the schemes to which the Union has promised its support:

Northwich (relief road).
Colnbrook (relief road).
Croydon (relief road).
Fishguard (diversion of the present route over Windy Hall Hill to the harbour).
Birmingham-Wolverhampton (a new road to connect these two towns).

One application which is receiving consideration concerns a proposal to build bridges over the Trent and the Humber in order to connect up Yorkshire, Lincolnshire, and Nottinghamshire, the land lying between the Humber and the Wash at present practically constituting a peninsula. The erection of bridges over the Humber and the Trent will also have the effect of obviating the difficulties of the crossing by the New Holland Ferry, besides opening up direct communication by road between places situated on the north side of the Humber and Yorkshire and Lincolnshire.

◇ ◇ ◇ ◇

The Union continues to receive a large number of queries anent the amount of taxation due in respect of motor cars under the Finance Act, 1909-10. Members are requested when applying for information of this nature to state the date of manufacture of the car, the number of cylinders, the maker's name, and, if possible, the bore of the cylinders.

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The Highways Committee of the Union has agreed, on the recommendation of the Cumberland Motor Union, that four special caution signs should be granted free of charge for erection at Cross Keys and Kempley.

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The introduction of the International Travelling Pass at the beginning of the summer considerably lessened the work of the Motor Union agents in the French ports. It was, therefore, found necessary to suspend the old agreement hitherto existing between the Union and the French agents, a provisional agreement at reduced charges being entered into. Definite arrangements have now, however, been made by the Union with a number of the agents for the Channel, Atlantic, and Mediterranean ports in anticipation of the annual migration to the Riviera and other winter resorts.

The following gentlemen have been appointed honorary local correspondents to the Motor Union in and in the neighbourhood of the towns hereinafter mentioned:

Dr. A. W. Allen (Skegness).
Mr. C. C. Cooper (Horncastle).
Mr. E. W. Tonkin (Tregoney).
Mr. S. B. Heaps (Beverley).

◇ ◇ ◇ ◇

Adverting to the applications for reduced speed limits at Southwick and Storrington, it is to be regretted that in the former case no particularly optimistic prospects of successfully resisting the application can be entertained. It is, however, to be hoped that in the case of Storrington the strong case presented by the Union will have the effect of negativing the demands of the local authority.

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An application has been made to the Local Government Board for a reduced speed limit in respect of a portion of the road in the village of Llansantffraid Glan Conway. The Motor Union will be glad to receive evidence bearing upon the application.

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The Union is supporting a prosecution against a man for dangerous driving and obstruction. The offence complained of is that the man drove his cart on the wrong side of the road, and for fully 100 yards, with the object of preventing the complainant's motor car from passing.

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The Motor Cycle Section will be represented at the Stanley Show which opens at the Agricultural Hall on 11th November, and at the Olympia Motor Cycle Show which opens on the 21st. An information bureau and members' rendezvous have been arranged for each exhibition.

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The next meeting of the Aero-Models Association will take place at Caxton House on Tuesday, the 15th inst., at 8 p.m., when Mr. Allender Roberts will read a paper entitled "A Few Argumentative Points and Possible Lines of Future Development."

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The reading of the paper entitled "Analyses of the Thirty-one Aeroplane Accidents at the Bournemouth and Lanark International Aviation Meetings," by Major J. N. C. Kennedy, before the members of the Aviation Section of the Motor Union, at the Royal Societies Club, London, on Tuesday last, 8th inst., was very warmly appreciated. The attendance was excellent, and the keenest interest evinced by Major Kennedy's auditors.

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The Motor Union is very anxious to bring about a change of position of stopping places of electric cars in those instances where the car comes to a halt just after passing a by or cross-road. This is frequently a source of grave danger to motorists driving out of a by-road into the main road along which the car runs. The London County Council has been approached by the Union with a view to bring about an alteration of the existing state of affairs within the province of this particular body wherever possible. The chances of accidents happening are considerably lessened if the car be stopped just before the opening of a by-road entering the main road, as is very well known to motorists who have occasion to drive in a district served by electric tramcars.

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The Motor Union. Chairman: W. Joynson Hicks.
Caxton House, Westminster, S.W. "Speedway, London." 9090 Ga rd.

Carburetter Action.

Being a digest of a paper read before the Institution of Automobile Engineers by W. Morgan, B.Sc., and E. B. Wood, M.A.

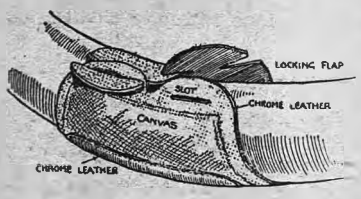
THE paper prepared by Messrs. W. Morgan and E. B. Wood, and read before the Institution of Automobile Engineers on Wednesday, was the outcome of a series of experiments carried out by the authors some three years ago at the Daimler Works as a preliminary to designing a paraffin carburetter. These researches were conducted on a standard four-cylinder Daimler poppet-valve engine with a bore of 124 mm. and a stroke of 150 mm., and as the main purpose of the experiments was to investigate the flow of air and liquid fuel, the engine was driven at the varying speeds required by an electric motor, which, however, was considerably overloaded by the engine, so that the range of speeds over which the tests were made was not so great as might be desired.

Objection may be made that the conditions under which such results were obtained are too dissimilar from those of actual working to have practical value, and therefore, to estimate the effect of actual running, measurements of air and petrol consumption were taken with the engine working under its own power. The results so obtained completely bore out those reached by driving the engine by an electric motor.

At an early stage an interesting point obtruded itself. There was no perceptible leakage of gas past the pistons, but at high vacua it was found that a considerable flow of air took place up the valve guides, although the valve stems were a good fit and were well lubricated. Naturally such a flow of additional air between the carburetter and cylinder affected results, so corrections had to be made for it.

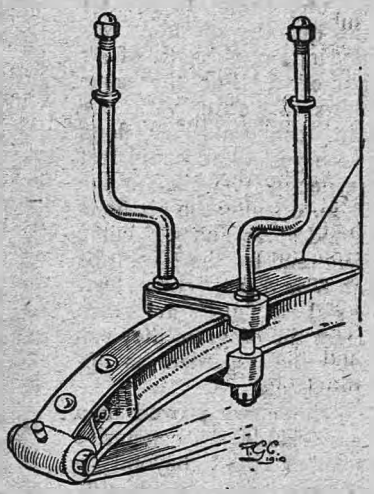
As regards corrections for losses on the exhaust side, it was found that with clear exhaust pipes the back-pressure never exceeded about 1⅞ lbs. per square inch, while at 500 r.p.m. the back pressure was only half that figure.

In a later series of experiments, undertaken to confirm the previous work, it was not thought necessary to apply atmospheric corrections for humidity or barometric and temperature readings, nor was any correction made for the volume of petrol vapour, since it was shown that such correction did not affect the main conclusions. The carburetters used in the experiments varied in form, but as a general thing they may be described as a float chamber with a jet projecting into a throttle-fitted tube, in which bushes of various sizes could be inserted to afford any required diameter of choke around the jet.



AT OLYMPIA. The new security gaiter shown by Riches and Co. The sketch illustrates the method by which the gaiter may be attached to an air tube inside the outer cover at a weak spot.

The results of the experiments were given in the form of diagrams, which, however, need not be introduced here, as the gist of what they show can well be given in words. Taking a record, obtained with a choke of ¾in. diameter, as typical of the whole, we find the petrol and air flow increase proportionally as the engine speed is increased, up to a certain point. But only up to a point, and at somewhat above 550 r.p.m. the petrol flow begins to increase slightly faster than the air flow, this fuel-increasing tendency steadily continuing. This appears to have been a marked feature in practically all the experiments, and it constitutes an important point. By plotting a line to represent the constant fuel mixture, it is shown that with this ¾in. choke the mixture is on the weak side up to about 250 r.p.m., after which it becomes more and more superfluously strong. Recognising that the height of petrol in the jet may have a considerable effect on petrol delivery at low suctions, trials were conducted with flooded jet, and these gave a temporary hyper-rich mixture, which, however, did not affect the readings as soon as the suction increased.



AT OLYMPIA. The Autoclipse adjustable lamp bracket, shown by Brown Bros., Ltd., fitted to the front dumb iron of a car. The distance between the vertical bracket members can be varied in a few moments to suit any size of lamp.

Reference has already been made to the fact that, as larger quantities of mixture are supplied minute per minute, the petrol flow increases in faster ratio than the air flow, and in this connection it is interesting to note how varying diameters of choke around the jet modify the carburetter action. Tests were carried out with chokes of 1¼, 1, ¾, and ½in. diameter, and the results went to show that this effect of relative increased fuel flow was caused by resurgence in the air pipe.

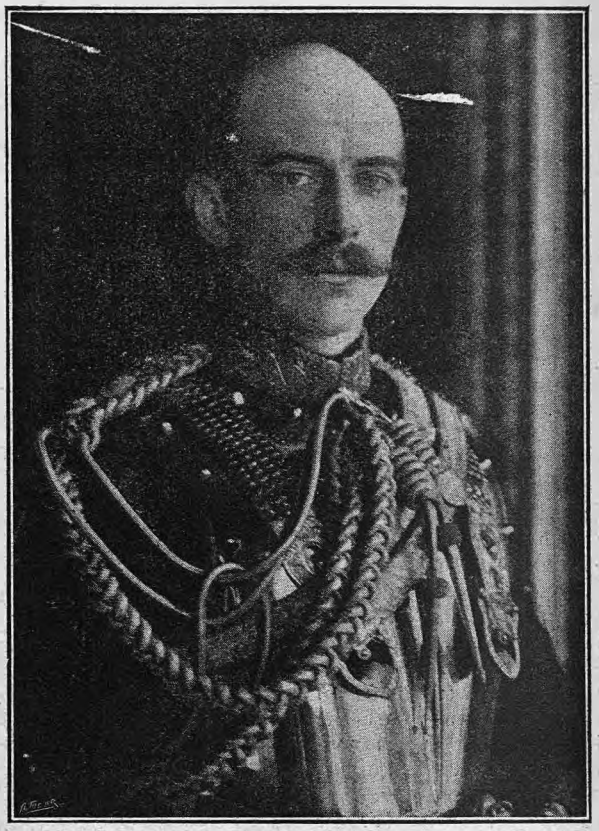
The authors then made reference to Dr. Watson's paper on "Thermal and Combustion Efficiency," which mentioned tests showing that actual reversal of flow takes place, due to resurgence on opening inlet valves and to inertia effects in general, and the tests carried out by the authors go to show that, with the larger diameter chokes and open throttle, this effect of the resurgence is more marked than when smaller chokes or half-closed throttles entail high gas velocities that tend to damp out the resurgence effect. Back pressure in the cylinders rushing into the induction pipe as soon as the inlet valve is opened also sets up resurgence, and tests by the authors showed that, though the air and petrol flow ratios to the engine up to 40 cubic feet per minute do not vary, with a back pressure of 5 lbs. per square inch only about 49 cubic feet of air minute per minute were flowing with a given quantity of petrol as opposed to about 58 cubic feet to a similar fuel quantity when the engine was free from back pressure. The authors of the paper tried to wipe out this resurgence tendency by inserting a silencer between the engine and the jet, and this was found to have the desired result.

Some of the quantitative results shown by the diagrams of the tests with varying chokes are interesting. With a given quantity of fuel the air flowing through the 1¼in. choke amounted to about 43 cubic feet minute per minute, while, when half the quantity of fuel was flowing, 11 cubic ft. of air passed. For the same flows of petrol with the 1in. choke the air flows were 39 and 10 cubic feet respectively, while for the ¾in. opening the air flows stood at 20 and 5½ cubic feet, and for the ½in. tube at 8 and 1¼ cubic feet. As these figures are taken from the diagram they can only be regarded as approximate.

The curve proved in a remarkably conclusive manner that, beyond a certain point, the quantity of the petrol supplied varied directly as the square root of the suction.

The curves in general show that, but for the resurgence effect, which can be overcome, the air fuel relation curve of a plain tube carburetter takes a straight line for all speeds, and this line is parallel to the ideal line, but shows the mixture as too weak throughout. "That being so," say the authors, "the designing of a constant mixture carburetter is within reach of attainment; allow the constant shortage to dribble into the induction pipe and the problem is solved, except for questions of convenience. . . . At intermediate throttle positions the mixture would be weak, but if the statement be accepted that such weak mixtures are economical, this would be a desirable feature. In any event, when maximum torque was required at any speed the required mixture could be obtained by fully opening the throttle. . . . To sum up, there appears to be no necessity in any carburetter for extra air devices, or the multitudinous contraptions employed, other than a neat form of apparatus for supplying this extra supply of petrol."

The New Chairman of the R.A.C.



Photograph by *Russell.*

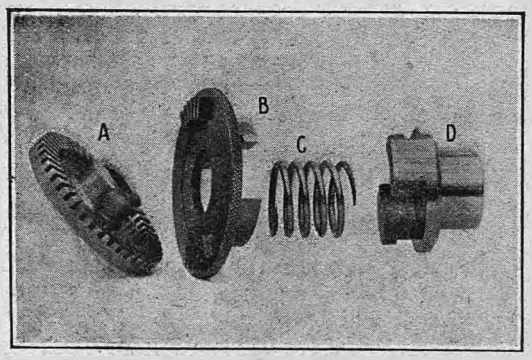
H.S.H. the Duke of Teck, G.C.V.O., C.M.G.

The Eisemann Magneto Coupling.

A Device Allowing very fine Degree of Adjustment.

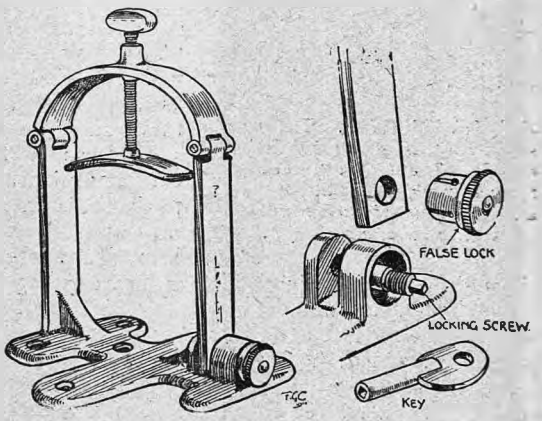
The illustration herewith shows a new type of magneto drive coupling introduced by the Eisemann Magneto Co., Ltd., by means of which a very fine range of positive adjustment is available.

As shown in the photograph, the various parts are in their respective positions; the flange A is locked on the magneto shaft, the boss passing through the disc B and allowing sufficient room for disengaging the teeth when the locking nut of A is in position. The bayonet coupling D is fitted to the half-time shaft, and when the magneto is fitted the spring C is compressed between flange B and the coupling D, so forming a non-chattering joint, quickly detached, and, as before mentioned, giving a very fine range for adjustment, it being possible by the teeth alone to make a variation of only 8° if required.



The Eisemann magneto coupling.

A, flange or driven disc on magneto
B, driving disc
C, spring preventing "chatter" between B and D
D, bayonet coupling on half-time shaft



AT OLYMPIA. *The new tyre lock shown by Alf. Dunhill, Ltd. This device prevents the theft of a spare tyre or wheel from the footboard. The details of this practical fitting are shown in the sketch.*

Olympia Show Statistics.

Small Shrinkage, but Olympia still ahead of last Paris Show. By H Hewitt Griffin.

THE present Show is the second largest on record, but second to none in interest. Cars were shown on 139 stands.

SHORT STATISTICAL SYNOPSIS.

Classification.	Ol'mpia London 1910.	Ol'mpia London 1909.	Grand Palais, Paris, 1908.	Ol'mpia London 1908.
Light and Heavy Cars	390	380	318	336
Two-seaters and Voiturettes	64	71	45	54
Racing Cars and Type	–	5	18	–
Three-wheeler Cars, etc.	3	2	4	–
TOTAL COMPLETE CARS	457	458	385	290
TOTAL CHASSIS, all kinds	132	139	190	142
GRAND TOTALS	589	597	575	532
Means of Propulsion.				
Petrol only	578	585	566	518
Petrol and Electricity	–	–	5	–
Electricity only	2	4	4	2
Steam	9	8	–	12
TOTALS	589	597	575	532
Methods of Driving.				
Propeller (cardan-shaft)	571	556	456	472
Chain	12	32	106	56
Electricity	2	4	4	4
Friction	3	3	5	–
Belt	1	–	4	–
Link	–	2	–	–
TOTALS	589	597	575	532
Countries of Origin.				
1. Great Britain	294	307	4	273
2. France	185	178	480	155
3. Germany	29	25	19	27
4. Italy	28	29	35	26
5. Belgium	25	21	18	19
6. America	18	17	6	19
7. Switzerland	7	14	11	9
8. Austria	3	6	2	1
9. Holland	–	–	–	3
	589	597	575	532

Banishment of the Chain.

Last year I made special comment on the imminent extinction of the chain. It is interesting to quote a few figures marking its decline:

1900.	1904.	1906.	1908.	1910.
62.77%	66%	33.33%	10.33%	2.04%

The last (1908) Paris Show had 18.434%. Even last year in Olympia thirty-two chain cars were on view.

Comparative Values.

The following table gives the comparative values of cars at the present Show and those of the previous two years:

	1910.			1909.	1908.
	Cars.	Chassis.	Total.	Total.	Total.
	£	£	£	£	£
England	131,504	25,186	156,690	146,498	146,297
Scotland	5,153	—	5,153	7,017	1,655
British	136,657	25,186	161,843	153,515	147,952
French	78,903	16,776	95,679	92,659	88,912
Germany	12,225	3,177	15,402	11,205	18,420
Belgium	13,457	1,570	15,027	12,527	8,970
Italy	11,025	3,705	14,730	15,527	15,490
America	7,446	815	8,261	6,220	5,670
Switzerland	2,047	945	2,992	5,759	4,775
Austria	875	960	1,835	2,855	590
	262,635	53,134	315,769	300,267	290,779

Despite many low-priced cars, the average price of complete cars in the Show is about £575, against £534 last year. In 1896 it was £683; in 1907, £622. The total values and numbers of cars at Olympia for the past five years are as follow:

Year	1910	1909	1908	1907	1906
Value	£315,769	£300,267	£290,779	£348,605	£393,663
Cars	589	597	532	560	576

Allocating the Values.

It is always hard lines for England, as very many of the cars credited to France and elsewhere bear English bodies. To sort these and other details out would be too vast a labour. There are many thousands of pounds for bodies; some of the beautiful creations of the coachbuilder's art in the Annexe cost £200 to £250. Out of the 298—say 300—"foreign" cars quite 200 have British bodies. At only £50 these would be £10,000, but £20,000 would be nearer the mark. But then many "English" cars bore French fittings, lamps, etc., but these are minor compared with the bodies. Still, if we reduce the French total to, say, £80,000 and raise the British to, say, £180,000 (allowing for other countries), it would be nearer the mark.

As far as possible the price taken was as the car, with all its equipments, stood on view. Hood, speed recorders, glass screen, and lamps repeated many (200) times mount up—with other extras £6,000 would be a very moderate estimate for these.

Poppet and Slide Valves.

We have received the following letter from Messrs. Godden, Son, and Holme, 34, Old Jewry, London, E.C.:

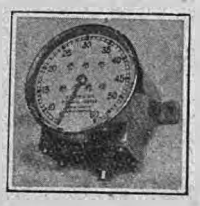
Sir,—In the first note in your issue of November 5th, you refer to an informal meeting of makers of poppet valve engines—who (you say) decided upon a common policy of opposition to the slide valve—and to the circular which was sent to the press as a result of that meeting.

As we were the channel through which that circular was sent to the press (for so large a number of manufacturers could speak with one voice only through some such channel), may we be allowed to make the following comment on your note?

The object of the meeting and of the circular was not "opposition to the slide valve," but to secure *Press impartiality*. Certain organs of the Press (not *The Autocar*, needless to say) seemed to be leading the buying public to believe that it is universally admitted that the slide valve has triumphed over the poppet valve, *i.e.*, is admittedly superior for practical purposes.

That is so far from being the fact that it seemed reasonable to point out that the contention has not yet been confirmed by the only means on which the public can rely, viz., official tests.

GODDEN, SON AND HOLME.



AT OLYMPIA. A view of the "Popular" model speedometer and distance recorder shown by S. Smith and Son. This very neatly designed instrument is fitted with an instantaneous set-back for the trip indicator. A somewhat similar but smaller instrument sold by the same firm is called the "Midget."

THE SHOW AT OLYMPIA.

AN ILLUSTRATED REVIEW FROM A STAND TO STAND INSPECTION.

PREFACED BY A GENERAL CRITICISM OF THE EXHIBITS.

THE Ninth Exhibition held by the Society of Motor Manufacturers and Traders, which closes to-day (Saturday), is, as it should be, the best of the series. The very high average of the exhibits of last year's Show has not only been maintained, but surpassed. We do not infer that there is no poor design or indifferent workmanship in the building, but the average is unquestionably in the ascendant. The best firms have clearly advanced the merits of their productions, and more than one second-class firm has unquestionably risen by sheer perseverance into the first class. The Show is a most representative one, as, in addition to the home makes, it includes, with a very few exceptions, all the leading makes of the world, and this is where it presents an outstanding advantage over the French and American shows. It is now such a well established feature of the autumn that there is no need to generalise at length. It will suffice to say that the visitor should not place an undue value upon the exterior finish of the chassis displayed, as in many cases it may be said that in this respect there is little or no difference between the best cars in the Show and those which can by no stretch of imagination be rated above second class. Those who visit the Show with the intention of making an inspection which shall guide them in the selection of a new car should consider the average workmanship of the firm, and not the mere superfine polish which may be a feature of the good and indifferent alike, so far as the show exhibits are concerned. There is one word of warning we would utter, and that is in connection with the car tax. There is a tendency both on the part of exhibitors and buyers alike to place undue weight upon this. Our advice, therefore, is to select the car first and regard the tax afterwards, because a couple of guineas more or less is not worth considering. For instance, if a man is hesitating between an 80 mm. engine and a 90 mm., he should not let a couple of guineas per annum influence his decision, as, other things being equal, there is no doubt he will get better service and greater pleasure out of the larger engine than out of the smaller one. Indeed, this applies if the difference is merely that which exists between an engine of 80 mm. bore and an 85 mm. engine. Only those who have tried both would be able to realise the advantage of the extra 5 mm. in the bore. Prices may certainly be said to have hardened considerably, but this must not be ascribed to the desire of the manufacturers to increase profits. It is the very natural corollary of the upward tendency in costs all round, commencing with the price of food and ending with those of material and establishment charges. It must, moreover, be borne in mind that so keen is the demand for silence, flexibility, and reliability that shop and road testing have to be persevered in to a much greater degree than in the past, and this practice, admittedly necessary, is somewhat costly.

Some General Tendencies and Criticisms.

Engines.—Last year, when penning our critical article, we dwelt upon the prevalence of efforts to simplify the engine externally. It was one of the very marked features of last year's Exhibition, and the tendency is still a very strong one, but we are glad to say that, speaking generally, it has not been overdone. At the same time it is a question whether internal efficiency has not been sacrificed in some cases to external neatness. With the idea of doing away with inlet and exhaust pipings as far as possible, we find engines which are cast with the inlet and exhaust passages as integral parts of the cylinder heads, and there is no doubt that in some instances this practice has been carried to the extreme, and the engine is unduly restricted. Not only so, but it requires very efficient cooling to keep the motor in good running order, as the heat of the exhaust is not instantly released, but is, more or less, confined within the engine. The casting of the engine *en bloc* has been dropped in some instances. but the total number of firms adopting this practice is certainly on the increase. There are notable exceptions, but in the main the single unit system is confined to the smaller powers. Some of the six-cylinder engine makers are following pioneer practice by fitting cylinders cast in groups of three, and there is more than one instance of the whole group of six being made from a single casting. This is a matter on which it is impossible to lay down a hard and fast rule, but very great care is required in carrying out the job well. The chief objections to the practice are that it is difficult to provide absolutely equal compression spaces in each cylinder head, which of course includes the valve pocket or pockets, and we must confess that when it comes to removing the cylinders and replacing them upon the pistons, we should not enthusiastically undertake the job with a six-cylinder *en bloc* engine, as it would certainly mean that several able assistants would be required. At the same time it must be understood we are not opposed to the system, as it undoubtedly results in a very rigid engine, and the practice must be condemned or commended according to the way in which it is carried out. To generalise, it may be said that the current parctice is to cast the cylinders in pairs, though several of the best firms adhere to the practice of separate cylinders, the design as a whole being so arranged that, although the cylinders are separate, they are thoroughly well supported. On the whole, we incline to the opinion that casting in pairs is a compromise which takes a great deal of beating. Stroke length in relation to bore tends to increase, but there are not many examples of excessively long strokes. The long stroke "hangs out" better under collar work, and, provided it is not overdone, and that the reciprocating parts are kept as light as possible, there is much to be said in its favour. At the moment the tendency appears to be to lengthen the stroke so far as it can be done without spoiling the smooth running of the engine. *Désaxé* cylinders are not materially increasing in popularity, but the majority of makers who have taken up the practice are adhering to it, as by placing the cylinders slightly

to one side of the crankshaft the connecting rod exerts a more direct thrust on the crank pin during the power stroke, also reducing the obliquity of the thrust from the crank pin on the cylinder wall. As we said last week, there is no doubt that the makers as a whole have concentrated their efforts upon combining silence of running with high power in relation to the size of the engine, but how far each individual effort has been successful can only be proved by an actual trial of each car over a trip which includes a run in good stiff country. It is, of course, impossible to overdo efficiency as such, but it is quite possible for the highly efficient engine to be overworked and overloaded. Indeed, there is no doubt that this has been done in many cases, and in the Show itself there are a good many large closed bodies which are necessarily heavy, placed upon chassis with engines that are too small for the work, and which will be overloaded for a very considerable portion of their running. Other tendencies to be noted are the increased use of thermo-syphon cooling, and the very large pipes used for the circulation of the water, while the radiator is more often placed behind the engine than heretofore. More exact provision for fine adjustment of the clearance between valve tappets and valve stems is made. Attention has also been given to inlet pipes to secure an even and equal flow of mixture to all cylinders. Valves are more frequently all on one side, and the practice of placing the inlet over the exhaust is coming in again. Crankshafts have stiffened, and five bearings are often used, though other makers maintain that three good long bearings are better.

Valve Gears.

We have no intention of entering on any discussion here of the relative merits of the valve systems, as sufficient has been said in our pages recently to render this unnecessary. To refer to the general practice with regard to poppet valves, it may be said that there is no tendency, as there was a year ago, to use exceedingly large valves or high lifts, as both have been found unnecessary. On the other hand, quite a number of makers whose valves have been rather on the small side hitherto have increased the diameters. No new valves have been introduced into the Show this year, the three types represented still remaining the poppet, the slide, and the piston. Quite a number of makers have relinquished spur wheels for driving the valveshaft or shafts in favour of silent chains. Indeed, in one or more cases worm drive is employed.

In a good many cases where the spur gear has been retained helical teeth are employed, though it would be preferable, in our opinion, to use double helical or, for want of a better term, V-teeth when this is done. Also, with a view to obtaining silence, other substances besides compressed fibre have been used, and so far as we can gather the best results are being obtained with compressed paper, though we are unable to say whether this would be successful with the really high speed engines which are so prevalent, as so far as we know compressed paper has been mainly used on engines which are notable for their silence and smoothness rather than for their high efficiency in relation to size. Opposed to all this we find other makers who, adhering to the steel spur gearing or to steel and some other softer metal, have succeeded in making their gears so nearly noiseless that they are justified in regarding a change of material or method as unnecessary. More engines than ever have the valve springs and tappets enclosed by readily removable cover plates; the original idea of this was to obtain silence, but we have not found that any noticeable difference has been made in this respect. The real advantage of the covering is that it enables a more generous supply of oil to be fed to the cams and tappets without making any mess, and it is undoubtedly a good practice for this reason. Makers have long been aware of the advantage of overhead valves, but very few have had the pluck to drive them by an overhead shaft, contenting themselves with long tappet rods and rocking levers. There is no doubt that with overhead valves, *i.e.*, both inlet and exhaust, a better form of combustion space is obtained, and the present Show gives very strong evidences that serious efforts are being made to use the overhead tappet system and at the same time to obtain silence with the arrangement. Indeed, it appears to us that the overhead valve is at last presenting itself for the serious attention of the many rather than of the comparative few. This is not, perhaps, the time to speculate on the future, but we certainly see possibilities of most interesting developments in this respect.

Engine Lubrication.

The old splash system is nearly defunct, that is to say, the system which had but two brutal indicators; if the engine smoked it was well lubricated, while if it did not smoke, it might, and sometimes did, seize. On the other hand, many systems of lubrication are but a refinement of the old splash system. Under each big end an oil trough is placed, and each trough is kept filled to overflowing by means of a pump driven by the engine, the pump usually taking the form of a pair of gear wheels, though in some instances a plunger pump is employed. There are all sorts of refinements of this idea. For instance, in some cases the main bearings of the crankshaft are lubricated through pipes. In others oil collecting pockets are formed, so that the oil as it is thrown up by the big ends runs down the crank case walls into these gutters or galleries, which carry it to the main bearings before it falls on to the gauze beneath the engine and is filtered into a sump to be returned to the engine once more. Another refinement is to carry the oil in considerable bulk in a tank outside the engine. The system, as a whole, remains the same, but by carrying a larger volume of oil and keeping it outside the engine, the oil is kept cool and better lubrication is thus provided, as the oil is not thinned by becoming hot. It is quite simple, as it merely means that each pumpful of oil has a longer rest before it is passed through the engine and back to the pump again. The complete mechanical system of lubrication goes much further than the trough system, as in it a hollow crankshaft is used and oil is forced to every bearing right up to the gudgeon pin, either through a hollow connecting rod or by means of a small copper pipe attached to the rod. There is no question, if expense be ignored, that this system is the best, but it must be perfectly carried out. Although it is true that a failure of the lubrication system is very unusual on a good car, it is at the same time somewhat extraordinary that so few engines have provision made for running on splash should the oil pump fail. Many of them would require very little modification to enable this to be done quite easily, and undoubtedly this point is one in favour of the system of carrying the oil outside the engine rather than in a sump beneath the crank chamber. It may be urged that any engine can be run on the splash system if sufficient oil be present. Broadly speaking, this is true, but with the great void beneath the connecting rods it would take more oil than is carried

on the average car to reach to the level of the big ends. There is a great difference in the manner in which the various systems are carried out. Some simply bristle with complicated piping; others have practically no outside leads at all.

On the whole, we rather prefer a combination which does not aim at the sacrifice of exterior piping for the mere sake of getting rid of it, but, on the other hand, does not sacrifice completeness of lubrication to the desire to avoid an outside pipe or two. Then there are the filters. There should be at least three filters in every mechanical or semi-mechanical lubrication system—one at the oil filler, so that the oil as it is poured in shall be relieved of any impurities; one above the sump, so that the oil as it drops from the engine is filtered into the sump; and, lastly, there should be one through which the pump sucks its oil. A good many engines only have the one filter—that is a big sheet of gauze under the big ends, and we may say that from our experience we do not consider this sufficient. At the same time, when a filter is used at the pump, it should be made so that it can be readily taken out and cleaned. Otherwise it may become so blocked that the pump cannot draw sufficient oil to maintain the full circulation, and it is for this reason that some makers have entirely suppressed this filter. On the other hand, the fact that it becomes blocked if it be not periodically cleaned seems to show that it has a very real mission to perform. Engine lubrication becomes more and more important in these days of small high speed engines turning at a very high rate of revolution, their long strokes giving at times very high piston speed, and we are very glad to see that, speaking generally, this highly important matter is receiving the attention it demands. Another tendency is to arrange for the lubrication to be proportionate to the speed and load by inter-connecting its control with the throttle. This is done in various ways, though, so far as speed alone is concerned, the oil pump itself (as its speed depends on the speed of the engine) provides a natural regulation.

Ignition.

Ignition can be dismissed very briefly, as the magneto is practically universal. There are various forms of dual ignition which enable an accumulator to be used for starting purposes in conjunction with the magneto distributer and a separate coil, but they are only apparata for providing easy starting, the ignition, as soon as the engine is once running, being carried out wholly by the magneto. On the smaller engines the magneto alone is used, as there is no need for the dual. On the larger engines two separate ignitions are generally employed. We must confess to having a preference for this practice, as there is really nothing against it, except additional expense. The magneto is more often placed in an accessible position than hitherto, and the cross-shaft driving the magneto at one end and the pump at the other is becoming more prevalent. At the same time this position does not always provide such accessibility as might be anticipated, as unless the magneto be fairly high, the front wheel and mudguard make it very difficult to examine the contact points, and one may often do better with the magneto parallel to the crankshaft, provided it be not blanketed by the frame, or some other part. It is true that the magneto very rarely requires anything to be done to it, but when it is necessary to adjust or face the contact points, this might just as well be made an easy single-handed job as a back breaking contortion in which two persons must take part. For driving the magneto we find silent chains, skew gear, and worm gear now employed, as well as the more generally used spur gearing.

Carburetters.

The Tourist Trophy Race and racing on Brooklands have undoubtedly done more than anything else to influence carburetter improvement. The effect of the carburetter upon engine power can be best realised when it is pointed out that a good many of the successful cars at Brooklands and in hill-climbing competitions are quite smooth and nice running cars with their ordinary roadster carburetters fitted. The engines may develop ample power for ordinary requirements, but when competition is the order of the day a larger carburetter is fitted, and the engine becomes another thing altogether. It will no longer run slowly or quietly, or pull at low speeds, but it develops vastly more power, and for competition purposes is a far superior engine. This, of course, simply means that in a single carburetter it is, to say the least of it, difficult to provide an instrument which is suitable for the engine at all speeds and under all conditions. After all, the multi-jet carburetters are attempts, and in many cases fairly successful attempts, to combine in the one instrument touring smoothness and docility with racing efficiency. This again is an evidence of the influence of the small engine. With the larger engines there is no need for a carburetter of such wide range, but with the smaller engines power is only to be secured by high engine speed, and we therefore have many modern touring cars, which may never attain a high road speed, in which the engine is revolving at speeds only used in races a few years ago. No striking developments in carburetters are exhibited, but there is no question that carburation as a whole is greatly improved, and a good deal of the silence and smoothness of the modern engine is simply and solely due to the improvements in carburetters. With the growth of the practice of placing the valves on one side we are glad to see that the carburetter is more frequently set upon the opposite side of the engine to the valves, connection to the induction ports on the opposite side being made through pipes or channels which pass between the cylinders, and are water jacketed in consequence. By placing the carburetter opposite to the valves much greater accessibility is attained, not only to the carburetter, but to the valves on the reverse side of the engine.

Clutches.—Clutches still remain in three leading divisions—the leather-lined cone, single disc, and multi-disc. There are also the internally-expanding and the externally-contracting types, either of which may be described as an internal or external brake in principle. Here we have five ways of effecting the same result, and it cannot be said that there is any definite settlement as to which is the best compromise. It seems to be almost wholly a question of design and workmanship, as with any one of these a satisfactory clutch can be produced. A really more important point is the way in which the thrust of the clutch spring is taken up. More than one leading make of car does not use a clutch which takes up in itself the thrust of the clutch spring but delivers it to the crankshaft bearings, provision usually being made for this by ball thrust bearings at one end of the crankshaft. There is no doubt that the self-contained thrust type is preferable, and it is so easy to design a clutch which takes up its own thrust that we can see no valid excuse

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for the other type. With regard to the coupling of the clutch to the gearshaft, we shall have something to say under the heading of "Transmission," as it has a very great effect upon the wear of the mechanism.

Change-speed Gears.—Undoubtedly the feature of the Show, so far as change-speed gears are concerned, is the very large increase in the number which are provided with four speeds. We have no wish to labour the question, as we have so steadily advocated the superiority of four over three speeds for some years, and we think a sound case has been made out for the four-speed gear box. It will suffice to say that we are pleased that so many leading makers have arrived at the same conclusion as ourselves. Here again great efforts have been made to attain silence. The direct drive is quiet enough, but the indirect drives are not quiet on the majority of cars, and no royal road has been found to securing quiet running. With this end in view every effort has been made to provide rigidity by short strong shafts, and thoroughly good support by the bearings, a central bearing being in some cases introduced. Every care may be taken in the cutting of the gears, and all the skill that human ingenuity and knowledge can suggest may be devoted to the one aim of securing silent running, and yet when all is done the thing resolves itself eventually into a matter of trial and error. In other words, only those who try their gear boxes carefully for noise and re-mate all the noisy pairs of gears have succeeded in turning out reasonably quiet indirect drives. In many respects the gear box may be regarded as the most unsatisfactory part of the car, and from a Show point of view this is disappointing, because there is so little shown that is new in this direction. It is a matter to which almost all the leading designers are giving attention, and from what we hear it seems likely that one or more may succeed in producing change-speed gears which will give equal efficiency and equally silent working on at least two, if not three, of the four speeds. After all, with a four-speed gear box a noisy first does not much matter. In a good many gear boxes the reverse pinion runs constantly whether in use or not, but this defect is being gradually eliminated. Another effort to secure silence is found in the two pairs of wheels which are in constant mesh in the average gear box, these wheels being made in a few instances with double helical teeth. Single helical teeth are unsuitable because they produce end thrust. Other makers are turning out gear boxes in which the second shaft is out of use when the direct drive is in operation, and at least one maker has designed an ingenious method of restarting it in advance of the engagement of one of the indirect drives, so that there is no shock when changing from direct to indirect. Another marked tendency is to increase the pitch of the gears, which put into untechnical langauge simply means that coarser teeth are employed. Opinions are divided as to which is the more silent method, but the coarser pitch is employed so that the teeth may be less affected by bad gear changing. Steel of very high tenacity is now being employed for the gear wheels, and it is moreover of such a nature that it can be air-hardened so that the tendency to distort in case-hardening processes is greatly minimised. This will have a very marked effect on gear box construction, as the metal is of such strength that the teeth can be narrowed, thus reducing the total lengths of the shafts and thereby enabling a stiffer gear box to be made. Lubrication of the gears is now by oil alone in some cases, and a pump is placed in the box so that the lubrication follows engine lines, as the oil is forced to the bearings and sprayed on to the flanks of the teeth where they engage. The only other notable features in change-speed gears are in the silent chain change-speed gear to be shown in the Gallery and the constant mesh or foolproof gear on a well-known car. Epicyclic gears are also to be found in somewhat larger numbers, but unquestionably the prevalent type is the sliding gear. The gate change is more prevalent than ever, this control being used in one notable instance in conjunction with epicyclic gearing.

Transmission.—The most noticeable feature is the increase of the number of firms using the worm in place of the bevel for the final drive. In a good many cases the overhead worm is employed, and in one instance at least the engine is inclined slightly forward, so as to keep a direct line between the crankshaft and the worm. On the other hand, where the under-hung worm is employed the engine is inclined backward with the same end in view. With regard to the respective merits of overhead or under-hung worm the matter must depend very much upon the purpose to which the car is to be put. The old idea that the overhead worm would be insufficiently lubricated has long since been exploded in practice, as the worm wheel acts as a natural conveyor of the oil to the bearings. If the worm be underneath ground clearance is reduced, and if it be above it is somewhat difficult to keep the back seats as low as they are often required to be, but a great deal depends on how the chassis is designed and the proportions given to the various parts, so that several makers appear to have overcome this objection to the overhead worm. Although it might well come under the heading of either engines or gear boxes, we may refer here to the tendency to consider more carefully the insulation of the engine and transmission as a whole from the bad effects of frame flexion. The rigid frame being accepted as an impossibility and undesirable, even if it were possible, more attention is being given to preserving the working parts from being thrown out of alignment with each other, as well as to preserve them from internal stress through this cause. The under-frame is tending to disappear, but three-point suspension of either gear box or engine, or both, is increasing in use. This is particularly the case with the gear boxes, but in the matter of engines a good many makers have found that three-point suspension is unsatisfactory for the higher powers, as the mere working of the engine tends, as it were, to take undue advantage of the three-point suspension, so that from lack of firm foundation engine vibration is increased. They have, therefore, compromised by stiffening up the crank chamber and supports and bolting the whole firmly to the main frame sides. A great deal more attention has been given to providing for flexibility in the connecting-shaft between the clutch and gearshaft, and undoubtedly this is one of the most important joints in the transmission next to the main universal joint of the propeller-shaft itself. A great many of the so-called universal joints between the clutch and gearshaft are very far from universal in their action, and there is no doubt that they are the direct causes of loss of efficiency through friction and wear of the bearings, simply because they do not compensate for small deviations in alignment between the engine and gear box brought about by frame distortion. Many of the universal joints on the propeller-shafts are too small for their work and not properly protected, but the more common defect is in the sliding joints at the rear end of the shaft. These are altogether inadequate for the very heavy pressures they have to

sustain, and the result is the slipper surfaces wear very quickly, and rattle and snatch are set up which can only be cured by a renewal of the parts. Indeed, these sliding joints are often so overloaded that the pressure to the square inch is excessive. All the lubricant is forced out from between the sliding surfaces, and they therefore work very stiffly, not only rapidly wearing away, but through their sluggish action they set up strains in the transmission, and may indeed damage the tyres more or less seriously. One or two firms are fitting ball bearings to their universal joints, and this is a step in the right direction, though probably unnecessary if some really satisfactory form of easily adjustable plain bearing could be devised. The unsatisfactory grease soddened cover for the universal joints is less prevalent, its place being taken by spun metal covers which, if properly designed, are undoubtedly far preferable. Some makers continue to use neither torque rods nor radius rods, all driving and braking stresses passing through the springs and the bolts which hold them to the axle casing. On the whole, we lean to the opinion that the best working compromise is the torque rod. Sometimes this takes the form of an outside member; at others it is made also to serve as a casing for the propeller-shaft. We do not know that there is any particular virtue in encasing the propeller-shaft, and it would be interesting to have details of the respective weights of the two systems. However, so long as the work were well carried out we should not make any great point of either in the selection of a chassis.

Bearings.—The ball bearing crankshaft has made no headway, but a good many makers are using balls for the bearings of the valveshaft. They appear to be quite successful there, but in the crankshaft the bearings tend to noisiness. With regard to front wheels, several makers are fitting thrust as well as load bearings, though a number of others maintain there is no need for thrust rings so long as the load bearings are really up to their work. Others are removing the defect by fitting a well-known form of conical roller bearing, which takes up thrust as well as load. In any case there is no doubt that attention is required at this point in many cars, as front wheels with considerable play upon their axles are the rule rather than the exception. The use of multi-ring ball bearings of small diameter in place of one or two rings of balls of larger diameter is not growing, because of the fact that such exceptionally careful work is necessary to ensure that each of the small five or six rings of bearings shall take its fair share of the load, the tendency being for it to concentrate on one or two rings, which are therefore overloaded, and wear comparatively quickly.

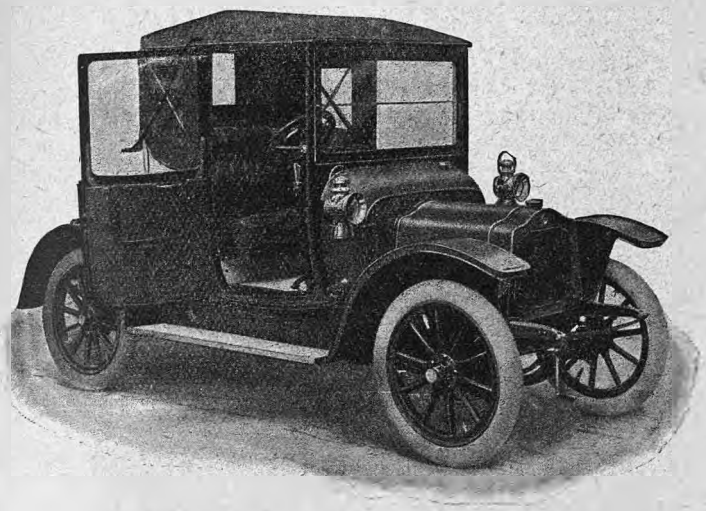
Brakes.—The tendency is to enlarge the wearing surfaces of the brakes, so that adjustment is less frequently required. This is particularly noticeable in the case of the gearshaft brake. This is rather a neglected part of the car, as many of the pedal brakes are so arranged that this very powerful brake concentrates its strain upon the gear box. There are many difficulties in the way of relieving the gear box bearings of these strains, but the matter has certainly not received the attention it deserves. The practice of concentrating all the brakes upon the back wheels, or fitting front wheel brakes, is slowly growing, but the method of operating the back wheel brakes from the pedal and the counter-shaft brake by hand is not finding much favour. It might be thought otherwise, but it is found that while the back brakes are not usually powerful enough, if a sudden stop should be imperative, the hand application of the counter-shaft brake in an emergency is very likely to result in skidding, as it is difficult to apply the hand lever working in a ratchet sector as sympathetically as a pedal.

Steering.—The absence of ball thrust bearings in the steering box is less marked than hitherto. We do not say that no steering can be made free unless it has a ball thrust bearing at the top and bottom of the steering box, but we unhesitatingly assert that cars which do not possess these bearings seldom steer nicely. Moreover, the steering requires more frequent lubrication. It cannot be said that a really final and satisfactory form of steering has been evolved, the great fault of the present system being its lack of adjustability. The connections from the rocking lever to the front wheels are undoubtedly improved. They are more often above the axle, and are so arranged that if they are neglected and should become loose, there is much less likelihood of the steering rod dropping off and so rendering the car uncontrollable. The lock has been increased in many cases so that the car can be turned round in a smaller space, and in quite a number of instances provision is made for the adjustment of the angle of the steering column so that it can be set in two or more alternative positions to meet the requirements of the owner.

Wheels and Tyres.—The wood wheel appears to be gradually dying out in favour of the all metal wheel, and the detachable wheel, whether of wood, wire, or pressed steel, is gaining ground over the fixed wheel. At the same time the detachable rim is falling out of favour, as the emergency wheel renders it unnecessary. The methods of combining ready detachability with security are becoming more numerous, but it cannot be said that anything like fixed practice has yet been reached, though there is no doubt that the detachable wheel is a very real advance.

Tyres have inward and invisible virtues rather than outward and visible good points, the most noticeable tendency being to combine in one cover the advantages of both a rubber and a steel studded tread. This is to be seen in several forms, but all with the same basic idea. External jacketing and internal gaitering and reinforcing are also in evidence.

Bodies.—Bodies were so fully dealt with in our last issue that there is no need to add much at the moment. Unquestionably the most notable sign of the times is the tendency to make the body, whether open or closed, a complete unit. Instead of the broken back appearance, we have neat complete looking carriages, which are not only far handsomer than the older types but far more comfortable. The high dash with scuttle extension backward is a great improvement so far as comfort is concerned. It does not always improve appearance, for the simple reason that the height or shape of the bonnet does not lend itself to a high dash. Scuttle dashes for the back seats are not numerous, but they or their equivalents in the form of adjustable screens will undoubtedly come into wider use as they so greatly increase the comfort of the back seats. Hoods which can be opened and closed single handed are growing in number, and the open car becomes more and more suitable for use in all weathers. The intermediate type, or, for want of a better term, the collapsable landaulet, has more exponents, and the cabriolet is also growing in popularity. Frameless windows are much more numerous than heretofore, not only on the cars with collapsable tops but also on limousines and landaulets.



Another De Dion advantage: easy entrance from offside.

A feature of the 1911

De Dion Bouton

carriage bodies.

The completely successful offside entrance which has been effected in De Dion Bouton cars has at least three important points to recommend it to the attention of intending purchasers.

1. Car can at all times be driven direct to curb without necessity of manœuvring for near side.
2. The second occupant of the front seat need not get out to allow driver to pass.
3. Passenger is safeguarded against danger of passing traffic whilst walking round car to gain the pavement as in other types when drawn up on right hand side.

The characteristic design of the gear and brake levers has rendered De Dion Bouton cars particularly suitable for offside entrance.

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Double-purpose to suit two or three.

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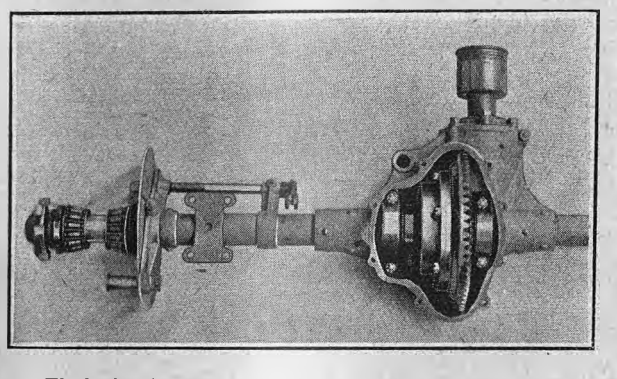
Motor Carriages and Chassis.

Adams.

Features: Epicyclic or sliding tooth change speed gear as is desired; self-starting device by compressed air.

THE ADAMS MFG. CO., LTD., New Bond Street, W. (40).—The Adams four-cylinder 16 h.p. chassis causes much attention by reason of the fact that it has a compressed air self-starting arrangement, which serves not only to start the engine, but also the compressed air cylinder is employed to blow the motor horn as well as to pump the tyres, thus relieving the driver of manual labour in the event of punctures or bursts of tyre tubes. Another feature is in the fitting of the C.A.V. dynamo electric lighting set, the dynamo being positively driven from the left-hand side of

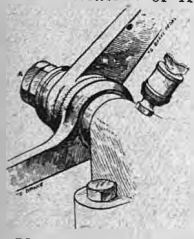


The back axle of the 16 h.p. Adams car, showing the large cover plate removed, rendering the differential and bevel gears readily accessible. Timken roller bearings are fitted to the back wheels.

the distribution gear case, and used in conjunction with suitable switches arranged on the dashboard. This electric lighting set removes all trouble and anxiety from the driver's mind in regard to the lighting of the car. The valve used in the self-starting system is arranged on the right-hand side of the dash, so that when a small lever is depressed the valve gives communication between the reservoir and the distributing mechanism attached to the right-hand side of the engine. Impulses are thus put on the pistons by the compressed air at the right periods and the crank rotated, when the engine takes up its normal method of running automatically. A small tap also carried on the same dashboard casing serves to make connection with the flexible pipe employed to blow up the tyres. Ignition is by high-tension magneto only, the magneto being driven by means of a cross-shaft arranged in front of the engine casing. This shaft is worm driven from the forward end of the camshaft, the one camshaft serving to operate all the valves, which are situated on the left-hand side of the engine. Planetary or sliding gear can be supplied at the will of the customer. This chassis has front wheel brakes; the rear brakes are hand applied, and are similar to the front. Sankey all-metal detachable steel wheels are fitted.

Adler.

Features: Overhead inlet valves; double mechanical pump lubrication; exceptionally accessible clutch; press-button lubrication of front universal joint; four speeds.



Method of adjusting the angle of the brake pedal on a 20 h.p. Adler. By loosening the locknuts and separating the serrated surfaces the brake pedal can be set at any desired angle.

MORGAN AND CO., LTD., Long Acre, W.C. (50).—Four complete cars and two chassis represent the Adler cars, for which this firm are sole concessionnaires. These were described in our issue of October 22nd, page 533, so it is unnecessary to go into details here. The new 20 h.p. chassis has four forward speeds, direct on top, and the control levers do not move with the steering. Lubrication is effected by two pumps, one to and the other from the sump. The press button on the dash indicator allows of oil being fed to the front universal joint when required. Of the complete cars, the new small 12 h.p. limousine is a very taking vehicle in lake, with red lines. Two touring bodies are fitted, and also a 20 h.p. cabrio-landaulet, which we illustrated in our last issue. The Cromwell Protector screen, the precursor of all practial screens, is also shown.

Albruna and Brown.

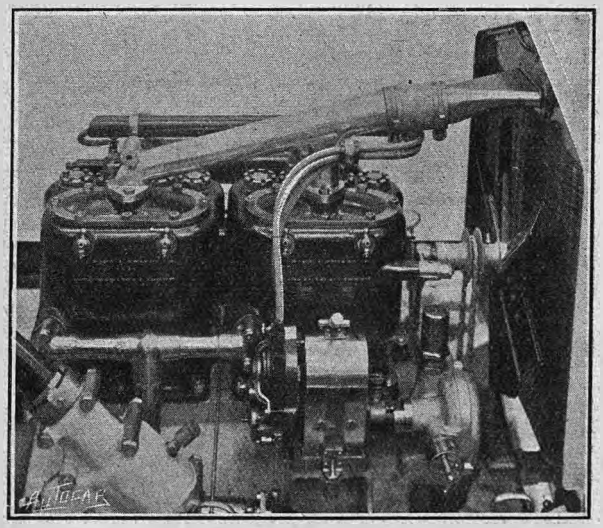
Features: En bloc engine; low built bodies on low power models; horn worked by engine suction.

BROWN BROS., LTD., Great Eastern Street, E.C. (48).—A four-seated 10-12 h.p. chassis and a two-seated vehicle of the same power together with a 20 h.p. torpedo body and a landaulet are staged. The small model has the cylinders of the engine *en bloc*, thermo-syphon cooling, G.L. carburetter, and Bosch magneto ignition. The inlet pipe of the engine is fitted with an attachment, which can be operated by means of a Bowden wire and lever controlled from the steering wheel, so that the suction in the induction pipe can act upon the special reed of the motor horn and sound it, the action being just the opposite of that of the usual horn. The throttle of the carburetter is operated by a pedal only, the timing of the magneto ignition being fixed. A three-speed gear operated by a lever with a gate change is employed, the change speed lever being fitted inside the side door and the hand brake lever outside. The drive is taken to the gear box through a multiple disc type of clutch. The lubrication of the engine is effected by sight feed from a tank on the dash beneath the bonnet. Extra lubricant can be given to the engine as required by depressing a pedal. The foot brake is of the contracting shoe type on a drum behind the gear box, the hand brake being internally expanding in the rear road wheel drums. The body is built very low, so that the vehicle looks quite small and light on the road. The two-seated car has the circular petrol tank set behind the two seats to give a good fall of petrol to the carburetter. The torpedo body vehicle is fitted with a Roper speed control device, and has also a heating arrangement attached to the exhaust pipe, whereby the rear and front seat passengers can be kept warm in cold weather, the controlling lever being conveniently placed.

Alldays.

Features: Four speeds, with direct drive on third; Timken roller bearings to all wheels; a new six-cylinder model of 30-35 h.p.

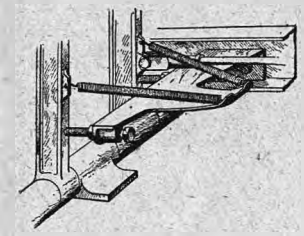
ALLDAYS AND ONIONS PNEUMATIC CO., LTD., Matchless Works, Birmingham (59).—The latest 14-18 h.p. Alldays is shown as a chassis. It has a four-cylinder engine and four-speed gear, driving direct on the third speed, gate control and leather coned clutch with flexible connection to the



Offside view of the 14-18 h.p. Alldays engine.

gearshaft. The ignition is by Bosch high-tension magneto, but provision is made for fitting a separate accumulator and coil ignition if required. Levers on the steering wheel control the throttle and timing, and there is also a pedal accelerator. Cooling water is naturally circulated, and the lubricating oil is forced through the crankshaft to the various bearings by a pump. Timken roller bearings are fitted to the wheels and back axle. In addition to this model there are also a 20-25 h.p. four-cylinder and the new

Olympia.—Motor Carriages and Chassis.



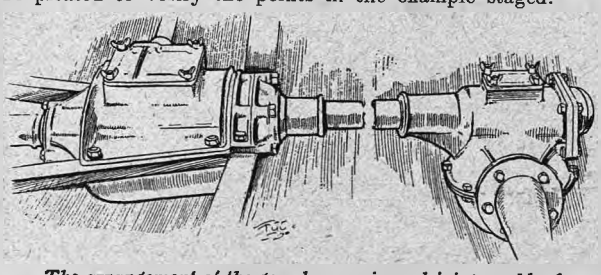
The pedal stop bracket and replacement springs on the 14 h.p. Alldays.

30-35 h.p. six-cylinder, which is provided with a handsome limousine body. At the other end of the range is a 10-12 h.p. two-cylinder Victoria with leather hood and folding back seat. This, like the other models, has a four-speed gear box. This is quite the best exhibit the firm have yet made at any show, and proves that they are keenly alive to the latest developments. The pedal stop bracket illustrated forms a means of adjusting the brake and clutch pedals to the driver's reach.

Argyll.

Features: The new 12 h.p. worm-driven model; four speeds; front wheel brakes; a complete touring model, with body providing special accommodation for all spares and luggage.

ARGYLLS, LTD., Alexandria, by Glasgow (34).—The illustrated description of the new 12 h.p. Argyll appeared in *The Autocar* of October 1st, so that the details will assuredly be fresh in the minds of the large number of readers who were interested in this well-designed and carefully-thought-out model. This being the case, it is unnecessary at the moment to enter into a detailed description of the chassis, but we would draw attention to the particularly neat *en bloc* engine, the substantial flywheel, and the very satisfactory manner in which both the engine and gear box are carried on the specially designed under-frame. The gear box, and consequently the shafts, it will be observed, have been kept very short, while the manner in which the torque and thrust stresses are delivered to the frame is praiseworthy in every way. The forward inclination of the engine, though somewhat disconcerting at first view, has been adopted in order that the lineability of crankshaft, gear box and propeller-shaft is maintained. the worm drive being set above the differential gear. The frame possesses no less than five cross members, making a particularly stiff job. A remarkable feature of the chassis is the fitting and application of the front wheel brakes, which were described in detail in the article referred to above. This remark also applies to the ingenious method of compensating the application of the internally expanding rear wheel brakes. We have no doubt that before the Show closes its doors the 12 h.p. Argyll will have been characterised as one of the most interesting exhibits in the exhibition. To demonstrate the suitability of the above chassis for a smart two-seated body, a two-seated, deeply scuttle dashed Victoria is shown. In this body the petrol and oil tanks are placed beneath the scuttle with openings outside the scuttle dash, so that both tanks can be replenished without disturbing the occupants of the car. Oil can be admitted to the crank chamber by the driver without leaving his seat. Both change speed and brake levers are inside the bodywork. There is also an example of a 20 h.p. Argyll carrying a complete touring body, as described and illustrated in our issue of October 29th. Those of our readers who perused this article will be pleased to verify the points in the example staged.

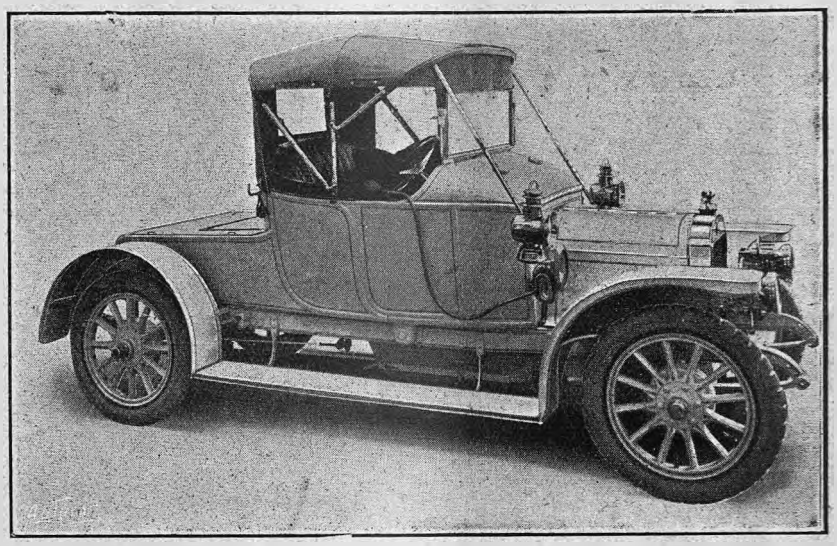


The arrangement of the gear box, universal joint, and back axle on the new 12 h.p. Argyll. The propeller-shaft runs in an oil-tight casing.

Armstrong-Whitworth.

Features: Cylinders *en bloc;* thermo-syphon cooling; air pump driven off secondary gearshaft; adjustable steering column. The new 17.9 h.p. model; four speeds.

SIR W. G. ARMSTRONG-WHITWORTH AND CO., LTD., Elswick Works, Newcastle-upon-Tyne (60).—Armstrong-Whitworth cars display, as usual, many ingenious and excellent features. The principal models this year are the 15.9 h.p. and the 17.9 h.p., which form one pair, and the 22.4 h.p. and 25.5 h.p., which form another pair. In dealing with the former, the four cylinders are cast *en bloc*, and the valves are enclosed. Thermo-syphon system is employed for cooling the water, together with a honeycomb radiator and a flywheel fan. The carburetter is set high for convenience of attention, and is controlled both by a hand lever and foot accelerator. It is supplied from the petrol tank by air pressure derived from a small pump driven off the layshaft of the gear box. The gear provides four forward speeds, the top being direct in all the cars. The clutch is on the plate system, and is coupled up rigidly to the gear box, a very stiff under-frame being employed. The gate change speed lever works with unusual freedom, and the brake lever is set inside this to suit the present type of body. The steering column may be adjusted to about thirty degrees, and has a ball thrust bearing, the steering pivots being similarly provided. Dunlop detachable wire wheels are standard on the 17.9 h.p. and the 25.5 h.p. cars. Dual ignition is fitted, and the lubricating oil is forced by a pump through ducts in the crankshaft to the main bearings. The propeller-shaft is enclosed in a tube, which serves both as a torque rod and radius bar. The back axle is a fine piece of pressed metal-work, and a large inspection plate allows for the detachment of the bevel gearing. The other models are on the lines with which we have been recently familiar in Armstrong-Whitworth practice, the cylinders being separate and water being circulated by pump.



A smart two-seated body with scuttle dash and high sides on a 12 h.p. Argyll chassis.

Ariel, A.G.R., and Hurtu.

Features: Both brakes on back wheels; thermo-syphon cooling with fan.

ARIEL AND GENERAL REPAIRS, LTD., Camberwell New Road, London (149).—On this stand is shown the new A.G.R. 10-12 h.p. chassis with a four-cylinder *en bloc* engine of 70 mm. bore and 120 mm. stroke. The cylinders have the valves all arranged on the left-hand side, one camshaft only being employed. On the forward end of the camshaft is a skew spur wheel driving the Bosch magneto, which is placed transversely to the crankshaft. The ignition timing is fixed. The engine is cooled on the thermo-syphon system, a large Zimmermann type of radiator being fitted. A leather-to-metal cone clutch transmits power to the three-speed gear box, which is supported from the side members of the frame by four substantial brackets bolted by lugs on each side of the gear box. A universal joint is arranged at the forward end of the propeller-shaft, the torque tube being anchored by links at its forward end to a channel cross member of the frame. The hand and foot brakes are both of the internally expanding type, and are contained within a brake drum on

12/14 h.p. Chassis with Michelin Tyres, £350

Complete Car - £425

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The NEW DESIGN of FRONT WHEEL BRAKES and latest improvements.

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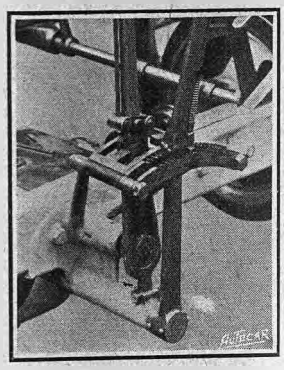
the wheels, side by side. Both are compensated by balancing levers. Riley detachable wheels are fitted. For the control of the engine there is an accelerator pedal acting on the throttle, and a small lever on the dash can be moved over a quadrant to set the engine speed at anything desired when the pedal lever resumes its closed position. A sight indicator is fitted on the dash, having a regulating needle above it for the purpose of adjusting the pressure of lubricating oil to the main engine bearings as it is delivered from a rotary pump driven by the rear end of the camshaft. This chassis is a good example of the increasing popularity of the light car type. Examples of 10 h.p. Hurtu vehicles with two-seated bodies, and also a 15 h.p. four-cylinder semi-torpedo Ariel car complete the exhibit.

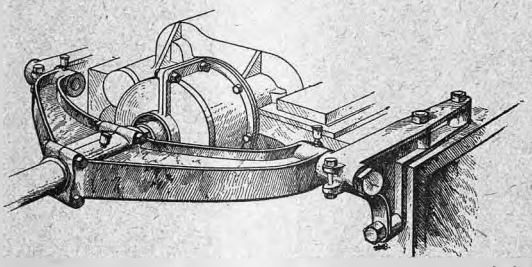


The swivel gear lever of the gate change on the A.G.R. cars.

Arrol-Johnston.

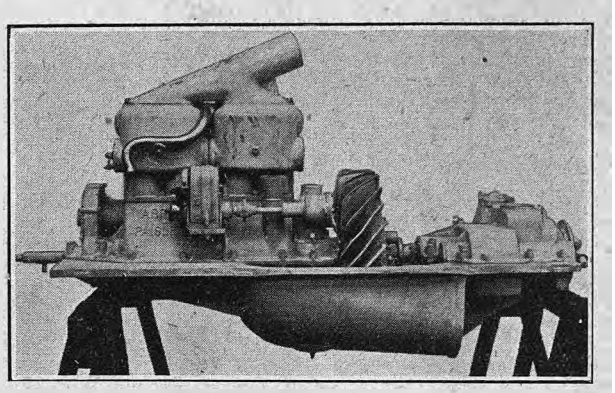
Features: Unit system of construction; silencer to carburetter intake; four speeds.

The New Arrol-Johnston Car Co., Ltd., Paisley, N.B. (70).—The well-known 15.9 h.p. car is the one most in evidence on the Arrol-Johnston stand. Examples of this machine are shown, with a saloon body, an open touring torpedo body



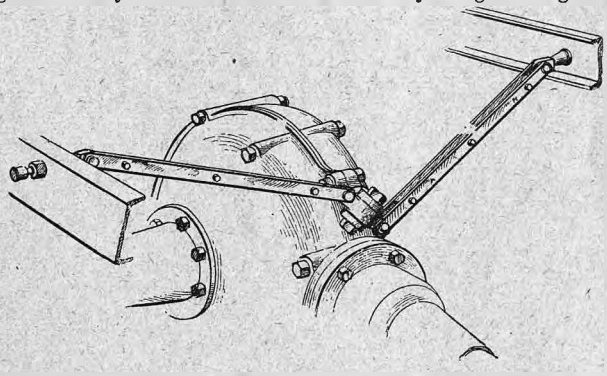
The forked swivel bracket carrying the forward end of the torque member on the 15.9 h.p. New Arrol-Johnston.

(with the back shaped in a manner reminiscent of the Prince Henry trial), and a two-seater, besides a chassis. In addition to these, they are showing a fine example of their 23.9 h.p. six-cylinder car with a double D-fronted landaulet body, and as the 15.9 is already so well known, we will deal with the chassis of the larger power. In this the six cylinders, of 80 mm. stroke by 120 mm. bore, are cast in pairs, and are formed with huge inlets in such a position that the inlet of the one pair can be coupled up to that of its neighbour



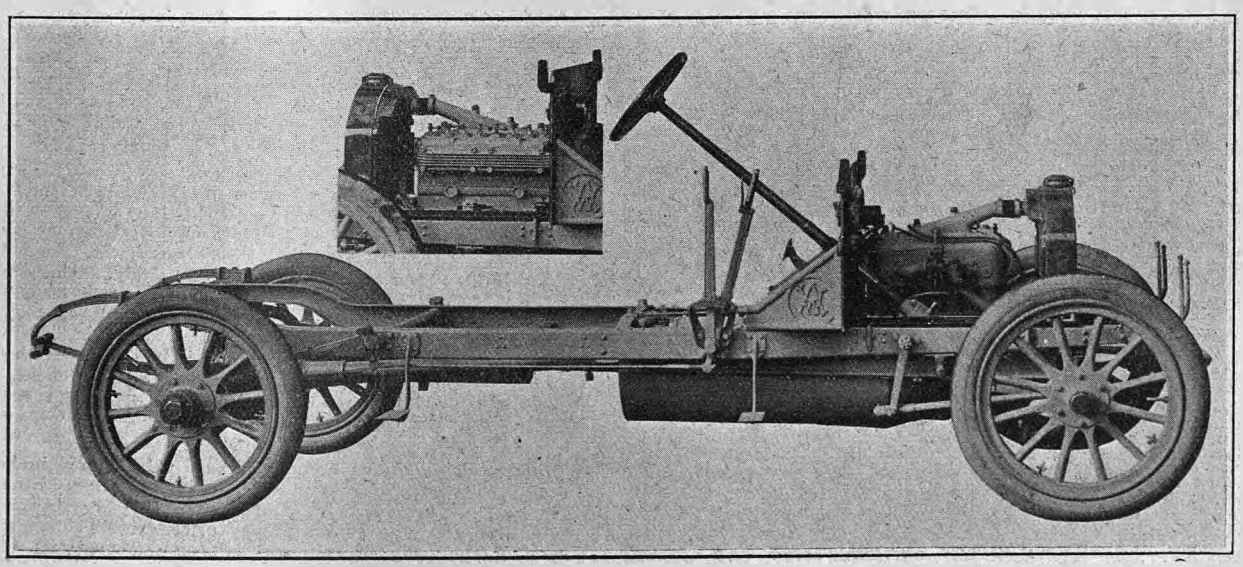
The 15.9 h.p. Arrol-Johnston power unit (engine, gear box, and flywheel).

by an indiarubber ring and clip without any necessity for external pipes. The size of the pipes throughout in the thermo-syphon system at once strikes one most forcibly, for they are of huge diameter. The White and Poppe carburetter is fitted with a silencer, and the pipe that leads the gas to the cylinders has been most carefully designed to give



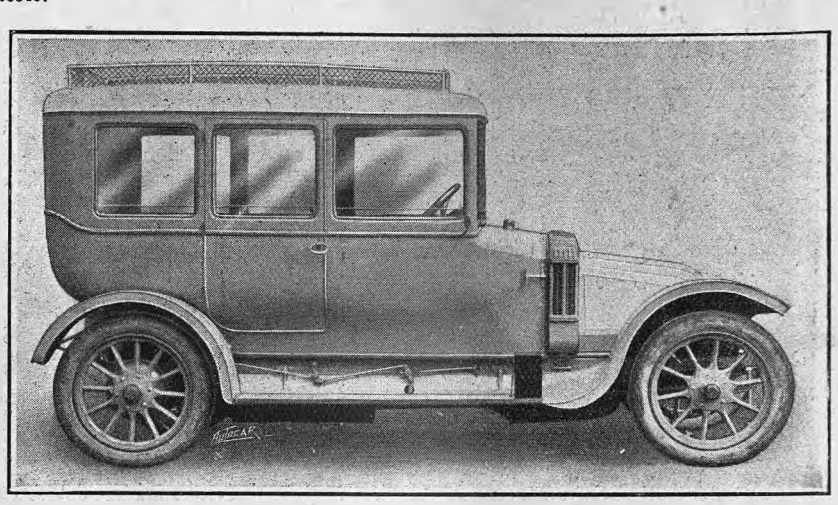
Parallel motion attachment between the frame and back axle of the 15.9 h.p. Arrol-Johnston.

an even supply to each cylinder, while both inlet and exhaust pipe systems are comparatively easily detachable. All the valves, actuted by adjustable tappets fitted with fibre for noiselessness, are placed on one side, and are encased by an easily detachable cover. The magneto coupling is worthy of note in that it provides a very fine means of timing adjustment relatively to the engine. As this is a larger engine to start up, the magneto is fitted with a spark variation lever, although on the 15.9 the point of firing is fixed. Engine con-



The 17·9 Armstrong-Whitworth chassis from the off side. The inset is a view of the engine showing its clean appearance with enclosed valves on the near side *(See preceding page.)*

trol is obtained from a pedal, a "setting lever" on the dash being used to fix a minimum throttle opening. It should be added that the magneto is driven by skew gear from the crankshaft on the side remote from the valves, to render it amply accessible. A single plate clutch is used in the flywheel, which is shaped much like a basin and fitted at its periphery with steel fan plates riveted on. The clutch action, moreover, provides a very efficient clutch brake. Although the power plant of this car appears to be designed in one unit, this is only true up to a certain point, for each section, as for example the gear box, can be detached from the rest of the unit. The gear box affords four speeds, and, instead of employing front wheel brakes as on the 15.9, a transmission-shaft brake of the usual external type is employed. Ball bearings are used throughout on both models, but the makers do not consider side thrust ball bearings necessary on the front wheels.

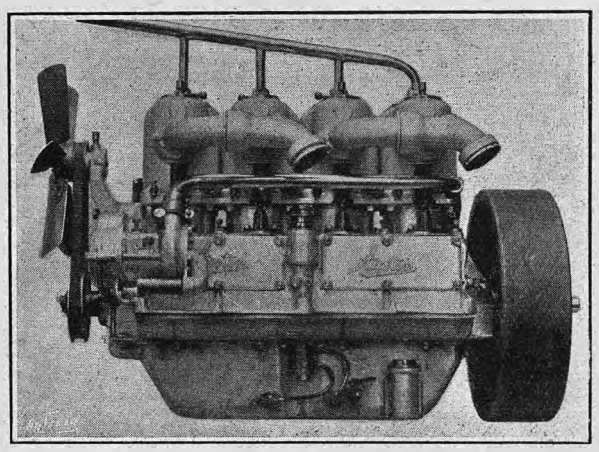


A 15.9 h.p. Arrol-Johnston car with its clean line saloon body.

Austin.

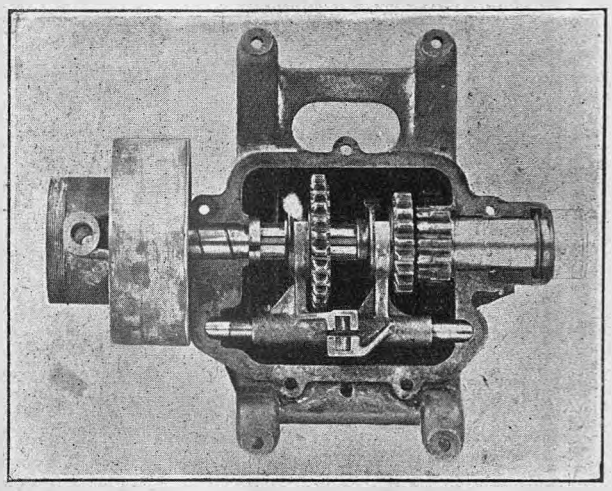
Features: Four speeds; dual ignition, with a single distributer and set of plugs; combined touring and landaulet body.

THE AUSTIN MOTOR CO., LTD., Northfield, near Birmingham (65).—The six finished cars and two chassis on the stand of the Austin Motor Co. exemplify the use of the best of materials and standard practice. The makers of these cars have got their design down to a fine point, so that a description of the details of any one car will reasonably cover the Austin practice. We may take the 18-24 h.p. as an example. In this the engine design remains pretty much as last year, with the exception that the



The 18-24 h.p. Austin engine, showing the separate exhaust branches, each with an expansion joint midway in their length.

exhaust pipe from each separate cylinder is now branched and connected up in couple, so as to give a very easy flow. The magneto and accumulator ignition can now be worked off a common distributer skew driven from the magneto, and with this system only one set of plugs are necessary. A new carburetter is also fitted on the Claudel system, in which the air supply is so adjusted as to be dependent on the operation of the throttle and so varied according to the engine supply requirements. In the lubrication system a pump working at about 2 lbs. to 3 lbs. pressure circulates oil round the bearings in the crank case, and during the circulation the oil passes through a gauze strainer. The flywheel is vaned so as to act as a fan, and the drive is taken through a conical leather to metal clutch, the cone portion of which is made up in six sections riveted to a steel spring plate, so as to afford easy engagement. The power is transmitted through a four-speed gear box, at the back of which is an effective metal to metal external type of brake. The universal joints at both ends of the transmission shaft give perfect universal action and transmit the drive to the bevel gear of the back axle. The springs are of the elliptic type, no radius rods are used, but a triangular torque member of the usual type is fitted. Extended use has been made of ball bearings, which are used throughout the transmission and on the wheels, very substantial thrust bearings being fitted on the front axles, as also at the top of the steering pivots. The six cars shown by the Austin Co. include a 50 h.p. six-cylinder model, with high-sided touring body and Cape cart hood (in this the engine details are practically similar to those of the four-cylinder type); an 18-24 h.p. Pullman limousine, with the new Blériot dynamo lighting set; an 18-24 h.p. Leicester coupé; a 15 h.p. Westminster landaulet; a 15 h.p. town carriage, in which the engine is located under the driver's



The gear box of the 10 h.p. Austin car, showing the peculiar form of the striking rod ends.

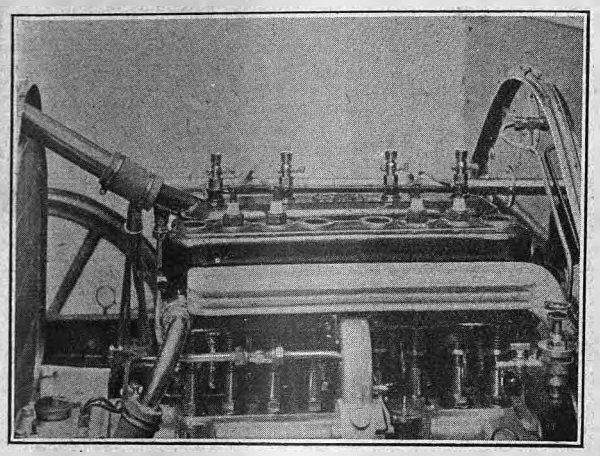
seat; an 18-24 h.p. Cabriolet, with a special body. This last calls for special mention, as it thoroughly combines the advantages of a closed car with those of a touring vehicle. The roof is practically a simplified Cape cart hood in leather, with screen in front for the driver, the back screen forming the front of the actual body. This back screen is carried on extremely light pillars, each made up of two parts, the inner of which folds inwards on to the top of the screen partition when the latter is lowered, while the outer parts, which are virtually the hood sticks, fold backwards with the rest of the hood, the windows of which can be taken out and stowed in a special space reserved for them at the back.

Austrian Daimler.

Features: Prince Henry body; overhead valves; four brakes.

THE AUSTRIAN DAIMLER CO., LTD., Cockspur Street, S.W. (31).—The principal feature on this stand is an exact replica of the Prince Henry prize car. The unusual shape of the body of this car will no doubt attract considerable attention in view of its recent successes. The engine fitted is a four-cylinder one, having a bore and

stroke of 105 mm. × 165 mm. respectively, with separately cast cylinders and overhead valves set at an angle, operated by an overhead shaft enclosed and running in oil. The ignition is by means of two independent Bosch h.t. magnetos with hand control, and an accumulator is provided



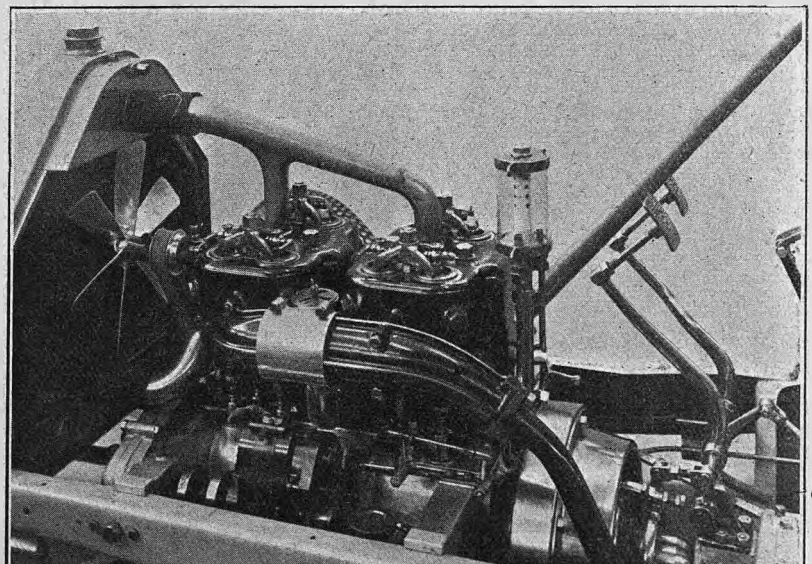
The engine of the 16-18 h.p. Austrian-Daimler.

in order to facilitate starting. The non-automatic water-heated carburetter is fitted with hand and foot control, and is so arranged that the movement of the throttle controls the mixture. Cooling is by centrifugal pump. The lubrication is by a pump which supplies oil to the dipping troughs for the connecting rod ends. The gear box, operated on the gate system, provides four speeds forward, the direct drive being the fourth. The final transmission on this car is by chains, as this is considered to give easier running at high speeds over rough roads. Four brakes are fitted, two of which are operated by independent pedals and act on the differential. The other pair are of the usual internal expanding type acting on the rear wheels. Rudge-Whitworth wheels are fitted, and have tyres 815 mm. by 105 mm. on the back and 810 mm. by 90 mm. on the front. In addition to the above, the company are showing a 25-30 h.p. and a 16-18 h.p., both of their standard type. The exhibit is a very fine one, and should on no account be overlooked.

Bell.

Features: Petrol feed to carburetter under air pressure by plunger pump on camshaft; air scavenged engine when throttle is shut; gear box with layshaft idle and special arrangement for picking up before changing from top gear.

Bell Bros., Ravensthorpe, Yorks (135).—Two chassis are staged, the 16 and 20 h.p. types. These are practically identical excepting that one has a four-cylinder engine with the valves all on the left hand side, whilst the larger has the valves on opposite sides. The Bell carburetter is distinctive in design and ingenious. It is arranged so that a small by-pass and separate jet are employed for running slowly, and this can be cut out when desired and the throttle operated by means of a lever over the steering wheel. When the throttle is completely closed admission of air is allowed to the induction pipe, so that the engine is scavenged and petrol saved. On the left side of the engine where the camshaft is arranged there is a small plunger pump which is employed for putting air pressure into petrol tank. The pressure can be adjusted to the required amount, 2 lbs. to the square inch, in a convenient manner. The ignition is by Simms magneto arranged on a bracket which is part of forward right hand arm of the crank case. A multiple disc type of clutch transmits power to the three-speed gear box which is arranged so that on direct drive the layshaft is idle, but on the gate change lever being operated the first small movement causes the layshaft to be started up before the top gear is disengaged, and since there is only the weight of shaft and whee' to overcome the change is made quite quietly. In noticing the gear box it will be seen that it is impossible to get in the reverse when the sprag is in action, nor can the reverse be put in direct when changing from forward speed, as a catch has to be operated before this can be done. The balancing mechanism of levers which operate the rear wheel brakes is worthy of consideration, for these are really universal in action. A torque rod and two side radius rods are fitted. The general design of vehicles on this stand shows that much careful thought has been given to them, and the results of extensive road work have been embodied in their construction.

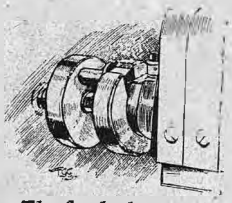


The near side of the 14-16 h.p. Belsize engine, showing oil circulation indicator.

Belsize.

Features: Cylinders in pairs; sight feed lubrication, with overflow return to sump; chain and pulley brake compensation to back brakes; worm drive if desired.

Belsize Motors, Ltd., Clayton, Manchester (83).—The 14-16 h.p. Belsize, which is shown in chassis form, is from end to end practically the same as that exhibited at the last Show. No alteration has been made in the design of this car, for the reason that out of the large numbers of Belsize cars now running on the roads in this country and abroad no necessity has been found for alterations or variations. The chassis exposed gives the visitor an opportunity of closely inspecting the mechanical economy of the Belsize cars and the remarkable care and thought with which the whole design is carried out. The same remark applies to the 18-22 h.p. six-cylinder, for, although it is not shown in chassis form like its lower powered stable companion, it has not been altered in any important detail. Although not fitted to the chassis shown, we understand that worm drive can be provided at a slight extra cost. The smart flush sided torpedo phaeton body, with three-seated back, finished in egg shell blue, the two-seated Aylesbury body with deep scuttle dash, the standard double phaeton touring body, which is made this year with high side doors, and the threequarter and standard landaulet are all from the Belsize Motor Works, and must be admitted to do that firm great credit as body makers



The flywheel magneto coupling with fibre-driving block which is fitted on Belsize cars.

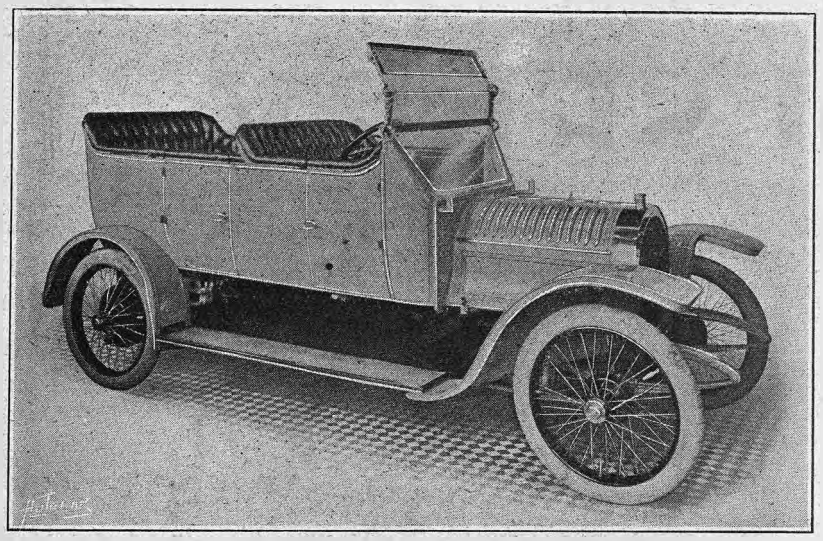
Bentall.

Features: Carburetter with air control from steering wheel; jet clearing device; both brakes on back wheel drums.

E. H. Bentall and Co., Malden, Essex (19).—The 24 h.p. Bentall engine has four separate cylinders, 100 by 95

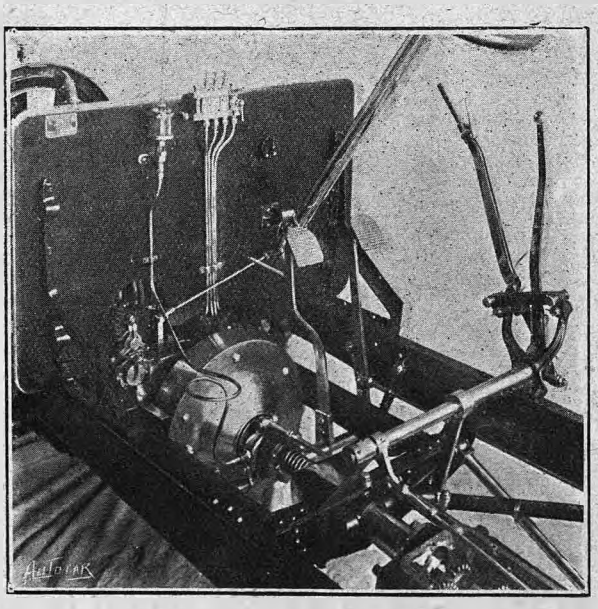
Olympia.—Motor Carriages and Chassis.

mm. The valves are situated on opposite sides. The carburetter is of the Bentall type, and has separate air inlet control on the steering wheel, which serves to tighten the spring of the automatic air valve, and so strengthen or weaken the mixture as may be required. A movement of the lever has the effect of allowing extra air delivery and depressing the cone top of the jet, allowing the petrol to wash through any obstruction that may be present. The magneto and circulating pump are driven off the half-time



A 16-20 h.p. Bentall touring car. The scuttle dash is formed by a glass panel, and is surmounted, as shown, by the usual driving screen.

gear in the usual manner. The clutch is of the fibre-to-metal type, and runs in oil. Between the clutch and the gear box is the usual universal joint. This is the sole universal joint employed in the transmission, but the gear box and propeller-shaft are triangularly stayed to the back axle. The only necessary movement is provided by a trunnion supporting the whole of the transmission system and attached to the main transverse frame member. The rear brakes both act on the back wheels. Very large drums are fitted, one brake taking effect on the inner and the other on the outer periphery of the drum. The outer applying brakes are applied by the foot. As regards control, spark, throttle, and air levers are on the steering wheel, and the foot accelerator is fitted on the footboard. The lubrication is performed by a pump delivering the oil from the reservoir by drip, whence it reaches the engine by gravity. The chassis is supported on threequarter elliptic springs at the rear. Ball thrusts are provided in the steering column, steering pivots, and stub axles to front wheels.



The Bentall cars. The magneto is brought through the back face of the dashboard. The photograph also shows the method of lubricating the clutch striking collar.

Benz

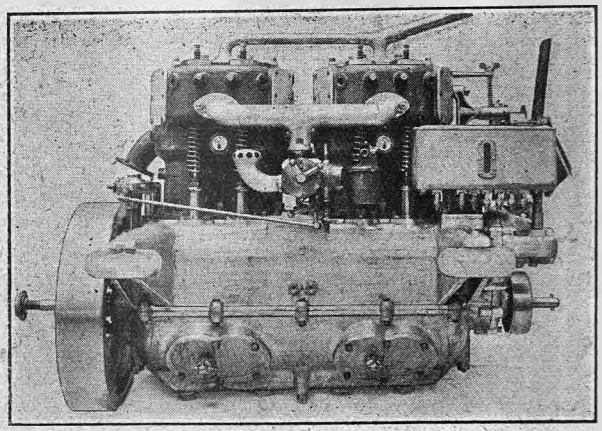
Features: Four speeds; carburetter with variable jet; two ignitions.

Benz Motors, Ltd., Brompton Road, S.W. (17).—The 15 h.p. Benz is a good example of what this firm can do in the way of small car manufacture. The cylinders are cast in pairs with valves on the near sides. On this side is also the circulation pump and the magneto, which are both driven off the same shaft. Engine dimensions are 80×120, 15.9 R.A.C. rating. The carburetter has a variable jet controlled from the dashboard. An ingenious belt tightening arrangement is fitted to the fan. Two ignitions are fitted, which is not the usual practice in the case of small four-cylinder cars, and the two switches controlling them can only be opened by the aid of a Yale lock. The clutch is of the leather-to-metal type, and between it and the gear box is a flexible joint. The gear box affords four speeds. The drive from the gear box is by propeller-shaft, which is enclosed in a tubular casing. No radius rods are fitted, but long jointed rods extend from the axle to the central member of the frame. The foot brake is of the external contracting type, while the rear brakes are of the ordinary internal expanding pattern. Every Benz car is now turned out with a small pulley on the forward end of the propeller-shaft to take the speedometer belt. The control is by spark and throttle on the steering wheel, and also by pedal. Ball thrust bearings are provided on the steering column. The lubrication consists of a reservoir containing a number of separate oil pumps provided with a variable throw, which is fed from a separate reservoir. This lubricator conveys the oil through an orifice in the crank-shaft, lubricating all the bearings and eventually reaching the crank case sump. Other Benz models are the 55 h.p. Prince Henry type and the 18.30. These both resemble the model we have described, except in details.

Berliet

Features: Long-stroke engine; thermo-syphon cooling; four speeds.

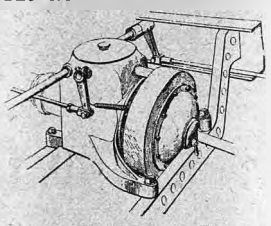
Berliet Motors, Sackville Street, W. (25).—The Berliet Co. are showing one new model of 20-25 h.p. with four-



The 35-45 h.p. Benz engine, carburetter side, showing the oil pressure tank, spring adjustment of the fan belt, etc.

cylinder engine, having cylinders 100×140 mm. cast in pairs with the valves on one side, the cooling being on the thermo-syphon principle. The high tension magneto is placed in front, driven by a cross-shaft and skew gears from the cam-shaft. The system of lubrication is by a gear-driven pump from the sump, and is the same as on their last year's models. The gear box is provided with four speeds, with gate change, the direct drive being on the fourth. The connection between

the engine and the gear box is by means of a split coupling. The carburetter is on the left-hand side, placed low down, and has pressure feed, the throttle being operated by hand from the steering column and also by a pedal. The clutch is a multiple-disc of the company's own pattern. The rear axle is of unusually strong design, fitted with bevel drive and a lattice type of torque member. The frame is pressed steel, parallel throughout its length, and upswept at the back, the rear springs being of the three-quarter elliptical type. The foot brake is placed behind the gear box, and the side brakes are operated by hand lever as usual. The company are showing three complete cars, which are of their usual type.



The arrangement of the brake at the rear of the Berliet gear box.

Briton.

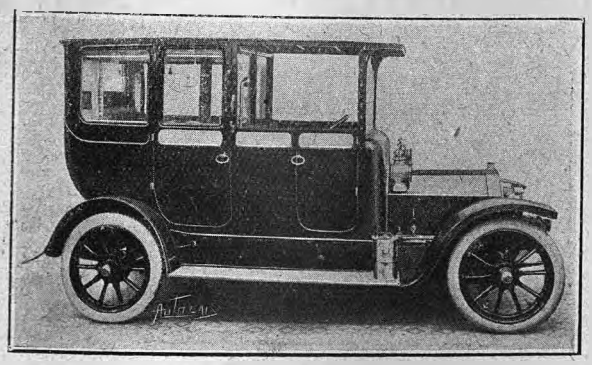
Features: Thermo-syphon cooling; foot and hand control; four speeds.

THE BRITON MOTOR CO., LTD., Stewart Street, Wolverhampton (23).—This company is showing a 10 h.p. two-cylinder chassis and a very smart two-seated car of similar power, also a 14 h.p. chassis and a complete car of same power with a torpedo body. The engine is of the four-cylinder type, 80 mm. × 127 mm., the cylinders being cast in pairs and provided with thermo-syphon cooling. The lubrication is by pump through a sight feed on dash to a duct cast in the upper half of the crank chamber, from which the oil feeds on to the bearings and connecting rods by drip. V-valves, all on one side, are enclosed, and a White and Poppe carburetter is fitted with both hand and foot control. Ignition is by Eisemann magneto, fixed. A leather-faced cone clutch is fitted, connecting to the gear box through a square coupling. The gear box provides four forward speeds and reverse, the third speed being direct, and, as is almost universal throughout the Show this year, gate change is adopted. The foot brake is of the external double-shoe type, with a neat hand adjustment. The back axle is bevel driven, and a simple torque member, consisting of two straight steel bars, is fitted. The steering is provided with ball thrust for end play. The front axle has ball thrust bearings in the vertical pivots, and the wheels throughout are fitted with Hoffmann ball bearings.

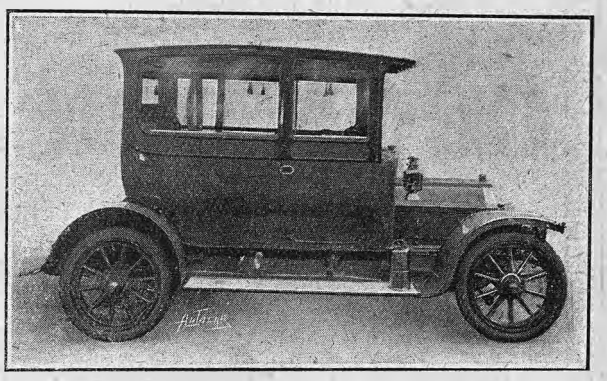
B.S.A.

Features: Four speeds; trough lubrication.

THE BIRMINGHAM SMALL ARMS CO., LTD., Birmingham (75).—The cars on this stand are both of 15-20 h.p., but a more powerful model of 25 h.p. is also constructed as a standard type. The principal departures for 1911 are the fitting of the Zenith carburetter and the Bosch dual ignition. The engine is lubricated by oil driven from the pump to troughs into which scoops on the big ends dip at each revolution. Pump water circulation is employed in conjunction with the honeycomb radiator, and a flywheel fan. A flexible connection is in position between the leather cone clutch and the four-speed gear box, the direct drive of which is on top speed. One of the best finished cars in the Show is to be found on this stand. It is of the saloon or *coupé* type, with driver's seat enclosed, a folding seat at the left giving entrance to the front portion. This particular body is finished in grey. A limousine finished in royal crimson, cream panels, and lined cream on a 15-20 h.p. chassis is also shown.



A smart high-sided 15-20 h.p. limousine on the B.S.A. stand.

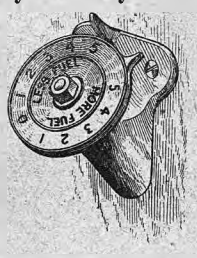


A 15-20 h.p. B.S.A., with a grey body of novel design.

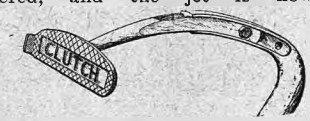
Cadillac.

Features: Square engine; interesting cascade system of lubrication; interchangeability of parts.

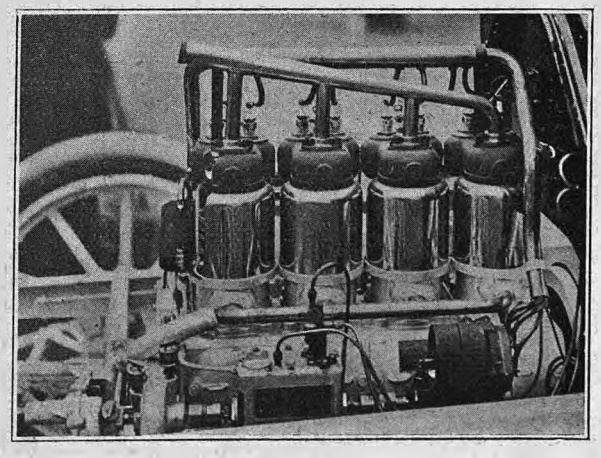
F. S. BENNETT, LTD. (CADILLAC MOTORS, LTD.), Shaftesbury Avenue, W.C. (99).—The 20-30 h.p. Cadillac is driven by a four-cylinder engine, the cylinders of which are cast separately and are 4½in. by 4½in. All the valves are situated on the same side, and the practice is followed of having the water jackets spun on to the cylinders. The carburetter has been slightly altered, and the jet is now controllable from the dashboard. On the opposite side from the valves are the circulation pump, the mechanical lubrication, and the magneto, all of which are driven off the half-time shaft. The lubricator is in a circular reservoir and is provided with a double acting pump, which delivers oil to the crank case. The crank case is provided with four separate compartments and has four troughs in it, into which the big ends dip, throwing the oil to one side of the case. Thence the oil falls direct into the first trough, which is sloped so as to lead it into the next trough, and so on to the end. When the end compartment is reached any excess of oil flows back to the first through a special channel provided for that purpose. The bearings supporting the crankshaft are lubricated by means of a



The petrol regulator on the dashboard of the Cadillac car.



The method of adjusting the pedal length on the Cadillac car.



The engine of the 20 h.p. Cadillac chassis shown at Olympia. The various details are partly sectioned to show the methods of construction and working.

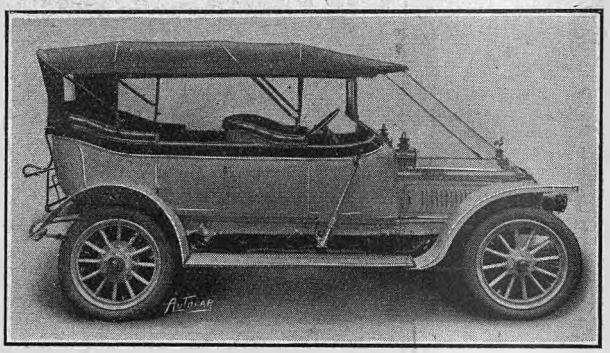
Olympia.—Motor Carriages and Chassis.

groove cut in the partition, which conducts the oil through small ducts to these bearings. The pump delivers oil to the base chamber through sight feeds on the dash. The clutch is of the leather-to-metal type, and is particularly sweet in action. There is a universal joint between the clutch and gear box; the latter provides three speeds and reverse, and from this to the rear axle the drive is by a propeller-shaft, which has universal joints at both ends. Both brakes are applied to the rear drums, the external one being applied by the foot and the internal expanding by the side lever. A triangular tubular torque rod is provided. The chassis is of the dropped type and is suspended on semi-elliptical springs at the front and at the rear, at which latter end there is also a transverse spring. Ball thrusts are provided to the steering columns, steering pivots, and front wheels. The Cadillac chassis is one of the finest pieces of demonstration work in the Show. Every important working part is sectioned and is electrically lighted, while the whole of the mechanism is driven by an electric motor. Many examples are also to be seen of the extreme accuracy employed in the manufacture of this car.

Calthorpe.

Features: Adjustable steering column; no feather keys employed.

THE CALTHORPE MOTOR CO., LTD., Bordesley Green, Birmingham (68).—The Calthorpe exhibit includes one of their 20 h.p. cars with torpedo touring body, two 15 h.p. models (one a two and one a four-seater torpedo body), and chassis showing their 15 and 12-14 h.p. designs. In the 15 h.p. machine the four cylinders are cast in pairs and cooled by thermo-syphon without fan. Simms-dual ignition with variable firing point controlled from the dash, and the White and Poppe carburetter from a lever on the steering column, which latter, by the by, is very ingeniously made adjustable to any angle. The oil in the crank case is circulated by a pump, which forces it to a galley pipe that runs it into the main bearings. The big ends obtain their supply by means of scoops integral with their lower ends and dipping into troughs. The oil then flows to the bottom of the crank case, whence it is drawn by another pump through a filter and again circulated by the force pump. The flywheel, fitted with a Hele-Shaw plate clutch, is vaned, and a universal joint is placed between the clutch and gear box, the latter being carried on a sub-frame. Only a single universal joint is fitted at the front end of the cardan-shaft, which slides at the trailing end. The casing of this shaft, which is bolted to the differential gear casing, is a particularly neat piece of work, and the axle itself is well trussed. Threequarter semi-elliptic springs are fitted to the rear of the frame, these being anchored at their forward ends so as to obviate the use of radius rods, although a torque member is employed. Ball bearings are used throughout except in the irreversible steering.



A white and green torpedo type touring body on a Clément chassis.

Charron.

Features: En bloc engine carried on under-frame; enclosed inlet leads; tension rods to torque column.

THE LONDON MOTOR GARAGE CO., LTD., Wardour Street, W. (82).—A 15 h.p. Charron chassis is shown with a *moteur bloc* four-cylinder engine, 80 by 120 mm. bore and stroke, carried on an under-frame, as is the gear box. The valves are enclosed by neat detachable inspection lids, giving free access to valve tappets and valve stem, the induction leads being contained entirely within the engine casting. The car has a three-speed gear box with quadrant change and propeller-shaft drive to the back axle through a tapered torque and thrust tube, stiffened by tension rods top and bottom. Five other chassis are shown carrying bodies of various types.

Clément.

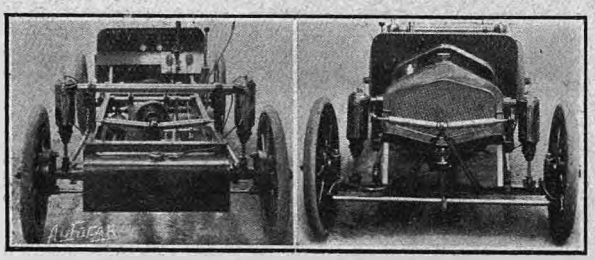
Features: Pressed frame incorporating under-frame; hinged change-speed lever; thermo-syphon cooling.

THE CLEMENT MOTOR CO., LTD., Leicester Street, W. (136).—The British-built Clément models on this stand have a number of modifications from those which have been previously exhibited. The 14-18 h.p. polished chassis staged has its four-cylinder engine with cylinders cast in pairs, thermo-syphon cooling, Bosch DR4 magneto ignition, Claudel-Hobson carburetter, and Zimmermann type radiator. The lubrication system is on forced feed lines by means of a Rotherham pressure pump which is bevel driven from the camshaft. An indicator on the dash is furnished with a relief valve, so that more or less pressure of lubricant may be applied to the bearings whilst the engine is running. The throttle is controlled by pedal, and also by lever above the steering wheel, whilst the ignition timing is varied by a wire attached to a lever clipped to the steering pillar. Another change in this model is the fitting of the gear box with ball bearings instead of plain; in fact, ball bearings are now used throughout excepting in the engine. The gate change quadrant is neatly arranged and the change-speed arrangement is very free in action. The power is transmitted from the engine to the gear box through a leather-to-metal cone clutch, the disc stop being arranged in front of the gear box shaft to facilitate the slowing of the clutch on changing gear. The frame members are extended as to the bottom member so that they carry the engine and the gear box. Radius rods are fitted in addition to the usual torque rod. Detail parts are exhibited on the stand to show the construction and the material employed. The 14-18 h.p. Clément landaulet and the torpedo-bodied vehicles, together with the 18-28 h.p. open car with torpedo body with flush sides and the double landaulet of the same power, complete the vehicles on the stand. The all-round design and proportions of the Clement chassis, together with the material employed, place them in the forefront of British built cars. All the coachwork shown on finished cars is by Salmons and Sons, of Newport Pagnell.

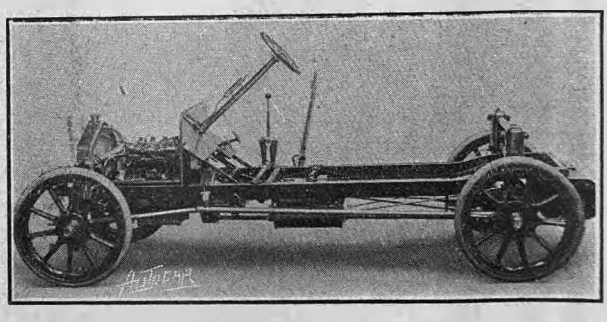
Cowey.

Features: The Cowey suspension.

THE COWEY ENG. CO., LTD., Kew Gardens, S.W. (146).—The chief feature of this stand is the Cowey automobile suspension. This company are exhibiting a complete car with torpedo body, and also a chassis fitted with the Cowey patent system of suspension, by which the ordinary laminated springs are entirely eliminated, and solid tyres are rendered possible

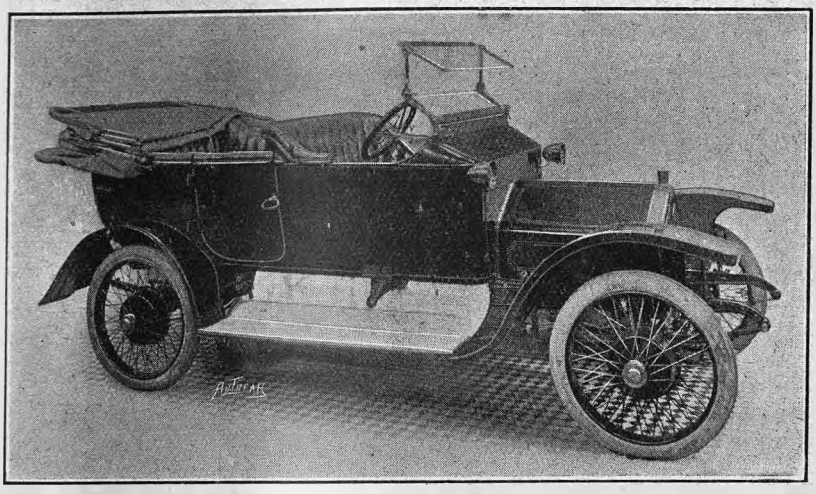


Back and front views of the Cowey car, showing the details of the Cowey pneumatic suspension. As may be seen the car is fitted with solid tyres.



A side view of the Cowey chassis with pneumatic suspension, showing the distance rods connecting front and back axles.

in place of pneumatics. The company are fitting their suspension to two models, viz., a 10 h.p. and a 20 h.p., the former having a wheelbase of 9ft., with a wheel track of



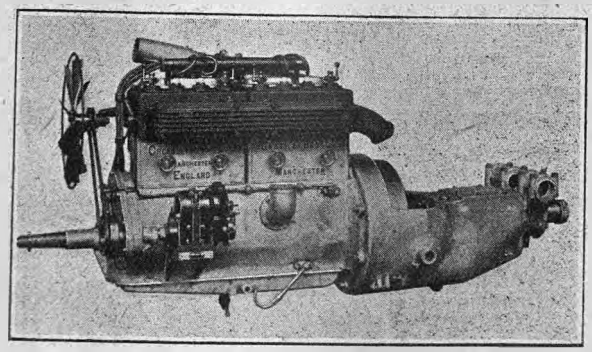
A 12-14 h.p. Crossley with a flush-sided body and scuttle dash.

4ft. 4in., whilst the latter has a 10ft. wheelbase and 4ft. 6in. track. Both models are fitted with standard De Dion engine of the latest type, with a leather-to-metal cone clutch of the company's own manufacture. The connection to the gear box is by means of two universal joints, and the gear box provides three forward speeds and reverse with gate change, the third speed being direct. The cardan-shaft is of the open type, with universal joints at either end, and the final drive is by bevels. Very long radius rods are fitted with ball joints at each end. These radius rods are also fitted with springs to take up end shocks. The suspension consists in its essential features of four pneumatic cylinders placed at the outer ends of the front and rear axles. These cylinders are provided with compressed air at a pressure of 100 lbs. to 120 lbs. per square inch, the air being compressed by a small pump fitted to the engine. The cylinders automatically provide for all variations in the load of the car, there being valves in the tops and bottoms respectively to provide for excess load or light load, the purpose of these valves being, of course, to control the amount of pressure as may be required. To prevent lateral movement of the axles, two spring rods in the form of a toggle, with ball joints at the ends, are fitted to brackets attached to the main frame. As compared with last year's models, the whole apparatus has been considerably reduced, and made much more compact. The company have now made exhaustive tests of the apparatus, and are so satisfied with its working that they are taking orders for cars fitted with it. The brakes are of the internal expanding type, the foot pedal operating those on the rear wheels, whilst the side lever operates the cardan-shaft brake

Crossley.

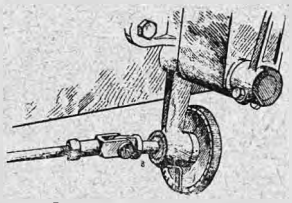
Features: Four speeds; front wheel brakes; *mono bloc* engine; three-point suspension of engine and gear box.

CROSSLEY BROS., LTD., Gorton, Manchester (129).—The only chassis staged on this stand is the 20 h.p., which fully described and illustrated in our issues of 15th and 22nd

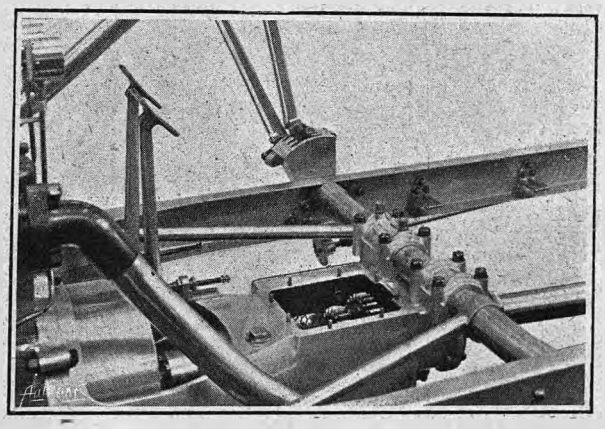


The power unit of the 12-14 h.p. Crossley car.

October last, has been modified in one or two respects since last year. The four-speed gear box has now an extra ball bearing fitted between the constant mesh and the direct drive wheel, thus tending to prevent all chattering when driving on the direct gear. The front wheel brakes, which are operated by a pedal, are re-designed, as described in the issues just mentioned, and now the makers are prepared to demonstrate that the application of this brake, however severe, does not disturb the steering. The side brakes take effect as formerly on the inner circumference of the rear wheel drums. Riley detachable wheels are fitted. Particular attention should be paid to the cooling arrangements, noting the large section water pipes employed for the thermo-syphon system of cooling; also the larger inlet pipes and exhaust chamber, the latter being ribbed for radiation. The valve springs are all enclosed by neatly fitting aluminium covers. The throttle lever above the steering wheel and the accelerator pedal are inter-connected, so that either can be used at will. The dual system of magneto ignition is employed. The engine and gear box practically form one unit, the suspension of the front end of the crank case being from a trunnion carried on the cross tube of the frame. At the rear the gear box is supported by two brackets bolted to the cross tube. The cross tube at the rear is stayed by means of splayed tubular members to the side members. The engine, save for improvement in the lubrication, remains the same, but the carburetter has been altered in design, a rotary in lieu of a plunging throttle being used. The clutch is of the expanding shoe type as before. A fine specimen of the 12-14 h.p. open touring vehicle, tastefully finished in green with all fittings suitable for bad weather, and a claret coloured landaulet of the same horse-power chassis, is staged. It should be noticed that all control levers are arranged inside the body at the right-hand side of the vehicle. Another complete car is shown, also on a 12-14 h.p. chassis, this being a landaulet type with flush sides and scuttle dash.



The finger nut adjustment of the Crossley rear brakes.



The rear suspension of the power unit, with diagonal stays, on the 12-14 h.p. Crossley.

Crowdy.

Features: Hewitt piston-valve engine; three-jet carburetter; inclined engine and worm-driven back axle.

CROWDY, LTD., Latimer Road, Notting Hill, W. (14).—The 19 h.p. Crowdy is a car which attracted a great deal of attention last year, and has come well through a year's work. The motive power is a Hewitt piston valve engine. By opening the crank case almost any part of the motor is rendered accessible, and may be withdrawn without difficulty. Gas is supplied through an H.P. three-jet car-

buretter. The lubrication is of the full force feed type, the oil being forced through the crankshaft to all moving parts, including the gudgeon pins. The oil pressure is kept constant by means of an automatic by-pass fitted to the front of the motor, which when the pressure exceeds 3 lbs. shortcircuits the oil back to the base chamber. The magneto is set transversely across the front of the engine. The fan is integral with the flywheel, and runs in an aluminium tunnel. The circulation is thermo-syphon, the radiator being behind the engine. Swivelling block joints are fitted between the clutch and gear box, and are protected by two covers held apart by a spring. From gear box to rear axle the drive is by propeller-shaft. A ball-ended torque rod and radius rods are fitted. The front brake is of the ordinary external type, with outside adjustment, while the rear brakes are of the internal expanding type. The gate change speed lever motion is fitted with the Crowdy patent ball locking device. The control is by throttle lever on the wheel, and a pedal is also fitted. The petrol tank is conveniently carried on the dash—an excellent point which many makers might adopt with advantage. Ball thrusts are fitted to the steering column and steering pivots, also to the front wheels. In the case of both models the engine is tilted, and the final drive is by worm. The other Crowdy model is a 29 h.p. six-cylinder, 89 by 127 mm., which very closely resembles the smaller model just described.

Daimler.

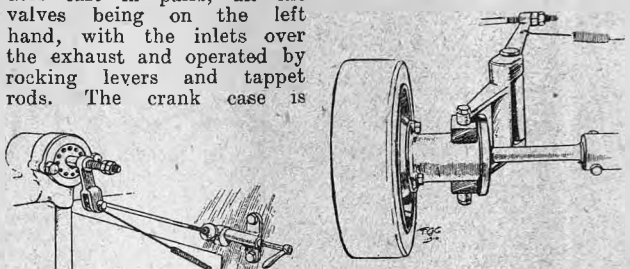
Features: Slide valve engine with an actual section of the engine on exhibition; worm drive; insulation of the body from flexion; inter-connection of oil troughs with throttle lever; Her Majesty the Queen's 38 h.p. limousine.

THE DAIMLER MOTOR CO. (1904), LTD., Coventry (54).—Some disappointment will be felt that no bare chassis of any one of the various Daimler types is exhibited; however, amends are made in one or two cases by the use of the Daimler body elevator, which is fitted to all the Daimler-made bodies. The chief exhibit here is undoubtedly the 38 h.p. 1911 Daimler limousine built for Her Majesty the Queen. Quiet good taste is the dominant note in this carriage. It is finished in dark green with black mouldings, picked out in light green, and is upholstered in fine cloth to match. There is ample accommodation for two passengers at the back seat with a single drop-down seat in front. The internal fittings are Smith's Perfect combined speedometer clock and distance recorder, also electric light in the corners of the limousine. Smith's electro side, tail, and head lamps are fitted, together with the Goldenlyte headlights, with the excellent illumination of which we dealt in a previous issue. These lamps derive their gas from an Allen generator. All fittings will be enamelled stone black. There are low side doors to the front seats. The new Daimler innovation—the body-carried dashboard—is found on a 25 h.p. landaulet, and the body itself is carried on rubber blocks contained in plunger cases on the frame, so avoiding all rattle. A C.A.V. dynamo is fitted under the bonnet and belt driven off the fan spindle. This dynamo supplies the current to the accumulators for all the lights on the car. The Daimler side electric lights and tail lights are fitted. They are finished in black stone enamel and brass, making a very smart appearance. A switchboard on the dashboard controls all the lights. In the Lashborough double limousine a 1ft. 6in. square table is ingeniously arranged and hinged to the back of the front seat. When this is turned over on the other side it presents a well finished bevelled mirror—a fact which will have particular attraction for lady visitors. The car is lighted within by electricity, and a ventilator is placed just below the roof in the forward part of the body. Daimler frameless windows, which are guaranteed not to rattle, are also found here, the rear glazings being of very large dimensions, and so affording the passengers at the back of the car an excellent view. Rudge-Whitworth wheels are fitted, with 920×120 Dunlop tyres. Not the least attractive exhibit is the Clovelly-Daimler car on one of the new 23 h.p. six-cylinder chassis. This is of the elongated Sedan chair type, very elegant and smart. It has been particularly devised for purchasers who drive their own cars and like to be protected from the weather when so doing. The two seats in front take the form of two comfortable swivelling armchairs, and the front glazing and screen are so arranged that the driver has an excellent view, and can drive the car with perfect safety. The upper part of the front glass is arranged to lift outwards for ventilation and a clear view in wet weather. All the windows are frameless. The front and back seats are accessible from either side, very wide doors are provided, and the position of the gear and brake levers is well forward of the door pillar.

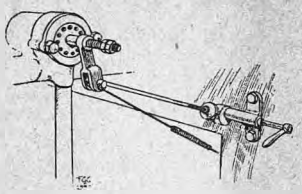
Darracq.

Features: New type 15 h.p. chassis with inlet valves of engine over exhaust; neat inlet and exhaust connections; cast iron crank case split vertically; simple automatic carburetter; fine example of pressed steel frame.

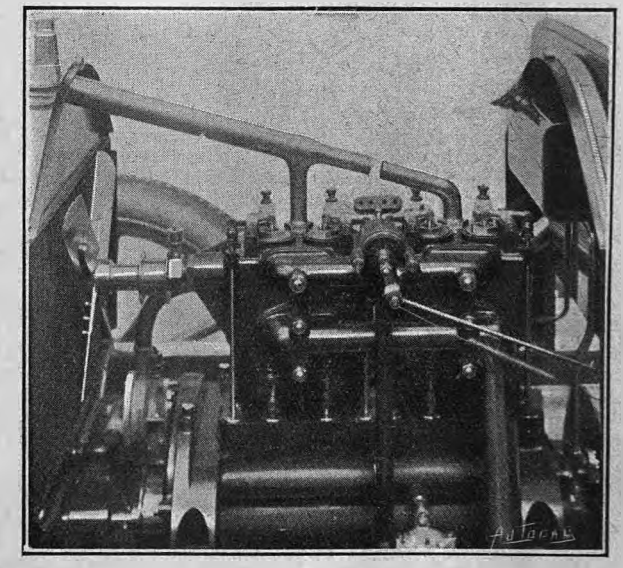
A. DARRACQ AND CO. (1905), LTD., Walnut Tree Walk, Kennington, S.W. (37).—The chassis of the new 15 h.p. Darracq is particularly clean in design, and attracts at once by the magnificent finish displayed. The engine has cylinders cast in pairs, all the valves being on the left hand, with the inlets over the exhaust and operated by rocking levers and tappet rods. The crank case is split vertically, and carries the crank—on the English models—in plain metal bearings, but for continental work the crankshaft is mounted in ball bearings. The carburetter is about as simple in construction as it is possible to make it. The float-feed chamber is attached by a single stud to the crank case, and the jet is covered by a vertical tube with four air holes drilled below the top of the jet. The main air is thus taken in through these holes, a rich mixture passing up to the throttle, which carries an automatic extra air valve, so that when the suction of the engine increases more air is passed through this throttle to preserve the correct mixture. Special attention should be paid to the one-piece casting forming the induction pipe and throttle casing combined, and the one-piece casting forming the exhaust chamber. Common ports are arranged to each pair of cylinders both for inlet and exhaust, this design lending itself particularly to clean inlet and exhaust piping. A high tension Bosch magneto with fixed ignition is fitted. A centrifugal type of circulating pump is rotated from the right hand forward end of the shaft protruding from the distribution gear case, the rear end of this shaft driving the magneto. A small oil circulating pump driven from the rear end of the camshaft takes oil from the lubricating tank arranged beneath the bonnet on the dash to a sight feed arranged behind the dash, and thence to the crank case, the splash system being



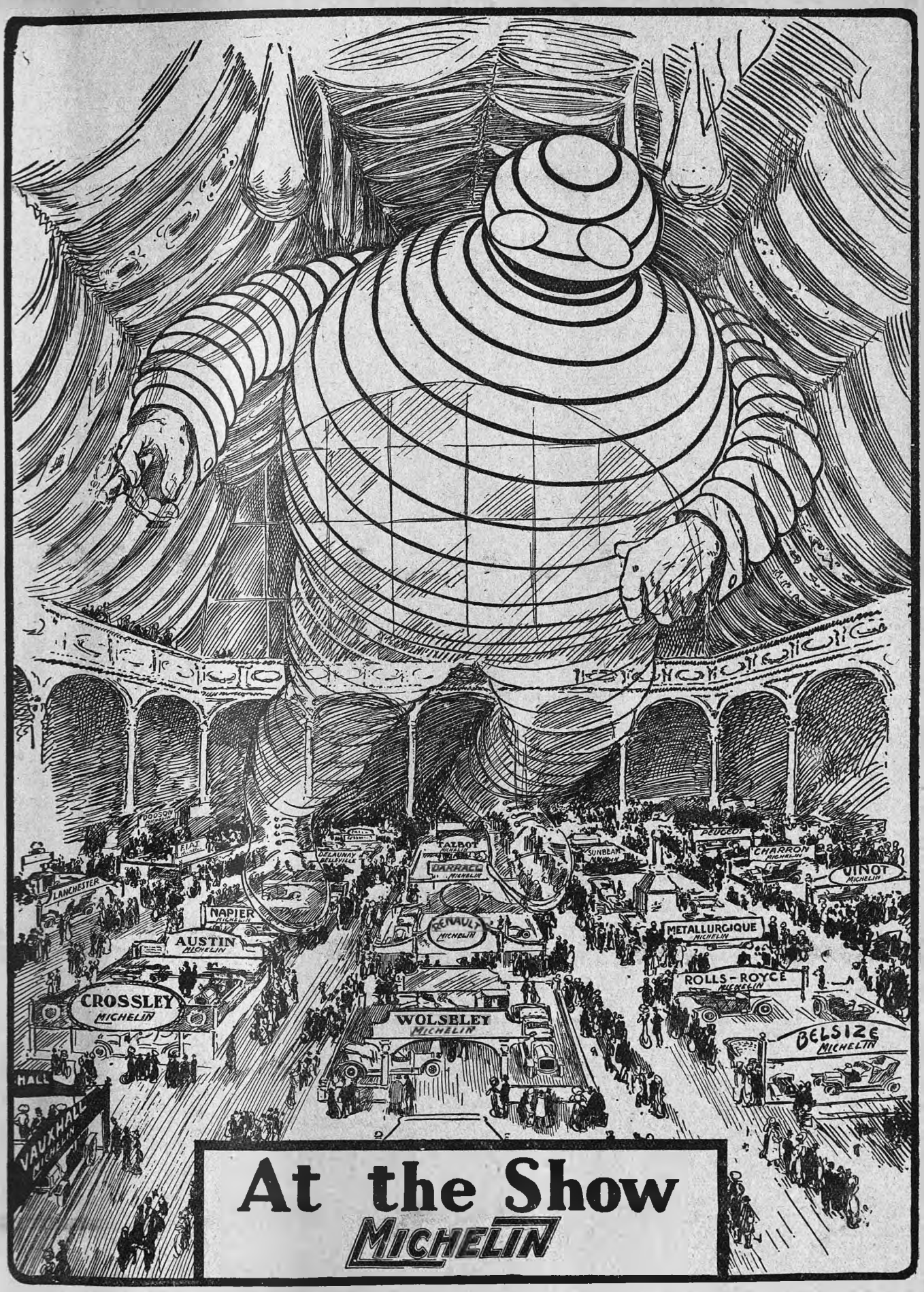
The new 15 h.p. Darracq clutch gear, with fibre blocks.



On the 15 h.p. Darracq a small lever is fitted on the dash, at the end of the bonnet, to operate the throttle without walking round to the accelerator when starting up.



Near side view of the 15 h.p. Darracq engine, showing the overhead valves and tappets.


TODDON
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AUSTIN
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VAUXHALL
DELAUNAY BELLEVILLE
TALBOT
DARRACQ
MICHELIN
RENAULT
MICHELIN
WOLSELEY
MICHELIN
SUNBEAM
PEUGEOT
CHARRON
VINOT
MICHELIN
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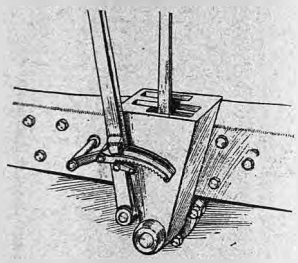
employed. A throttle pedal operates the throttle of the carburretter, no ignition timing control being fitted, either on the steering wheel or the dash. The cast-iron crank case of the engine is supported by four brackets from the pressed steel under-frame made in one with the side members. The three-speed change-speed gear box is similarly mounted. The brakes are of the internal expanding metal to metal type. The clutch is of the split leather to metal type, so that it is progressive in action. The drive to the rear axle is by means of a long double universally-jointed propeller-shaft.

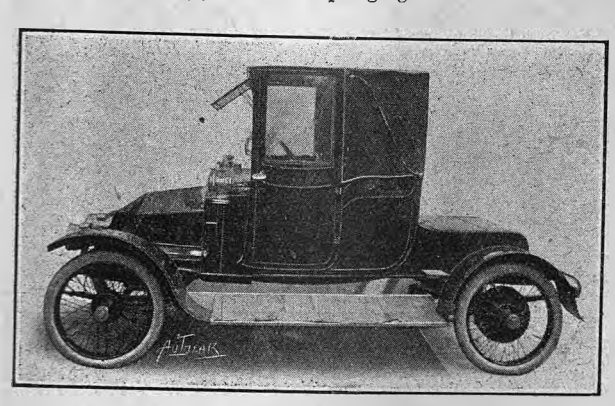
Deasy.

Features: Four speeds; worm drive; thermo-syphon cooling; ball universal joints between clutch and gearshaft; a sporting landaulet.

THE DEASY MOTOR CAR MFG. CO., LTD., Coventry (66).—Four different powers of J.D.S. cars are represented on the Deasy stand—the 12 h.p. with cylinders of 75 by 110 mm., the 14-20 h.p. with 80 by 130 mm., and the other two, which have the same stroke as the 14-20, are the 18-24 h.p. and the 24-30 h.p., with cylinders of 90 and 100 mm. bore respectively. The larger powers are so similar that one description will serve for all. The four cylinders of the engine are cast in pairs, and the makers, who make a great point of thermo-syphon cooling, have this year modified the outlet pipes from the cylinder jackets so as to give a clearer flow. The lubrication calls for attention, as it has been designed to work with oil in large enough quantities to keep cool, a valuable point. In this system one pump draws from a tank on the side of the chassis and delivers to a gallery pipe provided with numerous holes, from which the oil is delivered on to the bearings. The big ends also work over troughs from which the excess oil drains back into the bottom of the crank case. Another pump on the same shaft, and with its suction pipe located at a safe level on the crank case, then returns any superfluous oil to the supply tank, but as this flow of oil has to pass through a sight feed, this part of the system acts chiefly as a tell-tale when the supply of oil is running short. Of course, the enclosed plate clutch of the Deasy Co. is used on all these cars, and between the clutch and gear box universal joints of novel form are disposed. These joints are made up of a circular inner member with holes countersunk on the circumference so as to accommodate balls, and the outer ring member is grooved so that the other half of these balls fit in the grooves so formed. Of course, such construction only permits a limited amount of motion, but we understand that this new type of joint has proved itself effective under severe tests when fitted between clutch and gear box. In the four-speed gear box the reverse gear is only in motion when the first forward speed is in, or when it is itself in action. This ought to conduce to quietness, as, in fact, should most features on this car, which has been essentially designed for silence and comfort. Hence we have a worm gear below the back axle, and the engine is inclined so as to lessen the angle on the universal joints, the centre line of the engine produced being the centre of the back axle. The Lanchester type of rear springing has been retained.



The enclosed gate and the brake lever quadrant on the Deasy cars.



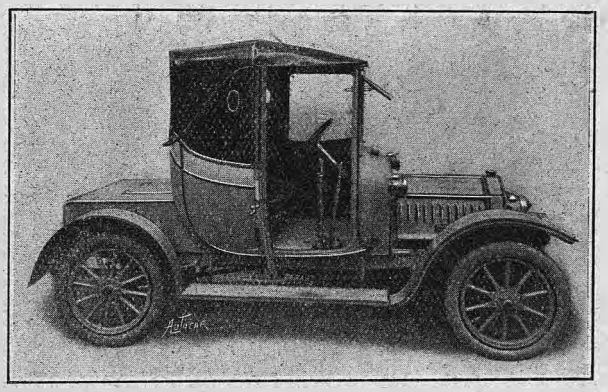
A doctor's coupé body on a 12 h.p. J.D.S. type Deasy.

Turning to the 12 h.p., we find a slight modification in the lubricating arrangements, although the principle is much the same. The Deasy plate clutch is used, but threequarter elliptic springs of admirable length are adopted in this design, in which also both sets of brakes, which are of the internal expanding type, are fitted on the back wheels. One of the most striking cars in the Exhibition was the sporting landaulet exhibited in the centre of the stand, with body entirely enclosed.

De Dion.

Features: Increased length of stroke; new type leather-to-metal disc clutch; twin-cylinder double-purpose body car; small models with propeller-shaft drive; large models with cardan-axle drive; sliding change speed gear to all models; De Dion vertical gate change lever.

DE DION BOUTON (1907), LTD., Great Marlborough Street, W. (36).—The most interesting of the light cars exhibited on this stand takes the form of a double-purpose vehicle suitable for any phase of our variable climate. The chassis has a twin-cylinder 9 h.p. engine, 75 mm. bore, 130 mm. stroke, the feature of this being that both pistons move up and down together. A Zenith type of carburetter, made by De Dion, is used, also a Nilmelior high-tension magneto driven direct from the forward end of the camshaft. The ignition is fixed on all except the single-cylinder 8 h.p., on which it can be varied. The throttle is controlled by a lever on the steering wheel and also by a pedal on the right hand of the foot brake. Thermo-syphon cooling is employed on the 9 h.p. model, as also on the single-cylinder 8 h.p. type and on the four-cylinder 12 h.p. The four-cylinder model has a fan to induce a draught over the tubular gilled type radiator, the smaller models lacking this feature. The change-speed gear on the models up to the 12 h.p. gives three speeds, the direct drive on the top, whilst the 18 h.p. and upward models have four speeds with direct drive on top. The smaller models have an enclosed propeller-shaft, which transmits the drive to the almost universal type of enclosed back axle, but the larger models have the well-known De Dion cardan-axle drive. The latter system has the differential casing rigidly attached to the frame, whilst shafts which protrude from the differential casing drive the road wheels through the medium of flexible cardan-shafts, the bearing for the outer portion of the axle being carried beneath the rear springs. On the smaller models the ball race thrust to the rear axle is of cup and cone type, and the load is carried on the driving axle itself; whereas on the larger models there is the usual load bearing on each side of the differential box and a thrust bearing is embodied in the outer bearing. Special attention has been paid to the lubrication problem in all models, this firm claiming to be the originators of the real pressure feed system, wherein a force pump of a double gear wheel rotary type takes oil from a sump in the crank case and forces it to the main crankshaft bearings, from which it passes through the drilled crankshaft to the connecting rod big-ends. On the smaller models the V-shaped radius rod is served to distance the rear axle, the torque being taken by the springs. The radius rod is mounted on a hinge at the front end, so that it acts universally and thus avoids stressing the frame or springs. The steering gear is of the ordinary worm and sector type with plain bearings. The exhibits on the stand include limousine, threequarter landaulets, torpedo-shaped touring side entrance body, fitted complete with Cape hood and wind screen.



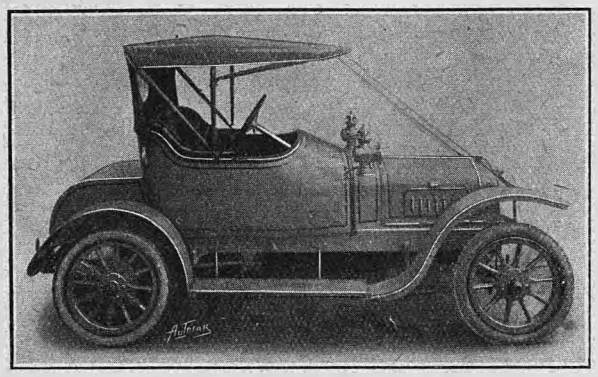
A De Dion coupé showing accessibility of seats from the off-side.

Olympia.—Motor Carriages and Chassis.

Delage.

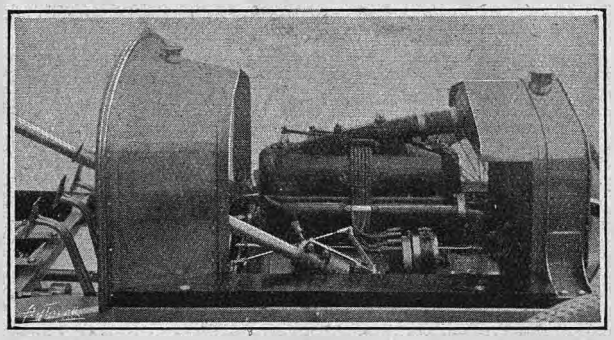
Features: Small six-cylinder cars.

THE LONDON AND PARISIAN MOTOR CO., LTD., Oxford Street, W. (101).—One of the smallest six-cylinder cars in the Show in the six-cylinder Delage 66 by 125 mm. The valves are on the near side of the engine and are enclosed. The cylinders are cast *en bloc,* and the plugs over the valves into which the sparking plugs are screwed are of such ample



A two-seated torpedo body on a 12 h.p. Delage.

dimensions as to allow the two valves to be extracted from one orifice. The carburetter is also on this side, and is a Claudel. The lubrication is force fed through the hollow crankshaft. The circulation is on the thermo-syphon principle, and the magneto is driven from the half-time shaft on the opposite side to the carburetter. The clutch is of the multiple disc type, and between it and the gear box are



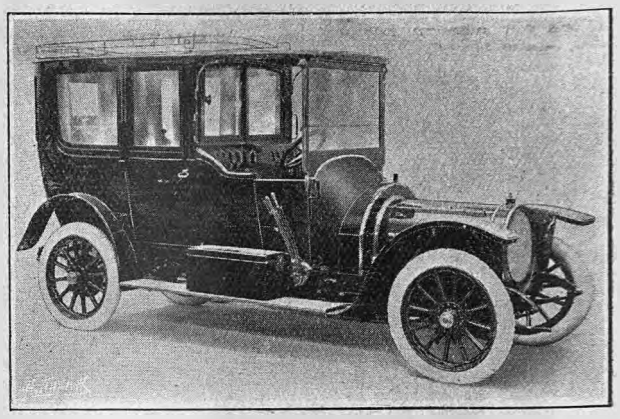
The 16 h.p. six-cylinder Delage engine.

two sliding joints. The gear box has short shafts, and is bolted over the transverse member of the frame. It has three speeds and gate change. Both brakes are of the internal expanding type. The chassis is suspended fore and aft on long, nearly flat, semi-elliptical springs. The control is by foot accelerator and hand throttle. Ignition is by a Nilmelior high-tension magneto, the firing point being fixed. The particular chassis shown has Rudge-Whitworth detachable wheels. The four-cylinder Delage remains as before.

Delaunay-Belleville.

Features: Long-stroke engines; forced lubrication to all engine bearings; torque and radius rods; four speeds.

DELAUNAY - BELLEVILLE AUTOMOBILES (ENGLAND), LTD., Pall Mall, S.W. (63).—The Delaunay-Belleville is as impressive as ever; no better work can be found in the Show. The latest model is a 26 h.p. six-cylinder, having several interesting features. The stroke is long compared to the bore, the actual dimensions being 85 by 130 mm. The valves are enclosed, and the throttle is arranged at a considerable height above the body of the carburetter. From the throttle, the gas is led through a long pipe from the right-hand side of the engine, where the carburetter is situated, to the left-hand side where the induction ports are cast in the cylinders. The throttle is controlled by a foot accelerator and a hand limit lever on the steering wheel. The ignition consists of a high-tension Bosch magneto with fixed timing. The lubrication is on the system long associated with these cars, viz., force pump, with drilled crankshaft, crank pins, and by tube to gudgeon pin. There is a flexible connection between the clutch and the four-speed gear box, while the change-speed lever



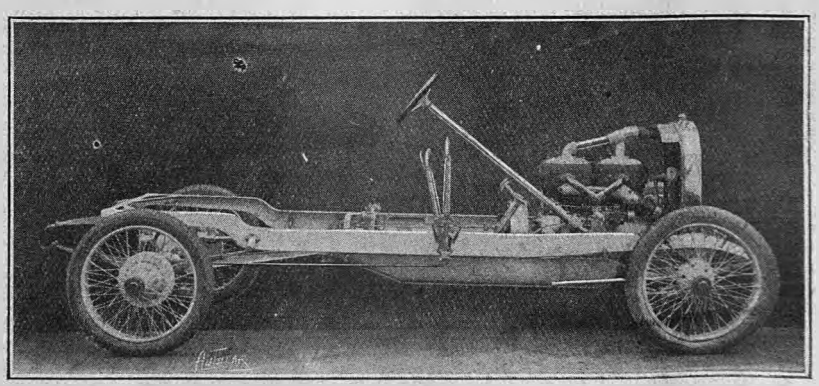
A 37 h.p. Delaunay-Belleville flush-sided limousine.

now moves in a gate quadrant. The setting of the back axle is peculiar, there being two rods, that on the right being in the nature of a torque rod, while that on the left is practically a radius rod. The question of lubrication has received much attention, and practically all the moving parts are fitted with grease-retaining washers. The bodywork is admirable, and worthy of the chassis.

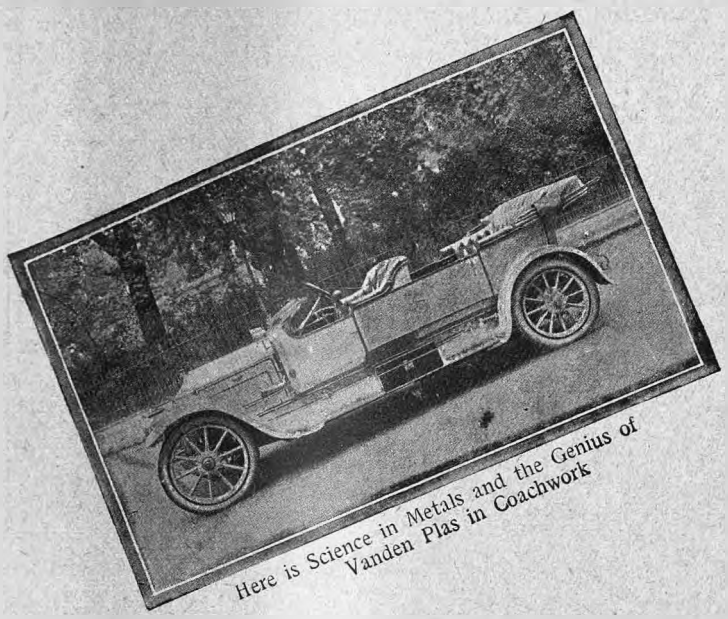
Dennis.

Features: Long stroke engine on the 24 h.p. model; overhead worm drive, which Dennis Brothers were the first firm to employ.

DENNIS BROS., LTD., Guildford (57).—This is one of the oldest established firms, and they have not found it necessary to make many alterations for the coming year. A few points, however, are noticeable in the latest chassis, which is a 24.8 h.p., with 100 mm. bore and 150 mm. stroke. The three-speed gearing and leather cone clutch have been reverted to, and there is a flexible connection between these two members. Thermo-syphon cooling is adopted on the four-cylinder engine, together with the high-tension Bosch magneto ignition, which is timed by a lever on the steering wheel. The throttle is operated mainly by a pedal, with a limit control on the steering column. Both the steering column and the steering pivots are provided with ball thrust bearings. The transmission is by propeller-shaft and worm gearing, this firm being the first to adopt the overhead worm system. The worm remains as before above the worm wheel, so avoiding any undue slope of the propeller-shaft. From an examination of the exhibit it will be seen that simplicity and proved reliability are two points which the firm have kept carefully before them, and no better objects could be pursued. In addition to the 24 h.p. chassis, an 18 h.p. landaulet is also shown. This is of the round back single type seating four persons, but accommodation for a fifth passenger can be provided by a folding seat.



The 18 h.p. four-cylinder Dennis chassis.



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Oct. 19th, 1910.

Dear Sirs,

It might interest you to know that we have had the Engine of Mr. Buckleton's 26 dismantled, and that we have not been able to find any sign of wear whatsoever in either the main or Big End Bearings, and have simply replaced them as we took them off, without any adjusting being necessary.

In view of the Mileage, approximately 20,000 miles, which this Car has done, we think this is very commendable.

Yours faithfully,
DAVISON & KLIPSCH.

Olympia 74

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The cars we exhibit will establish the fashion for 1911 : : :

METALLURGIQUE

(Science of Metals.)

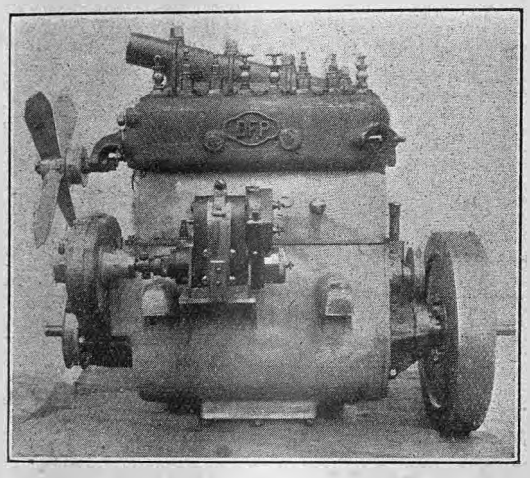
It is always a pleasure to demonstrate the beauties of our cars and we NEVER ASK PEOPLE TO BUY.

WARWICK WRIGHT, LIMITED,
110, HIGH ST., MANCHESTER SQ.,
LONDON, W.

D.F.P.

Features: En bloc engine; thermo-syphon cooling.

G. A. Lecoq and Co., Hanover Street, W. (7).—The 10-12 D.F.P. model is driven by a four-cylinder mono-bloc engine, with the valves all on the near side, and provided with adjustable tappets. Water circulation is arranged on the thermo-syphon principle. The engine is fitted with a Claudel carburetter, and the magneto is the Bosch driven off the half time gear in the usual manner. Lubrication is by a belt driven pump, forcing the oil through the drips, whence it reaches the crank case by gravity. The



The engine of the 10-14 h.p. D.F.P. car, having a bore and stroke of 70 × 120 mm.

clutch is of the leather-to-metal internal coned type, and is provided both with universal and sliding joints. The gear box, which is mounted on an under-frame, provides three speeds forward operated on the quadrant system. The drive from the gear box to the rear axle is by a propeller-shaft with universal joints. The gearshaft brake is of the external type, the band being lined with cast iron segments, and is adjustable from the outside of the chassis.

Dodson.

Features: Cylinders cast in pairs; Renault type radiator.

Dodson Motors, Ltd., Old Bond Street, W. (143).—This company's exhibit consists of cars which might be taken for Renaults; in fact, they are almost exact copies of the Renault, but built entirely in England. Two models are staged, namely, a 12-16 h.p. and a 20-30 h.p. The former has cylinders cast in pairs, with a bore and stroke of 80 mm. by 120 mm. respectively, with the valves all on one side and thermo-syphon cooling. The Zenith carburetter is fitted on the right-hand side, with gravity feed from a tank placed under the driver's seat. Lubrication is by a pump through a drip feed on the dash, the oil being led to the main bearings, from which the cranks are lubricated by means of oil rings. The big ends also scoop up oil from the base chamber. The ignition is fixed, and is by high-tension magneto, with a separate distributer, just as in the Renault cars. The clutch is an internal leather-faced cone, the connection to the gear box being by a shaft with a sliding sleeve at the front end of the gear box. Three forward speeds and reverse are provided, with a quadrant change. The brakes are of the internal expanding type, that on the cardan-shaft being of the same diameter as those on the rear wheels. An open type cardan-shaft is fitted, with a bevel drive to back axle, and there is a tubular torque member.

Enfield.

Features: Mechanical lubrication; four speeds, direct on third.

The Enfield Autocar Co., Ltd., Sparkbrook, Birmingham (90).—The latest model Enfield is a 12-16 h.p. with four-cylinder engine and White and Poppe carburetter, which is both hand and foot controlled. The timing of the Bosch magneto is variable, but the car exhibited was barely complete when it had to be despatched, and this accounts for the fact that, as shown, there is only one control lever upon the steering wheel. The lubricating oil is distributed through the engine by a pump communicating with a hollow crankshaft. The steering column is provided with ball thrust bearings, and Timken roller bearings are fitted to the front and rear wheels. The gear box provides four speeds forward with direct on the third speed. A flexible connection occurs between the clutch and gear box, comprising a modified form of universal joint in duplicate. The front ends of the rear springs are anchored to the frame and serve as radius rods, a torque rod being, however, provided. Besides this model there is a sample of the 10 h.p., with two-cylinder engine, and fitted with a comfortable four-seated body. The 16 and 20 h.p. cars include two touring models and a limousine, and a 16 h.p. car fitted with a *coupé* landaulet.

F.I.A.T.

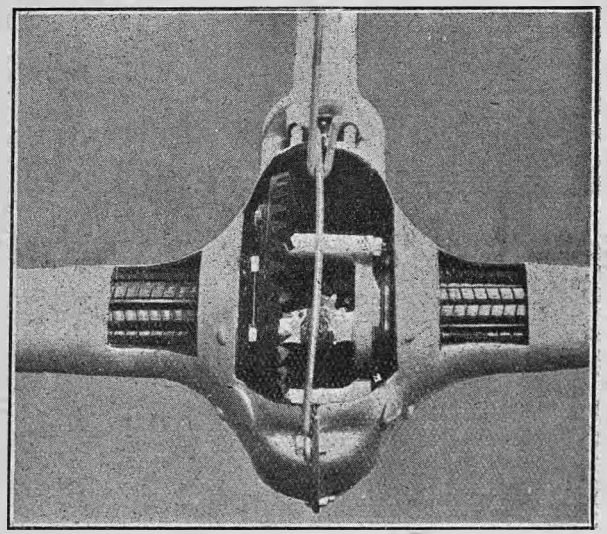
Features: Water-cooled brakes; mechanical lubrication through hollow crankshaft; four speeds.

F.I.A.T. Motors, Ltd., Long Acre, W.C. (73).—The cars exhibited on this stand all have four-cylinder engines, but a 20-30 h.p. six-cylinder is also constructed. The highest-powered car exhibited is a 28-35 h.p., but a 35-50 h.p. is also one of the firm's standard patterns. In all cases the cylinders are cast *en bloc*, the cooling water being circulated by a pump through a honeycomb radiator, and the flywheel having vaned spokes utilised in place of a fan for cooling purposes. A plate clutch is fitted, this being connected up to the four-speed gear box by a detachable coupling. Although the cylinders are cast *en bloc* there is a sufficient space between the second and third to accommodate the body of the carburetter, the induction from which is arranged vertically to the inlet ports. A second pump is employed for circulating the lubricating oil which is driven through the hollow crankshaft to the various bearings, and also through pipes running alongside the connecting rods up to the gudgeon pins. The Bosch high tension magneto is controlled, like the throttle, from the steering wheel. Two commendable features are the ball thrust bearings fitted to the steering pivots, and the water-cooling of the foot brake on the rear end of the gearshaft.

Ford.

Features: En bloc engine and combustion head; low tension electric motor supplying current to high-tension coils and lamps; two-speed epicyclic gear; universal springing; helical roller bearings.

The Ford Motor Co., Shaftesbury Avenue, W.C. (80).—The tastefully finished 20 h.p. Ford chassis, which is mounted on standards, attracts much attention. The constructional details are so well known that it is unnecessary to describe them in detail at the moment, but we would draw attention to the interesting *en bloc* engine casting, with its removable combustion head, the ingenious low-ten-



The back axle of the Ford cars, showing the bevel transmission and the Hyatt helical roller bearings.

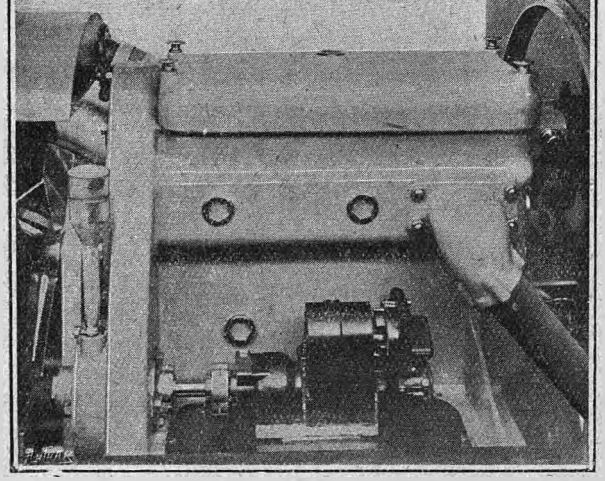
sion electric generator, in which the magnets are attached to the flywheel, and the coils of the rotor attached to a disc plate at the rear of the engine. The e.m.f. obtained from this apparatus at 800 r.p.m. is equal to twelve volts, and in addition to firing the engine the headlights can be supplied from the same source. It should be understood that no accumulator is used in this system, but that at the lowest engine speeds ample current is generated for ignition purposes. The simple two-speed and reverse

epicyclic gear is interesting, both forward speeds being operated by one pedal. Attention should also be given to the method in which the propeller-shaft is carried and the chassis sprung. The frame is three-point suspended, and by the arrangement of the rear springs it is possible, as demonstrated to us in a cross-country trip, for the Ford car to run over obstacles which place the axles at an angle of 45° to the frame. We would draw attention to the helical roller bearings, which are seen on light cars for the first time on this side of the Atlantic. The adaptability of the Ford chassis to various bodies is evidenced by five chassis upon which are mounted motor bodies of various types, including a three-seater runabout, a landaulet, a standard touring car body, and a special Victoria with smart hood and screen.

Germain.

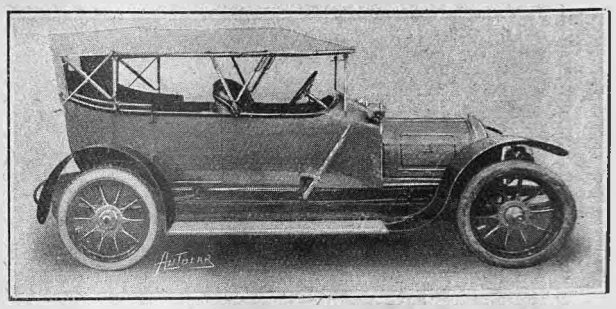
Features: Overhead enclosed valves; chain-driven camshaft on ball bearings; chain-driven magneto; complete mechanical lubrication; four speeds; steel pistons.

CAPT. THEO. MASUI, Grosvenor Road, Westminster, S.W. (28).—As mentioned in our issue of Oct. 29, Capt Masui is showing an entirely new model of Germain car, which we feel sure from the novelty of the design and the great excellence of its workmanship and fitting throughout will attract considerable attention. This is a 15 h.p car, having a four-cylinder engine of 80 by 130 mm bore and stroke respectively. The cylinders and crank chamber are all cast *en bloc*, the cylinders being set 1½in. *désaxé* with the crankshaft. The inlet, exhaust, and water outlet branches are cast integrally with the main casting. The chief feature of this new engine, which is a departure from previous practice, is the arrangement of the valves overhead. They are boxed in, and with a neat aluminium cover are entirely protected from dust. The valves are in separate seatings, each having a gunmetal cover, and they are very easily removable. The operating levers are arranged in two sets as units, each of which can be removed by loosening four nuts. The camshaft, supported on ball bearings throughout, is driven by a silent chain from the magneto-shaft, which in its turn is driven by a similar chain from the crankshaft. At the back end of the camshaft is a worm drive and vertical shaft operating a pump in the base chamber, from which latter the lubrication of



The Germain engine with chain-driven overhead vertical valves, the cover plate in position.

the engine is effected through the hollow crankshaft. Also at the end of the camshaft but outside the valve casing is a second pump, which supplies compressed air for the petrol feed. A Zenith carburetter fitted on the right-hand of the engine draws its air supply through a tube cast in the middle of the water space, fitted with ribs to give extra heating surface. The magneto, which, as already mentioned, is chain driven, is fitted with an automatic governor control integral with the machine. This is fitted on the left-hand side of the engine. The usual Germain type of clutch of the internal expanding metal-to-metal type is fitted to this car, though it is a little smaller than usual. The connection to the gear box, which is a double universal coupling, and also the spring for the clutch are enclosed in an oil-tight casing just in front of the gear box. The gear box provides four speeds, the direct being the fourth. The foot brake and side brakes are all of the same size and of the internal expanding type, with easily get-at-able hand adjustments. The transmission is by an open propeller-shaft with covered joints, the back axle drive being by bevels. No torque or radius rods are fitted, but specially long springs of the threequarter elliptical type, each of which is fitted with two counter blades to ensure easy motion, are found to give satisfactory results. The control of this car is comprised in a neat foot lever, with small brass adjusting screw stop in front of the dash. Ball thrust bearings are fitted to the vertical swivels of the front axles. The pistons of this engine



A torpedo body of Capt. Masui's on a Germain chassis.

are of pressed steel, and are fitted with a single ring with a double twist, which certainly as a sample of good workmanship should not be missed. Visitors to this stand should make careful examination of Capt. Masui's special torpedo bodies, two of which are of the open type and one of a new type, which can be either entirely open or entirely closed.

Gladiator.

Features: A new 15 h.p. model; block engine. Also a new live axle 35-40 h.p.

GLADIATOR MOTOR CO., Great Portland Street, W. (35).—Fresh to the public is the 15.9 h.p. Gladiator, a neat and well-considered chassis, differing considerably from previous Gladiator practice. An under-frame, supported by first and second cross members, carries the engine and three-speed gear box. The engine is of the *en bloc* order, with valves on the left side, stroke and bore 80×110 mm., Claudel carburetter on the right, and pump and Bosch magneto on the left, driven off the same spindle. The valves are enclosed, and the exhaust trunk forms part of the engine casting. A leather-faced cone clutch is fitted, and connects with the cylindrical gear box by a long link coupling. The pedal brake externally expanding shoes are lined with Raybestos. The propeller-shaft is fitted with a universal joint forward and a plunging joint behind, while a pressed steel banjo type torque member runs between the back axle and the central cross member. Screw-down lubricators are fitted to universal joint pins. The back axle is of the built-up type, the differential gear box being strongly gussetted. The axle is also stiffened by adjustable tension rods. The frame is carried on semi-elliptical springs forward and three-quarter elliptical springs behind. This is a remarkably neatly designed and compact production, and presents all the best features of Gladiator work. A 35-40 h.p., a new model of live axle, carries a 35-40 roomy handsome landaulet body.

Gobron and Brasier.

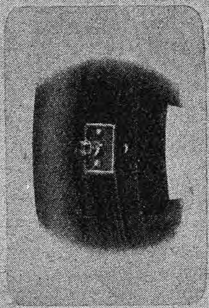
Features: Gobron—Double piston engine; new live axle model; four speeds. Brasier—Hardened crankshaft and uncommon form of mechanical lubrication.

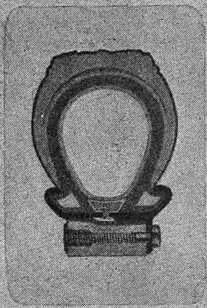
ARTHUR TURNER AND CO., Piccadilly, W. (30).—This firm are exhibiting Gobron and Brasier cars. Beginning with the Gobron Co.'s productions, they are showing a 26-36 h.p. new model with live axle. This is provided with the usual Gobron type four-cylinder engine with eight pistons. Forced lubrication is provided from an eccentric driven pump, and the ignition is by high-tension magneto with hand control from the steering column. The throttle control is operated by a pedal, and there is a hand adjustment in the shape of a milled brass nut on the top of the steering column. The gear box provides four forward speeds, with direct drive on fourth speed. The rear springs are threequarter elliptical. The steering column is provided with ball bearings to take end

ROYAL AUTOMOBILE CLUB

CERTIFICATE OF PERFORMANCE

(Under the Open Competition Rules of the R.A.C.)





on a

Trial of the

"Captain" Detachable Rim.

August 5th to September 9th, 1910.

This is to certify, [illegible]

Description of the Device. [illegible]

Total weight

The average running weight on the back axle of the car was [illegible]

The rims completed a distance of [illegible] miles when the trial was brought to a conclusion by the above mentioned tire [illegible]

The trial was held upon Brooklands Track [illegible] miles per hour.

During the trial the rims were changed [illegible]

At the conclusion of the trial the rims were found to be in good condition [illegible] creeping or working between the component parts and the rim had not stretched during the trial.

[illegible], Secretary. [illegible], Chairman.

September 26th 1910 Date. Dugald Clerk, Chairman of the Technical Committee.

119 Piccadilly London W.

4000 MILES TRIAL

CAPTAIN RIMS

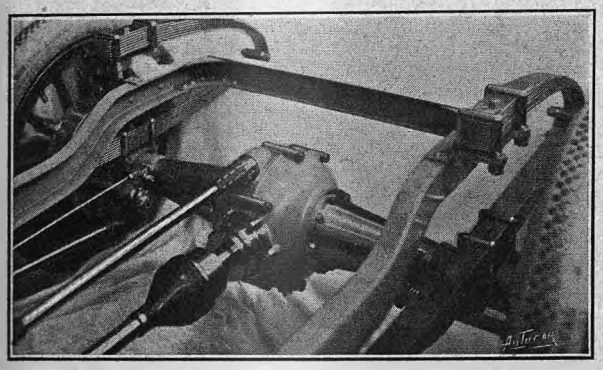
The "CAPTAIN" MOTOR WHEEL Co. Ltd. 29 Marsh St. BRISTOL

thrust, and the front swivel axles are also fitted with ball-thrust bearings. The new type of Brasier chassis of 18-30 h.p. has some notable improvements. The engine has four cylinders 90 mm. by 140 mm., cast in pairs, with the valves all on one side, the cooling being on the thermo-syphon principle. Ignition is by high-tension magneto, with hand control from the steering column. Lubrication is somewhat novel, and includes a strong rectangular box fitted on the right-hand side of the engine. In this box there are cam-operated plungers supplying various feeds to the engine, and, by means of a small lever on the dash, the feed can be cut off entirely when desired.

Hobson and Delahaye.

Features: Engine and four-speed gear box three-point suspended; six cylinders cast *en bloc* in parallel sets of three driving a three-throw crankshaft; horizontal thrust rods; four speeds.

H. M. Hobson, Ltd., Vauxhall Bridge Road (81).—Here is found one of the few striking novelties of which the Show can boast. This takes the shape of the new six-cylinder Delahaye, in which this old-established firm have, so far as the engine is concerned, departed very widely from existing practice in the matter of six-cylinder engines. Except for the appearance of the six plugs on each side of the motor block casting it would not be thought for a moment that the bonnet enclosed a six-cylinder engine, but this is, however, the case, the cylinders being set in lines of three at an angle of 30° to ea h other, and all contained in a rectangular form of *en bloc* casting with valves enclosed on both sides by easily detachable inspection plates. The water jacket areas round the valve chambers are closed by large plates bolted to the cylinder casting, giving easy access for core drawing and cleansing. The magneto is placed in front and on the right of the engine block, and the water circu-



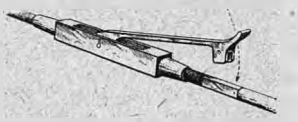
The 16-20 h.p. Delahaye back axle, which has an unusual type of torque rod.

lating pump on the left, driven by skew gear off the near side camshaft. The exhaust trunks are formed with the engine casting, with the result that there is an unusual absence of piping in connection therewith. A flywheel of large diameter and a leather-faced cone clutch with rubber ring insertion between the leather and cone surface convey the drive to the four-speed three-point suspended gear box. In the rear of the gear box the mechanical details follow the usual Delahaye practice, but we would draw attention to the generous dimensions and construction of the back axle, and the substantial manner in which the brake gear is fitted. A torque and thrust column runs from the differential gear case to the centre of the central cross member of the frame. Another new model is the 16-20 h.p. Delahaye with engine *en bloc*, and cylinders 85 by 130 mm. The engine and gear box, as in the six-cylinder model above referred to, are both three-point suspended. The valves are enclosed by a very accessible single nut secured plate. The water pump is on the left and the magneto on the right of the engine, both driven off the distribution gear. The chassis conforms in all points to the model previously described. A 20-30 h.p. Nagant-Hobson with four-cylinder engine, cylinders cast in pairs, 100 by 130 mm., is also shown. This chassis differs from the 1910 type only in the fact that in the 1911 model there is a propeller-shaft and live axle drive in lieu of chain drive as heretofore. A 12-16 h.p. Delahaye is shown with the new, interesting, and convenient conning tower body which was illustrated in *The Autocar* of October 22nd. It has a specially sloped steering to suit this kind of carriage. The other chassis carries a flush-side torpedo body of good style, comfortably upholstered.

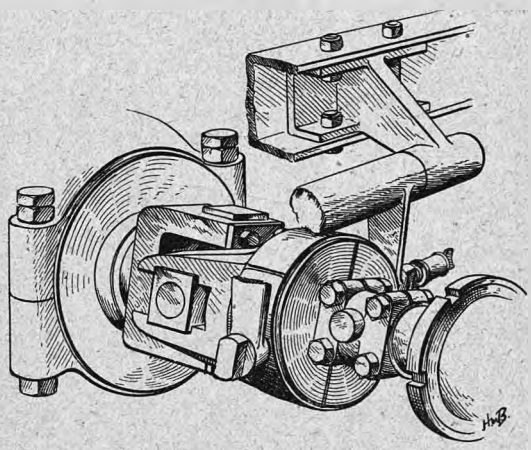
Hotchkiss.

Features: Enclosed leather-faced clutch; locomotive type brakes, with simple form of brake adjustment; four speeds; safety catch for reverse on change-speed lever.

The London and Parisian Motor Co., Ltd., Davies Street, Oxford Street (79).—A grandly-finished 16-20 h.p. Hotchkiss chassis occupies a prominent position on this stand. The mechanical details of this car have been found so satisfactory in the past that the alterations in 1911 are very few in number. The chief of these is the enclosure of the valves by easily detachable inspection lids and the removal of the lubricator to the forward face of the dashboard within the bonnet. The six-cylinder 20-30 h.p. Hotchkiss, which was described and illustrated in *The Autocar* as recently as October 22nd, is shown carrying a handsome cabriolet body, by Hamshaw, of Leicester. Another chassis 20-30 h.p. mounts a good-looking threequarter landaulet, but the gem of the stand, so far as bodies are

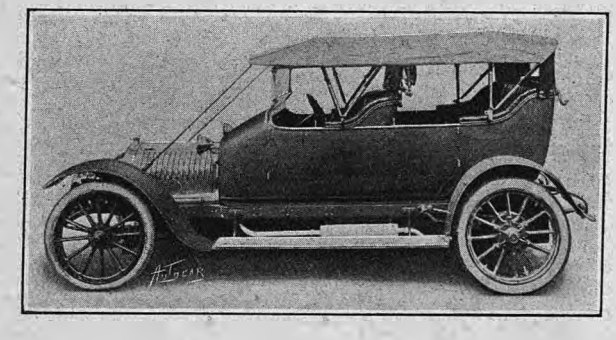


The method provided for adjusting and locking the brake rod of the 20-30 h.p. six-cylinder Hotchkiss.



Universal and sliding joint between the clutch and gear box of the 20-30 h.p. Hotchkiss.

concerned, is a flush-sided torpedo-type double phaeton on a 16-20 h.p. Hotchkiss, by Melhuish, of Camden Town, very smartly finished in coaching yellow fine lined black, and provided with hood in dark leather and screens to both back and front seats.



A torpedo type body on a 16-20 h.p. Hotchkiss car.

Humber.

Features: Chain-driven valveshafts and magneto; detachable wheels; four speeds; adjustable driving bevel.

Humber, Ltd., Coventry (47).—Humber productions have been so fully dealt with in our columns recently that it is not necessary to repeat the descriptions. There are a number of points, however, to which attention may be directed. In the first place there is a model of the 16-24 h.p. engine, which shows the chain drive in the distribution gear in place of the usual pinions; the oil circulating pump and the system generally is also exposed to show how this is thoroughly carried out. On the 12-20 h.p. chassis the salient points are that the Humber detachable wire wheels

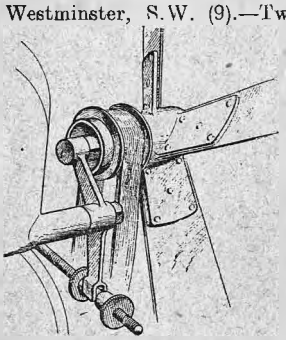
Olympia.—Motor Carriages and Chassis.

are fitted, and the frame is inswept for steering lock and upswept to give clearance to the rear axle. The steering wheel has now four arms instead of one, which has been fitted for many years past. The steering pillar is mounted on trunnions, so that it can be arranged at any angle to suit the driver, and is fixed at the said angle by means of a bracket which bolts to the dash and the steering stem. The clutch has a central disc stop for slowing up at gear changing. The gear box is three-point suspended, a long link supporting it at the front to a cross bolt, which is mounted on a cross-channel member of the frame, whilst long bolts support it at the rear by a pair of brackets, the same brackets carrying the anchor pins to which the torque rod is attached at its forward end. On the section of the rear axle exhibited the arrangements for adjusting the small bevel will be duly noted, whilst the detachability of the differential after removing the back plate will be appreciated. The chassis can be left standing on its road wheels whilst the driving axles are removed. Finished models include flush-side touring phaetons, landaulets, and a particularly neat torpedo body mounted on a 12-20 h.p. chassis.

Imperia.

Features: Ball bearing crankshaft; six-cylinder *en bloc* engine; combined sub-frame and under-shield; adjustable steering column.

Mansion's Motor Garage Co., Ltd., Rochester Row, Westminster, S.W. (9).—Two Imperia models are shown, a 12 h.p. (75 by 100 mm.) and an 18 h.p. (90 by 120 mm.) which are practically identical, except that the engine of the larger car is fitted with ball bearings. The chassis of the 12 h.p. model is not without interest. The engine is a four-cylinder, cylinders cast *en bloc*, with the valves all on one side. The carburetter is a Zenith, and the magneto a Bosch driven off the half-time shaft. The circulation is arranged on the thermo-syphon system. The crank case is in two halves, the lower half being the oil tank, holding two gallons of lubricant The oil pump driven off the half-time shaft maintains the oil in the crank chamber at a constant level. The engine and gear box form a single unit, and both are bolted on to steel sheeting, which in turn is bolted on to the chassis, thus doing away with the necessity for a separate tray and providing the necessary give in the frame. The clutch is of the Hele-Shaw type, and is provided with an adjustable clutch plate, and between clutch and gear box are the usual sliding joints. The gear box contains three speeds and reverse, and the change is by gate. From gear box to back axle the drive is by propeller-shaft, with a rather unusual type of universal joint at both ends. The torque rod is of channel steel, reinforced by wood inside the channel. The chassis follows standard lines, and is sprung on threequarter elliptical springs at the back. The steering column is pivotable to suit the driver, and a ball thrust is provided. As regards control, the firing point is fixed, and the throttle control is solely by pedal, with a setting lever on the dashboard.



The Imperia spring fan bracket adjustment.

Iris.

Features: En bloc engine; thermo-syphon cooling; enclosed water and inlet leads; three-point suspended gear box; easy access to bevel drive and differential gear.

Iris Cars, Ltd., Regent Street, W. (85).—In the 15 h.p. new model Iris the frame is of the usual channel steel type inswept at the dashboard and upswept over the back axle. The engine is of the *en bloc* order, carried on the main frame, with valves and magneto on the left-hand side, the latter driven off the camshaft in the usual way. The carburetter is set close up to the right-hand side of the engine, the leads being all through the cylinder casting. Thermo-syphon cooling is adopted. A leather-faced cone clutch takes the drive to the gear box, the arms of the flywheel and clutch being vaned for draught-producing purposes. The gear box is extremely short, and is three-point suspended from the cross members, affording three speeds forward, with propeller-shaft drive to the back axle. The differential gear case has an easily detachable back cover, through which the differential gear and bevel drive can be withdrawn without disturbing the rest of the chassis. The 25 h.p. remains very much the same as the 1910 model, save that the frame has been downswept in the centre to afford easier access to closed bodies, while the wheelbase has been lengthened to 10ft. 6in. The lubrication is by the pump and trough system, the crank chamber on the off-side having very accessible inspection lids.

Itala and Grégoire.

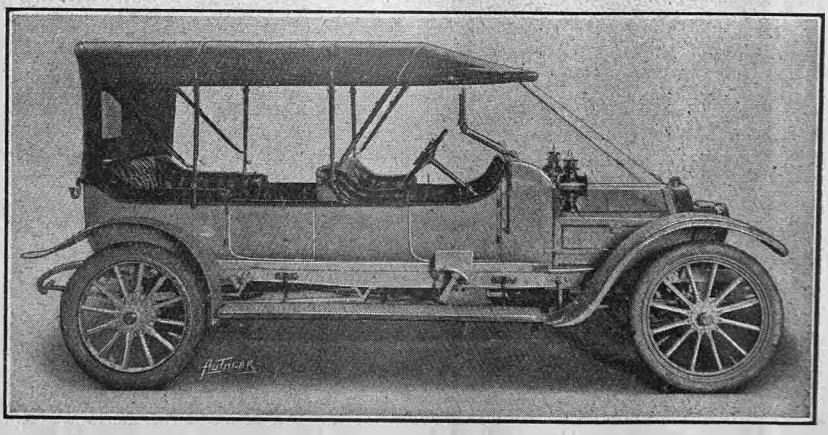
Features: New 16-22 h.p. model Grégoire, with long stroke and four speeds; direct drive on third or fourth speed optional.

Osborn and Co., Great Marlborough Street, W. (29).—On this stand are shown Grégoire and Itala chassis. The Grégoire chassis is a new model of 16-22 h.p., having a four-cylinder motor set parallel with the frame, with cylinders 80 × 160, cast in pairs, and having the valves all on one side, the valve stems and springs being enclosed by an easily removable cover. Cooling is by thermo-syphon, and lubrication by gear-driven pump supplying oil to the engine through a hand-controlled valve on the dashboard, by means of which the pressure can be regulated. The ignition is by high tension magneto with hand control from the steering control, the throttle control being by pedal only. The clutch is a leather-faced cone, and there is a split coupling between engine and gear box. The gear box provides four speeds and reverse with gate change, direct drive being on the fourth, but it can be fitted to the third if desired. The steering column is provided with ball thrust bearing. A new model Itala chassis of 14-16 h.p. is also shown. This has a four-cylinder engine, with a bore and stroke of 77 by 120. The valves are all on one side, the engine being set parallel with the frame. Lubrication is by forced feed through a hollow crankshaft, with a special device to prevent excess of lubrication to the pistons. The clutch is of the disc variety, and the gear box provides four forward speeds and reverse.

Jackson.

Features: Pressed steel frame developed to form the lower part of the body.

R. Reynold Jackson and Co., Ltd., Notting Hill Gate, W. (91).—Eight Jackson cars are on show here, and they illustrate practically three different patterns. First there is the 6 h.p. thermo-syphon cooled single cylinder special with three forward speeds and reverse. The engines on this and on the other cars are De Dions. This particular car is of very light construction and of racy appearance. The pressed steel frame is developed to form the lower part of the body. The 12 h.p. type also has a single-cylinder De Dion motor and carburetter, and is provided with three gear changes. It is shown as a two-seater with a four-seated torpedo body. The last pattern is rated at either 14 or 16 h.p. according as it is fitted with a Jackson or Aster engine. The former is a very neat example of the *en bloc* construction. Eisemann magneto and Zenith carburetter are fitted to this type, with both hand and foot control. The cars appear excellent value at the prices asked.



A low-sided four-seated body on a 12-14 h.p. Jackson car.

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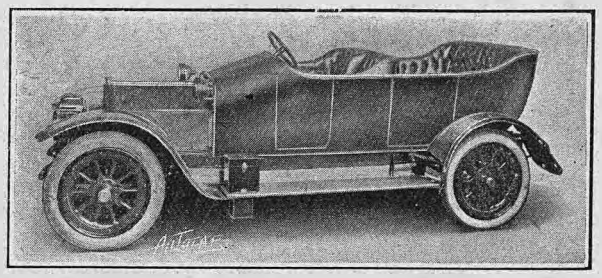
Stand No. 60 Olympia.

La Buire.

Features: Silent chain drive to camshaft; six cylinders *en bloc*; four speed gear box.

THE HOLLINGDRAKE AUTOMOBILE CO., LTD., Stockport (49).—The agents for the La Buire cars have an interesting show, comprising a 15 h.p. with torpedo body with a neat arrangement of scuttle to the back seat; a 15 h.p. four-cylinder polished chassis, and a 24 h.p. six-cylinder polished chassis; also a 24 h.p. threequarter landaulet. They also have a very smart little 15 h.p. two-seated *voiture-de-course*, which is fitted with wind screen and hood, so as to be practically weather-proof. The six-cylinder chassis is a new model having all the cylinders cast *en bloc*. The bore and stroke are 85 mm × 140 mm. respectively; the valves arranged on one side with the stems enclosed by convenient covers. Cooling is by centrifugal pump driven by a cross-shaft and skew gears from the forward end of the camshaft. The other end of this cross-shaft operates the magneto. In this model the camshaft is operated by a Hans Renold silent chain. High-tension magneto is hand controlled from the steering. Lubrication is effected from a gear pump in the base chamber, which supplies lipping troughs for the connecting rod ends. The oil is strained at each circulation, the strainer being easily accessible for cleaning. Both hand and pedal throttle are fitted, the carburetter being of the La Buire type, with a provision for supplying cold oil when the throttle is shut. The clutch is of the multiple disc type enclosed within the gear box, and a new feature of this model is a flexible split coupling between the flywheel and the gear box. Four forward speeds and reverse are provided, the fourth being direct, and, it need hardly be said, a gate change.

taken part, and the workmanship is beyond reproach. A splendid example of the longer wheelbase chassis is fitted with limousine landaulet body by Maythorn.

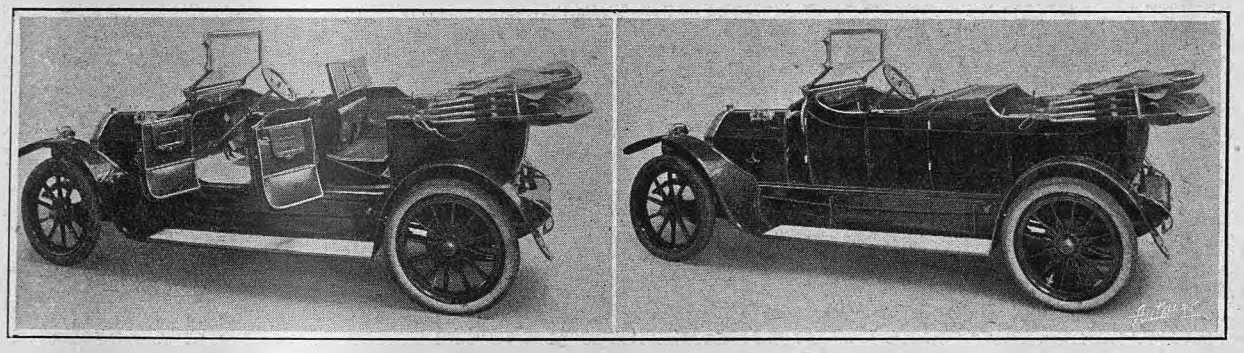


A feature of the Lancia stand. The touring car with copper finish, the bare polished metal providing a remarkably striking and brilliant effect.

Lanchester.

Features: The new 38 h.p. six-cylinder with equal bore and stroke; unique springing—indeed, the chassis is unique from stem to stern, and the worm drive is the pioneer of this system.

THE LANCHESTER MOTOR CO., LTD., Sparkbrook, Birmingham (62).—A separate example of the engine and gear unit is shown at one end of the stand, but the latest feature is the new 38 h.p. six-cylinder car. This has a bore and stroke both of 4in., while the 28 h.p. has a stroke of 1in. less. We dealt with some of the special features of this car in our issue of October 29th (p. 589), and we may here call attention to the arrangement of the gear levers inside the right front door, which is intended for use. To the same end the steering wheel is now hinged obliquely to the top of the column, so that the driver can readily take his seat without inconvenience to his passenger or himself. The steering column, steering wheels, and steering pivots are all provided with ball thrust bearings. The wick carburetter remains a standard feature, and the petrol is fed to it by the pump sunk in the liquid, any surplus returning to the tank by gravity. The flywheel is at the rear end of the crankshaft,

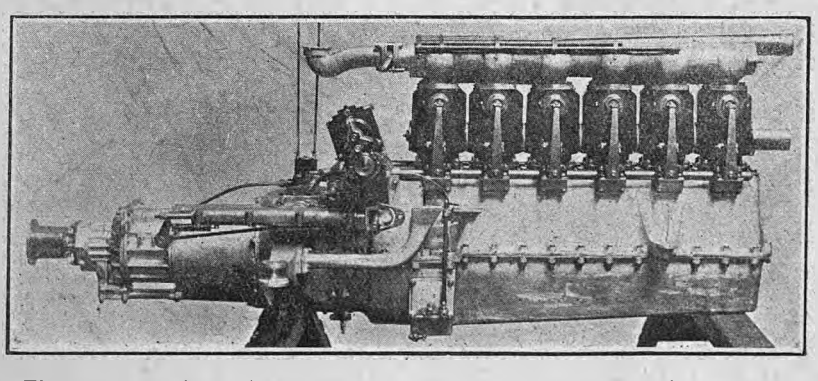


A touring body on a 15 h.p. La Buire car, one view showing the doors and scuttles closed, the other showing the method of hinging the rear scuttle and the ample width of doorway to the front seat.

Lancia.

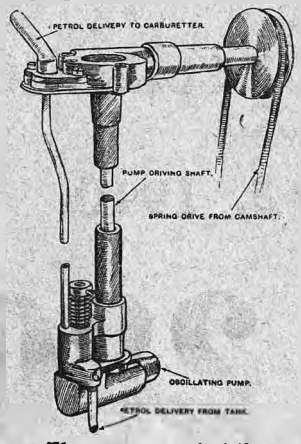
Features: An all-copper body; four speeds; longer stroke.

W. L. STEWART AND CO., LTD., Shaftesbury Avenue, W.C. (20).—A striking all-copper body by Maythorn is fitted on a standard 24 h.p. chassis. This chassis has an *en bloc* engine and the combined crank case and gear box which is a leading feature of the Lancia car. A modification in the engine is that instead of the dimensions being 100 by 110 mm., they are now 100 by 130 mm. A plunger pump operated from the camshaft is now employed for supplying pressure to the petrol tank instead of the exhaust pressure as formerly. A special feature to which attention is called is the fitting of the change speed and hand brake lever inside the fixed right-hand panel of the body and at the same time preserving a narrow flush side. The lines of this body are exceptionally neat, as will be admitted after an inspection. The scooped dash is continuous with the body sides, affording ample protection and leg room to the front seat passengers. Another small modification of the engine is that the Bosch magneto is now placed about 5in. further back than formerly, and thus access to it is easier. Like many other makes, the Lancia has a four-speed gear box with direct drive on the fourth gear. This practice, which used to be practically universal two or three years ago, and then lost hold, has now come in again. As to the running of Lancia vehicles, this has been amply demonstrated at Brooklands and in other tests in which this car has



The power unit of the 38 h.p. six-cylinder Lanchester, comprising engine, gear box, clutch, and brake casing.

Olympia.—Motor Carriages and Chassis.



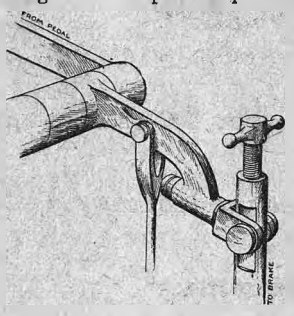
The arrangement of the oscillating petro pump on the 38 h.p. Lanchester.

and the engine is canted so as to bring the crankshaft, propeller-shaft, and worm into line, the worm, it will be remembered, being arranged below the wheel in the Lanchester cars. Bosch dual ignition is adopted as standard, and, of course, wire wheels. The lubricating oil is fed to the engine bearings by a pump through ducts formed in the crankshaft and connecting rod. A second pump delivers oil to the plate clutch, the gear box, and other moving parts. A seven-seated limousine is one of the finest vehicles in the Show. The exhibit also includes two cars with landaulet bodies and a touring car, this last being the 38 h.p. chassis which we have briefly referred to on the foregoing page.

Léon Bollée.

Features: The engine and gear box carried on under-frame; thermo-syphon cooling; enclosed valves; four speeds.

CONNAUGHT MOTORS AND CARRIAGE CO., LTD., Long Acre, W.C. (84).—The 14 h.p. Léon Bollée, which is shown in chassis form, was briefly described in *The Autocar* of October 22nd. The frame is of the usual type, inswept at the dashboard, and upswept over the back axle. The engine and gear box are supported on an under-frame carried from cross members and filled in by metal sheeting for the exclusion of dust. The cylinders are cast in pairs, with valves on the left-hand side, enclosed, and have thermo-syphon cooling with large diameter leads and upswept exhaust trunk. An internal leather-faced cone clutch is provided, and a four-speed gear box with propeller-shaft drive to the back axle. A well-designed V-shaped torque member is fitted, and the frame is carried on threequarter elliptical springs at the rear. The throttle valve is controlled by a pedal, and the advance and retard lever is set on the steering wheel. The fact that the chassis is the production of Léon Bollée is sufficient warranty and guarantee that it embodies the best attributes of automobile construction A chassis is shown carrying a very smartly designed and extremely comfortable two-seated body termed the Connaught Cosy, with scuttle dash petrol tanks and smart low well raked hood with rain catching device on forward hoop. A disappearing seat is provided at the back, and in the tail portion of the body cabinets are arranged for inner tubes, etc. At the rear a lid closes down over three ample sized baize-lined drawers, in which motoring kit and oddments can be carried with great convenience. Another chassis carries a smart handsome four-seated cabriolet type of landaulet, and another a tasteful flush-sided torpedo double phaeton. A roomy, comfortable three-seated landaulet completes the exhibit.

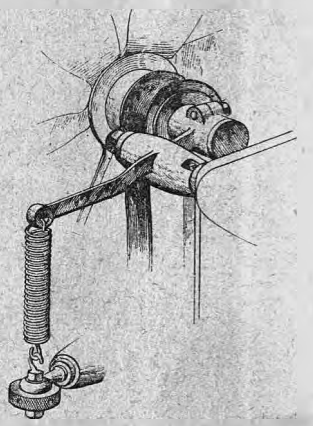


Method of adjusting the pedal brake on the 14-20 h.p. Léon Bollée.

Le Gui.

Features: Compact engine; overhead valves; four speeds.

ROSE AND HOLLEBONE, LTD., Frith Street, W. (95).—A Le Gui 10 h.p. and a 15 h.p. chassis of this well-known racing vehicle are staged in addition to a two-seated finished car. The *en bloc* four-cylinder engine has a bore of 65 by 130 mm. stroke on the 10 h.p. type, and on the 15 h.p. type a bore of 75 by 150 mm. stroke. The inlet valves are arranged above the exhaust, the former being operated by means of rods which pass through the water-jacketed cylinder and actuate tappet levers carried in a detachable cover on the top of the cylinders This construction allows of a short engine being produced, and as a matter of fact the models are this year upwards of three inches shorter than formerly, and therefore it is only necessary to fit end bearings to the crank. A Zenith carburetter is used, control of the throttle being by means of a pedal. The speed at which the engine runs when the pedal is released is variable by means of a cam action lever arranged on brackets behind the dash. The petrol tank, like the radiator, takes a circular form or rather the main construction of the petrol tank is horseshoe shape, with the lubricating tank placed beneath it under the bonnet. The clutch is a leather-to-metal self-contained cone. The gear box gives four speeds with direct drive on the fourth. It is chiefly distinguished by the short castellated primary shaft and the wide gear teeth, these being ⅜in. The foot brake is of the expanding type behind the gear box, and the hand brake of similar type acting on the rear wheels. A long propeller-shaft universally jointed at both ends transmits the power to the rear axle. A torque rod takes up stress set up torsionally from the propeller-shaft.

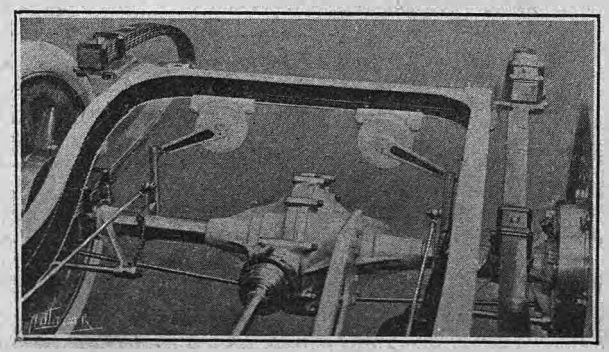


The fan supporting arm and belt tensioning spring of the 18-20h.p. Lorraine-Dietrich.

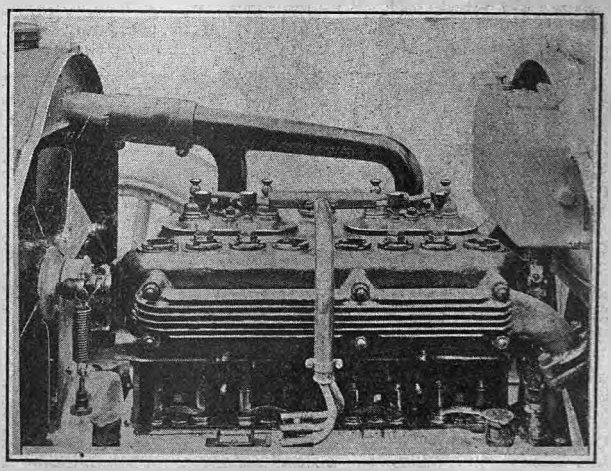
Lorraine-Dietrich.

Features: Thermo-syphon cooling; enclosed valves; three-point suspension of engine and gear box.

DE DIETRICH AND CO., Great Marlborough Street, W. (33).—On the new 18-20 h.p. model we find that the cylinders are cast *en bloc* with a bore of 90 mm. by 130 mm. respectively, with thermo-syphon cooling. The valves are all on one side, and the springs and valve stems are enclosed by neat covers. Throttle control is by hand and foot, and the lubrication is by a pump driven by worm from the camshaft, feeding the crank chamber through a drip-feed lubri-



The shock absorbers of the 18-20 h.p. Lorraine-Dietrich connecting the axle to the rear cross member of the frame.



Near side view of the 18-20 h.p. Lorraine-Dietrich engine.

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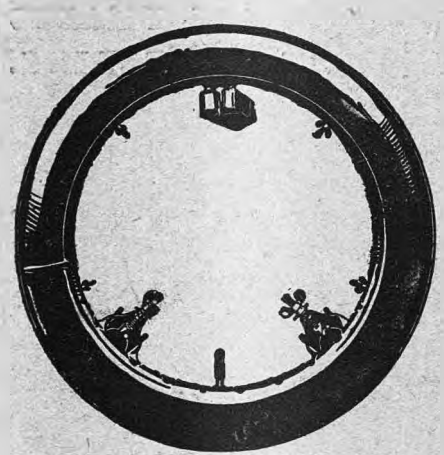

The "Stepney" Leather Cloth Cover as fitted to "Stepney" Wheel.

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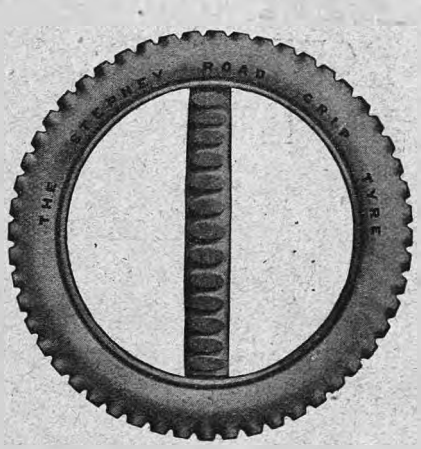

Front and Side View of "Stepney" Road Grip.

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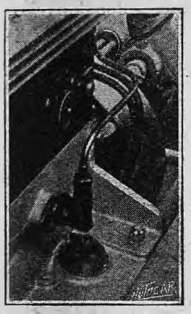
cator on the dash. The lubrication of the engine is entirely by splash. The ignition is by the high-tension Bosch magneto with hand control from the steering wheel. The clutch is a leather-faced one, and the connection to the gear box, which is set unusually far back in the frame, is by means of a long shaft with square end couplings. The gear box and engine are three-point suspended. Four speeds and reverse are provided, the fourth being direct with gate control. The foot brake is of the internal expanding type of unusually large diameter with a simple hand adjustment. The rear axle is provided with a bevel drive, and the cardan-shaft, which is of the open type, provided with block universal couplings at either end. The steering is provided with ball thrust to take up end play, and is also adjustable for wear.

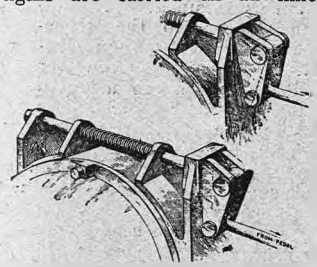
Martini.

Features: Four-cylinder *en bloc* engine; four speeds; enclosed valves; ball sight feed for engine lubrication.

MARTINI (LONDON), LTD., Knightsbridge, S.W. (8).—The 15.9 h.p. Martini is a fine example of automobile engineering. The four cylinders are cast *en bloc*, and the valves are enclosed. The circulation pump and magneto are driven by a transverse shaft running across the front of the engine. To provide fan belt adjustment the fan is set eccentrically, and is connected by means of a spring to the adjusting rod, beneath which is a screw. The lubrication system is of a semi-mechanical type, the oil pump delivering the oil into troughs, into which the big ends dip. The sight feed on the dash shows that the pump is working. To render the oil more clearly visible a large ball is placed in the glass indicator. When the oil is flowing the ball is lifted up, and is thus distinctly seen. The clutch is of the metal disc type, and between it and the gear box are the ordinary sliding joints. The gear box and engine are carried on an inner frame; the former has four speeds and reverse, gate change being fitted. The propeller-shaft brake is of very large dimensions, and is of the contracting type, with external adjustment, and the shoes are provided with six substantial ribs. A ball jointed torque rod and ball jointed radius rods are fitted. The frame is of the ordinary channel steel type, and at its rearmost extremity is carried the petrol tank, which feeds by air pressure, which is supplied by a small air pump driven off the half-time shaft. The steering column and steering pivots are provided with ball thrusts. The control is by foot, hand throttle, and magneto advance.



The lead from the mechanically driven petrol pressure pump, and the oil level regulator on the 15.9 h.p. Martini.



The cam gear actuating the foot brake of the Martini cars. The small upper view shows the position of the cam pieces when the brake is applied.

Mass.

Features: Pressed steel clutch cone; adjustable angle steering column.

MASS CARS, Ladbroke Road, W. (67).—Of the different powered cars on the Mass stand, the 20 h.p. and the 15 h.p. are on very similar lines to last year. The former has separately cast cylinders of $4\frac{5}{16} \times 5\frac{1}{8}$in. bore and stroke respectively, while on the 15 h.p. the cylinders are $3\frac{3}{4} \times 4\frac{3}{4}$in. The gear-driven magneto and pump are very accessible. The oil is contained in a tank on the dash, whence it falls by gravity through the large bore pipe to the three main bearings of the crank; and, as the crank is hollow, oil is then conducted to the big ends, whence it is thrown up on to the other moving parts by centrifugal force. One of the most notable parts is the pressed steel cone clutch fitted to all patterns, made with tabs around its circumference to graduate engagement. The universal joints have been designed to give movement in a single vertical plane, and to allow the wearing parts to be very easily and cheaply renewed.

Maudslay.

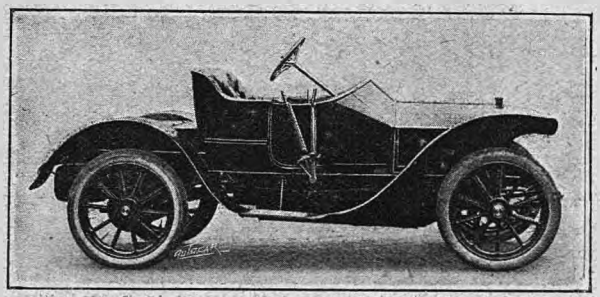
Features: Overhead valves; swing back camshaft; lead-faced pedals; four speeds.

THE MAUDSLAY MOTOR CO. (1907), LTD., Parkside, Coventry (72).—The leading model here is the 17 h.p., or the "Sweet 17," as it is popularly known; but the 25-30 and the 40 h.p. cars are also represented. The special features of the Maudslay car are for the most part well and very favourably known, the most prominent of them being the overhead valveshaft, which has proved so successful since it was introduced many years ago. It allows of the valves being arranged in the top of the combustion head, and of their being readily got at when required. The magneto is situated in the centre of the dashboard, being driven off the valveshaft, and it is therefore in a particularly accessible position. Timing is controlled by one of the steering wheel levers, the other controlling the setting of the throttle, the opening and shutting of which are also operated by the accelerator pedal. Ball thrust bearings are fitted to the steering pivots, above and below, and the worm on the steering column. A rotary pump feeds the lubricating oil to the crankshaft and connecting rod bearings, the shaft being drilled and the rods hollow to form the necessary ducts. The crankshaft runs in white metal bearings, and a White and Poppe carburetter is fitted. For cooling, circulation is effected on the thermo-syphon system. The four-speed gear drives direct on the third speed, and there is a flexible double connection between the clutch and the gear box, thus allowing for any disalignment which may occur. The gearshafts are very short and stiff. A sound detail consists in the filling of the pedal faces with lead, which gives a very good grip for the foot. Greasers are fitted at a number of points that are commonly neglected. The Maudslay back axle, with annular centre, is retained, and a particularly good system of axle control is provided. The torque rods contain springs, while the radius rods are centred about the back axle, and, incidentally, form shock absorbers. These cars were described in detail in the last issue of *The Autocar*.

Mercèdès.

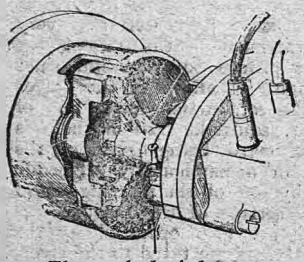
Features: Throttle regulated lubrication; slide and poppet valves, all actuated by gear-driven shaft; four speeds.

MILNES DAIMLER, LTD., Tottenham Court Road, W. (98).—The 15 h.p. Mercèdès is shown here for the first time. The cylinders are cast in pairs, and have a bore of 70 mm. and a stroke of 120 mm. The valves are all on the near side of the engine, and the magneto and circulating pump are driven off the half-time shaft. On the opposite side is the carburetter. The lubrication is force fed through the hollow crankshaft, and is controlled by the throttle, so that at high engine speeds the amount of oil delivered is increased. It is also interesting to note that the engine is suspended at three points. The clutch is of the ordinary leather to metal type, and there is no universal joint between clutch and gear box. The gear box contains four speeds and reverse. The forward end of the propeller-shaft is universally jointed, and the whole of the shaft carried in a casing, which at its forward end is supported by a U bracket. The casing is also stayed by a triangular torque rod. The gearshaft brake is of the external type, and is lined with cast-iron, and the rear brakes are of the internal-expanding type. Petrol feed is by exhaust pressure. The chassis is carried on semi-elliptical springs fore and aft. The control is by accelerator pedal and hand throttle, while the magneto is the latest type Eisemann with automatic advance and retard. The new Mercèdès-Knight engine is shown for the first time. This is of 40 h.p., 100 by 130 mm. On this engine the same system of lubrication is employed, but the oil is also delivered to the cylinder walls, while the outer of the sleeves is drilled to ensure both being adequately

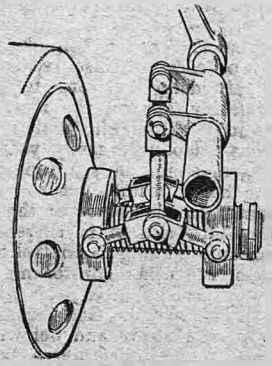


A 15 h.p. Mercèdès with a two-seated "Sporting" body.

lubricated. It is also interesting to note that the same type of Eisemann magneto is fitted as in the case of the 15 h.p., and that the sleeves are gear driven, and not by chains as is the case of other Knight engines. It is also worth recording that the gear wheels controlling the sleeves are midway between the two pairs of cylinders, to ensure a more evenly balanced thrust.



The method of driving the Mea magneto on the 15h.p. Mercédès.

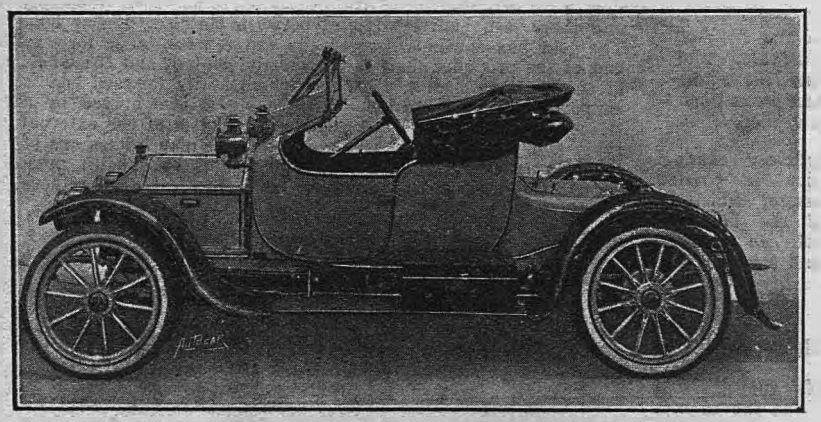


The Mercédès clutch gear.

Metallurgique.

Features: Four speeds; larger valves; spring drive.

WARWICK WRIGHT, LTD., High Street, W. (74).—The Métallurgique is shown in three powers, the 14, 20, and 26 h.p. types. The four cylinders are in each case cast *en bloc*, and on all types the gear boxes provide four forward speeds, the top drive being direct. The Bosch magneto is depended upon for ignition, the time of firing being controllable from the steering wheel, as well as the throttle of the Zenith carburetter, pedal control also being provided. Larger valves are now fitted in order to gain in efficiency. The engine is lubricated by a pump delivering oil through a drilled crankshaft to the various bearings. Thermo-syphon cooling is provided, the radiator still taking the distinctive V form associated with these cars. The steering pivots are inclined outwards, with their centre lines meeting the point of contact of the tyres with the ground, and are fitted with ball bearings. At the rear end the frame is carried upon threequarter elliptic springs, and the petrol is now fed from a tank situated between the spring extensions by pressure instead of by gravity. Longer frames are fitted than previously to provide more body space. The special Métallurgique expanding clutch and spring drive are maintained; the latter device is situated in front of the propeller-shaft joint. In complete cars



A 14 h.p. Métallurgique two-seater.

attention should be directed to a very commodious and handsome cabriolet in the large class and to a very finely finished two-seater on a 14 h.p. chassis.

Minerva.

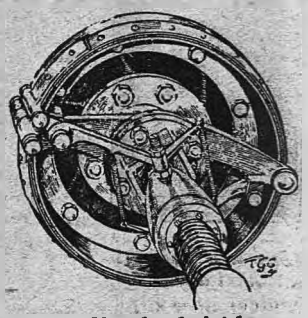
Features: Slide-valve engines; stamped steel back axle to 16 h.p.; inter-connection of lubrication and throttle; double filtration of engine oil; four speeds.

MINERVA MOTORS, LTD., Holborn Viaduct, E.C. (61.)—Very little alteration has been made in these cars for next year, but the 16 h.p. model has been considerably improved by the fitting thereto of the stamped steel back axle previously fitted only to the higher powered models. The front steering arm is now carried above the axle to give better wheel lock, and thrust bearings are fitted to the wheels, steering heads, and steering column. The Silent Knight engine remains practically as before, but the lubricating system has been improved by mounting the troughs on a bar and coupling the bar up to the throttle connections, so that the scoops on the big ends dip to a depth which varies in accordance with the throttle opening. This idea is carried out very simply. The oil pump is arranged outside the crank case, and is provided with a distributer from which leads run to each of the four troughs. The whole passes through two filters to a sump, from which it is drawn for recirculation. A single true universal joint connects the clutch to the gear box. The clutch is of the leather cone type fitted with spring bosses to give gradual engagement. The gear gives four speeds with direct on top. Ignition is by the Bosch dual magneto, and the carburetter is throttled both by hand and foot. On the 26 h.p. touring car a neat arrangement of screens is provided, the special feature of which consists of short side screens which should do much to ensure the comfort of the occupants of the car. The back screens are adjustable in various directions, and can be placed horizontally to serve as tables.

Mors.

Features: En bloc engine, with separate cylinder barrels, Mors contracting clutch; adjustable thrust to bevel drive.

MORS (ENGLAND), LTD., Great Marlborough Street, W. (78).—In the 10-12 h.p. chassis shown it is only necessary to draw attention to the improvements in detail which have been introduced in the new patterns. These consist of lengthened stroke, the engine being now 75 mm. by 120 mm., the adoption of a gear-driven pump for the purpose of force lubrication to the crankshaft bearings, adjustable tappets, while the well-known Mors contracting clutch is retained. A gate change gear to the three-speed gear box is now provided. A Zenith carburetter is fitted, and Bosch magneto and pump skew gear, driven off the comshaft, are set across the front of the engine, both in accessible positions. The propeller-shaft has a universal joint forward and a flexible joint behind. The brakes are of excellent design, those applied by the side lever being satisfactorily compensated by a curved cross head connecting the brake spindles. A chassis of this power carries a particularly smart two-seated cabriolet body with folding seat at the back—a most attractive two-seated carriage. A naked chassis of the 20 h.p. six-cylinder Mors is also shown. In this the 80 by 120 cylinders are cast in pairs. There are four speeds, and the magneto and pump are set similarly to the 10-12 h.p., but the compensating arrangement of the rear brakes is reversed, and a torque column, enclosing the propeller-shaft, takes the place of the V-shaped torque member in the smaller model. A similar chassis carries a very handsome double landaulet body, and another a smart flush-sided torpedo body by Thorn, of Great Portland Street.



The Mors band clutch.

N.A.G.

Features: En bloc engine on small power chassis; attachment of engine and gear box to frame; torque rods and radius rods; thermo-syphon cooling.

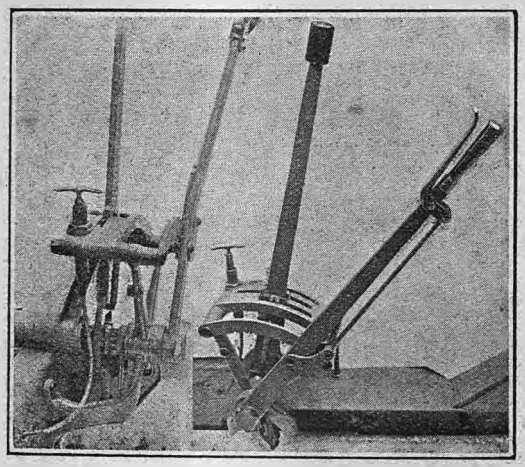
A. WARD AND CO., LTD., Shaftesbury Avenue, W. (154).—The 12-14 h.p. polished chassis has a number of points in it which departs from the usually accepted practice. The mounting of the engine is by means of circular lugs fore and aft of the crank case, through which lugs cross tubes pass, and are connected to the side members of the frame by special brackets. When the engine is set lineable, set screws position it on the tubes so that it remains true. The gear box is mounted in a similar manner at the forward end, but at the rear it is supported on a cross channel member attached to the side members of the frame. The same brackets of the gear box which rest on the channel serve to anchor the for-

ward end of the torque rod which encloses the propeller-shaft. At the sides beneath the main members of the frame are brackets to which two radius rods run from the rear axle. The water cooling of the engine is on the thermo-syphon system. The carburetter is automatic, a spring-controlled extra air valve being arranged above the jet and below the butterfly throttle valve, which is operated by means of pedal or hand lever above the steering wheel, this being the only lever for control, since the magneto timing is fixed. Lubrication of the engine is mechanical by pump, a large oil sump being formed in the base, the oil filler being remarkably large and situated at the right-hand forward end of the crank case. The gear box has three speeds and direct on top, with gate change lever.

Napier.

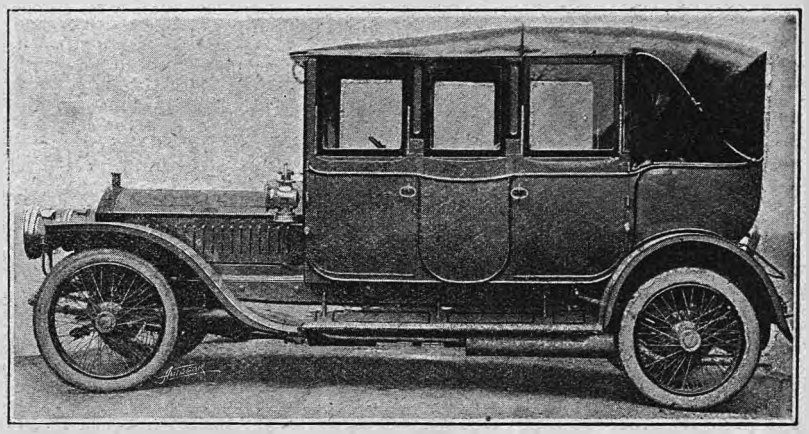
Features: The new 15 h.p. *modèle de luxe* chassis; three-point suspension of engine and gear box unit so that both are insulated from frame flexion.

S. F. Edge, Ltd., New Burlington Street, W. (29). — Raised above the ordinary level of the platform we find a magnificent example of automobile engineering in the shape of a finely polished 15 h.p. four-cylinder Napier chassis, *modèle de luxe*, which we described in *The Autocar* of October 8th. The side members, which are cambered to an unusual depth, are flush throughout above and inswept at the aluminium dashboard. Faithful to the now well-known Napier practice, the motor unit, composed of four-cylinder engine, clutch case, gear box, and brake case, is three-point suspended from the frame and a tubular cross member. The forward portion of the unit is carried on pivot trunnions attached to the web of the side members, and is suspended at the rear by bracket and rocking joint from the cross member. The bore and stroke are 82 mm. by 127 mm. respectively. The cylinders, which are amply water jacketed, have their valves all on the left-hand side. A cross-shaft in front of the engine, skew driven off the camshaft, rotates the magneto, which faces outwards on the off side. The valves are



Two views of the Napier gate change, showing the rocking lever and bracket, and the ratchet sprag control forming a safety lock for the reverse gear. A peculiarity of this method of gate change lies in the fact that, although when top speed is in mesh the secondary shaft is stationary, the act of moving the gear lever across the gate from top to second enmeshes the intermediate pinions, so that the secondary shaft is revolving before the lower gear is put into engagement.

enclosed by inspection covers, secured by thumbscrews. The Napier two-jet carburetter described in detail in *The Autocar* of 22nd October last is fitted. Thermo-syphon cooling is adopted, and the high tension wires from the magneto are carried through aluminium leads. A large circular orifice fitted with a capacious oil filter is provided in the off side front bracket for replenishing the sump with oil. It is closed by a spring-retained cap, momentarily detached. A pedal-applied contracting shoe brake is wholly enclosed in a casing at the rear of the gear box. The propeller-shaft is provided forward with a specially designed grease-tight universal joint and a flexible plunging joint connecting to the driving worm. The latter is placed below the axle, which is of neat but stiff design. Semi-elliptical springs are fitted fore and aft, and all frictional bearings outside the main mechanism are provided with screw lubricators. The front axle is a massive, imposing piece of work. Rudge-Whitworth detachable wheels are fitted. The control is by throttle



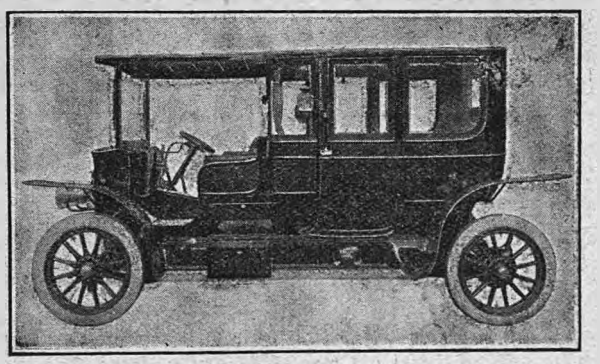
The 45 h.p. six-cylinder Napier with cabriolet saloon body. The car is a replica of that which was awarded the Grand Prix at the Brussels Exhibition.

pedal and throttle control lever on dashboard, the advance and retard lever of the ignition being set upon the steering wheel. The rear brakes are neatly compensated by rocking cross links. It can be said with truth that Messrs. Napier and Son, notwithstanding their great reputation, have every reason to be proud of this chassis. There is also found a 30 h.p. six-cylinder chassis, 82 mm. by 127 mm., carrying a very smart flush sided semi-torpedo body with especially low deep hood and two-jointed screen. This chassis does not differ very largely from its prototype of the present year

N.E.C.

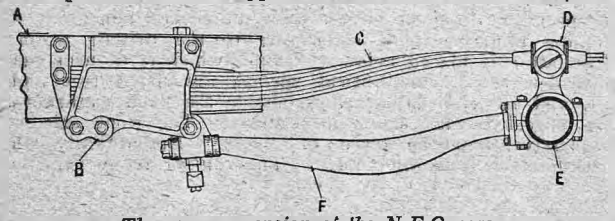
Features: Body within wheelbase; quarter spring suspension; four speeds.

New Engine Motor Co., Ltd., Grafton Street, W. (24).—This firm are showing two 30 h.p. and one 40 h.p. car, and one of their engines is mounted on a stand to show the ease of accessibility of the parts, but there are no radical changes on their standard designs as shown last year. The lubrication is forced, there being two oil pumps, one of which feeds the main bearings of the engine—the other, by way of a sight feed on the dash, supplying the cylinders. There is a four-speed gear box with gate change, the direct speed being on the fourth. A high tension magneto is fitted controlled by a governor only. The governor also controls the air supplied to the carburetter, which is drawn from the outside of the exhaust pipe in the usual way. The steering column has a ball bearing to take the end thrust. The wheels are fitted with roller bearings and ball thrusts. The control is



A 40 h.p. N.E.C. with a limousine body.

by hand from the steering column as usual, with a decelerator pedal which also applies the brakes. In other respects



The rear suspension of the N.E.C. cars.

A, frame
B, spring box
C, spring
D, spring bracket
E, rear axle
F, radius rod

these cars follow the New Engine Co.'s usual practice, the rear axle drive being by worm with the worm placed underneath.

Opel.

Features: Large variety of models; Opel carburetter.

THE BRITISH ELECTROMOBILE CO., LTD., Halkin Street, S.W. (77).—The stand of the British Electromobile Co. contains Opel cars in great variety, 10, 14, 16, 18, 20, and 25 h.p. models all being represented. The little 10 h.p. car was the most available for inspection, and in this a four-cylinder engine *en bloc* is fitted, having dimensions of 65 mm. bore and 90 mm. stroke. High-tension magneto with fixed sparking point is used, and thermo-syphon cooling with specially flanged tubular radiator. Lubrication is effected mechanically by a dredger feed to the crank case, whence it is distributed on the splash system. The Opel automatic carburetter is controlled either by lever at the top of the steering column or by accelerator pedal. A leather cone clutch with star universal joints between it and the gear box transmits the power from the engine to the gear box, in which nickel chrome steel gears give three speeds forward and reverse. Thence a propeller-shaft with universal joints at each end rotates the bevel driven axle, which is fitted with two internal expanding brakes operated by hand lever. The foot brake is fitted in the usual position at the back of the gear box. The exhibit on this stand was interesting on account of the variety of cars of single make.

Oryx.

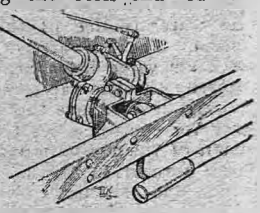
Features: A first exhibition appearance in this country; engine and gear box built on the unit system.

F. B. GOODCHILD AND CO., LTD., Oxford Street, W. (145).—The Oryx cars are exhibited in England for the first time. They show a 14-16 h.p. with four cylinders with bore and stroke of 70 mm. and 102 mm. respectively, the valves being all on one side and the valve stems enclosed. The cooling is by thermo-syphon, and splash lubrication is used. The carburetter is of the automatic single jet type, with an adjustment for the air supply, and throttle control by hand lever on steering column, or accelerator pedal. A Bosch high-tension magneto fitted with a control operated from the steering column is used. The clutch is of the internal leather cone type, and the gear box has three forward speeds and reverse, the direct drive being on top.

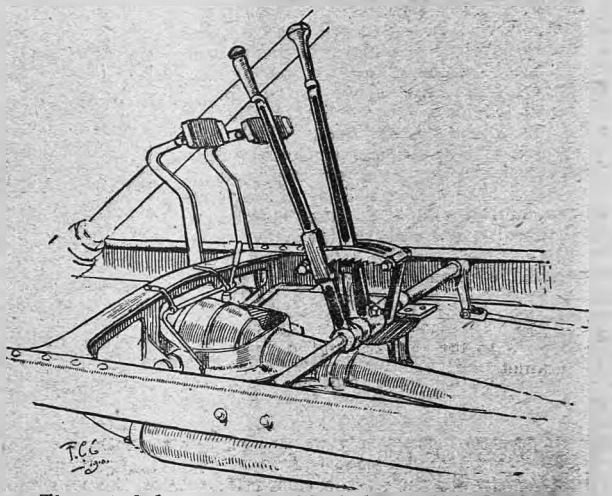
Overland.

Features: Cylinders cast singly; engine carried on cradle frame; combined tubular torque member and gear box; universal adjustable steering standard.

THE ANGLO-AMERICAN MOTOR CAR CO., LTD., Regent Street, W. (86).—The Overland cars, to which we referred in a late issue of *The Autocar*, in illustrating and describing the 25 h.p. chassis, are shown here in three powers—15 h.p., 20 h.p., and 25 h.p., carrying standard bodies of various types. At this short space of time it is unnecessary to enter again closely into the detail of the chassis, but from the exhibit staged it will be seen that the cylinders are cast and set separately upon the crank chamber, and that a special form of tank lubrication with leads to all the important bearings is provided. The engine is carried in a form of cradle frame, supported at the rear by a pressed steel bridge member with perforated web, by which are carried the pivot lugs, taking the fork end of the tubular torque and thrust member. As set out in our description, the three-speed gear box is found at the rear of this torque member, bolted to a large flange on the differential gear case. The gears are operated by a change-speed lever placed with the side brake lever on the left hand of the driver and in the centre of the footboard. 15 h.p. and 20 h.p. chassis are shown with the remarkably neat standard bodies supplied with the cars. These cars are fully equipped with side lamps, head lamps, tail lamps, generator, tools, efficient rain screen, and Cape cart hood.



The adjustable steering box bracket on the Overland cars.

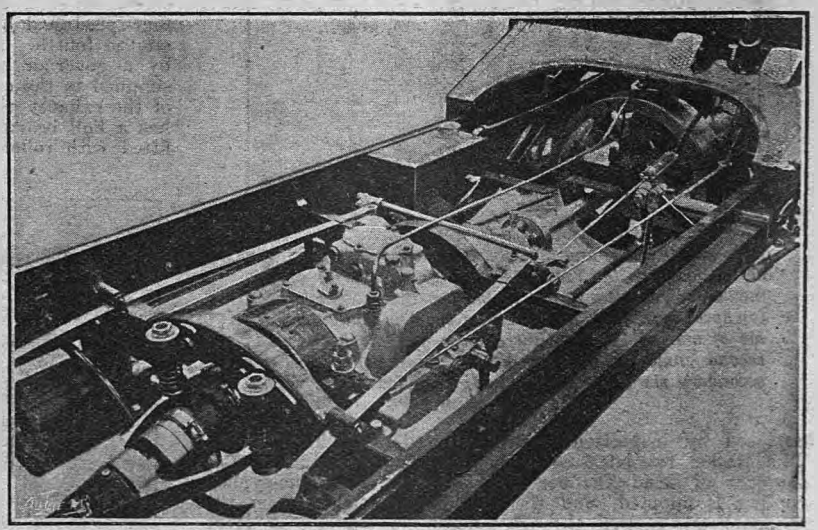


The central change speed and brake levers of the Overland cars.

Panhard.

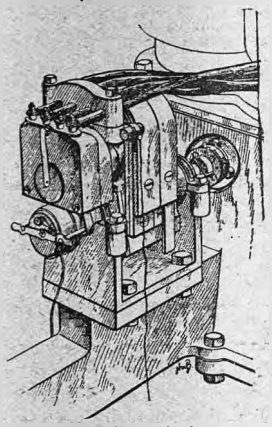
Features: Sleeve valve engine; rocking magneto; metal clutch in change-speed gear box; fan behind radiator and in flywheel; narrow steel side members of frame reinforced by wood; engine braking; four speeds.

PANHARD AND LEVASSOR (W. AND G. DUCROS, LTD.), Regent Street, S.W. (43).—The interest in this stand is mainly focussed on the new 25 h.p. sleeve-engined chassis. This engine, made under the Knight patents, presents a workmanlike appearance. The



A view of the 25 h.p. Panhard chassis, showing long shaft between engine and gear box, and the torque member spring brackets.

camshaft is driven by means of a silent chain, and between the first and second cylinders a worm drives the cross-shaft which projects on either side of the crank case, the left hand side driving the Nilmelior high-tension magneto, the right hand side the centrifugal water circulating pump. The timing of the magneto is varied by rocking it between the bearings on which it is mounted. A Krebs carburetter of the latest type is fitted. For cooling purposes a belt-driven fan is arranged in front of the engine behind the horizontal tubular gilled radiator, whilst the flywheel arms also act as a fan. The change-speed gear is of the four-speed type, direct drive on top, the lever moving over a straight cut quadrant. The metal disc clutch is contained in a casing bolted to the forward end of the change-speed box. Application of the hand brake lever also disengages the clutch. The engine is supported by four arms on an angle steel under-frame, whilst the gear box is supported at four points by cross-channel arms. The propeller-shaft is enclosed in a casing, forked at its forward end, and anchored to adjustable bolts to relieve the springs from the driving stress. The side members of the frame are somewhat narrow, the channel section not being above one inch wide on the flange, but it is reinforced by a substantial piece of wood on the outer web which extends from the dash to the forward end of the axle centre. The 12-15 h.p. landaulet with bodywork by Vincent, of Reading, has a four-cylinder *en bloc* engine, 80 by 120 mm. bore, this being



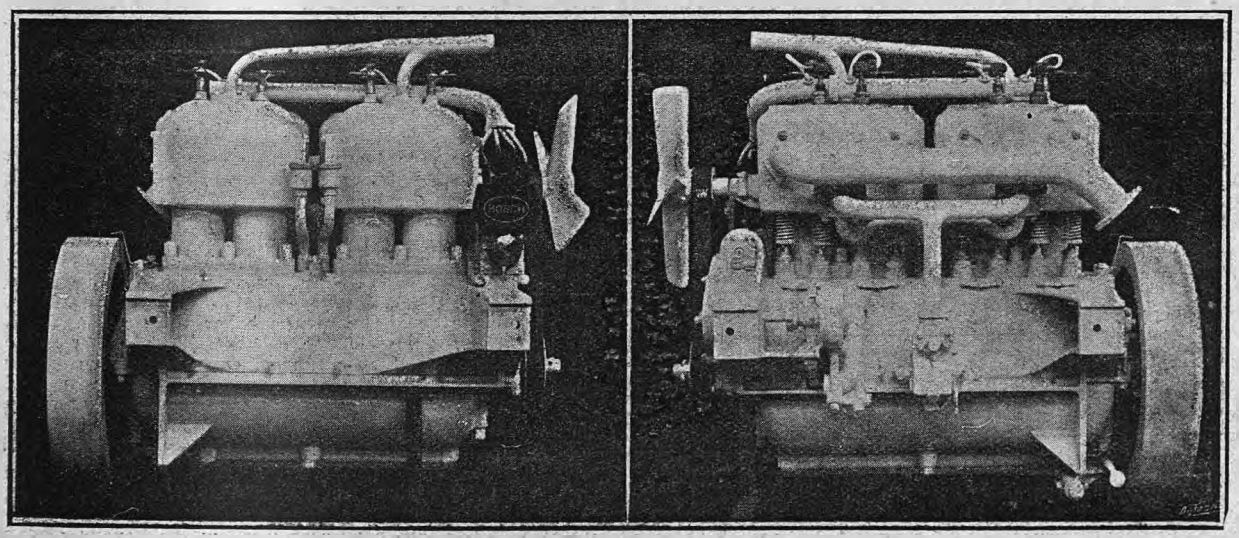
The ignition timing on the 25 h.p. Panhard is effected by rocking the whole magneto.

a compact piece of work The engine has thermo-syphon cooling with a belt-driven fan and high-tension magneto. All the other models staged have forced circulation. The 30 h.p. six-cylinder limousine landaulet bodied vehicle, bodywork by Hooper, is of a particularly pleasing type, and one very suitable for sustained touring or town work. This is the latest model, and is fitted with engine brake, the braking effect being produced by sliding the camshaft and bringing extra cams into action, so that the engine is turned into an air compresser instead of working in the usual manner. The 18-24 h.p. six-cylinder chassis with a torpedo cabriolet body by Barker, and an 18-30 h.p. threequarter landaulet, bodywork by Windover, are also fine productions. The six cylinders of the former car are cast *en bloc*, while the engine of the 18-30 h.p. model has its four cylinders cast separately. All the types shown have four speeds, excepting the 12-15 h.p., which has three only.

Peugeot.

Features: *Moteur bloc* engine; 16 h.p. twin-cylinder V engine; engine starting handle retards spark and operates half compression; four-speed gear box.

PEUGEOT (ENGLAND), LTD., Brompton Road, S.W. (3).—The 10-14 h.p. Peugeot is an exceedingly interesting car of a popular type. The engine is a four-cylinder cast *en bloc*, 70 × 130 mm. bore and stroke. The engine is set horizontally in the frame, and the exhausts issue into a casting made with longitudinal radiating flanges. The water pump and magneto are set transversely across the front of the engine. The lubrication is by pump, driven off the camshaft, delivering the oil through drips, whence it falls by gravity into the base chamber. One of these drips leads direct to the rear axle down the hollow torque tube. The propeller-shaft tube is brought right up to the transverse member of the frame. The chassis is of the ordinary channel steel type inswept at the front; four speeds are provided. Ball thrust bearings are fitted to the steering column, steering pivots, and spindles of the front wheels. The control is by accelerator pedal or hand controlled throttle, and the ignition the latest type of Bosch magneto with fixed firing point. The 16 h.p. twin-cylinder Lion Peugeot is another interesting model, shown here for the first time. The engine is of the V type, with cylinders set at an angle of about 15°, though to all outward appearances the engine is of the ordinary vertical type, since the cylinders are cast *en bloc*, and the valves enclosed. The engine is set transversely in the frame, and at right angles to the main shaft is the secondary shaft, driving the magneto, water, and oil pumps. The starting handle shaft has a cone on the end, which, when the shaft is pushed in to start the engine, raises a spring, retards the spark, and puts the engine on half compression. The oil pump circulates oil round the bearings, while the sump is supplied by means of a drip delivering by gravity from the tank. The clutch resembles that of the 10-14 h.p. car, but the gear box has three speeds only. Ball thrusts are provided in the steering column, steering pivots, and stub axles. The gear box and engine are carried on an inner frame. The 18-24 h.p. six-cylinder Peugeot, 80 × 110 mm., cylinders cast in threes, fitted with landaulet body, and the 12-15 h.p., 80 × 130 mm., fitted with torpedo body, remain practically unaltered from last year. Truffault shock absorbers are fitted as a standard to all models.



Two views of the engine of the 22-30 h.p. Peugeot, which has a bore and stroke of 100 × 160 mm.

Phanomobile.

Features: A three-wheeled car; V type engine mounted on front wheel; tiller steering.

PHANOMOBILES, LTD., Upper Street, Islington, N. (6).—The Phanomobile is a practical pattern of car built on motor cycle lines of a type which has long been popular on the Continent, and is becoming more so in this country. It is made in two sizes—8 h.p., 82 by 84; and a 10 h.p., 82 by 105, otherwise both models are on the same lines. The engine is of the V-type, air-cooled, and is mounted on the front wheel. The epicyclic two-speed gear (parallel pinions) is contained in the flywheel. The drive is by means of a single chain adjusted by two jockey sprockets. The frame

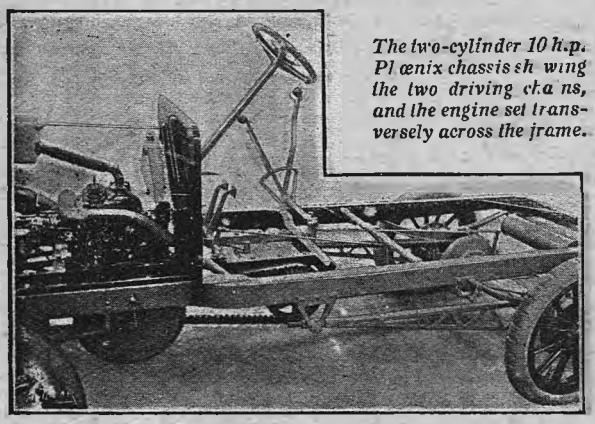
Olympia.—Motor Carriages and Chassis.

is tubular, and immediately behind the forks are carried the petrol and oil tanks, which feed the carburetter and lubricator by pressure. The lubrication is on the drip system. Tiller steering is adopted, the tiller carrying four control levers, exhaust cut-out, spark, throttle, and air. The frame is carried at the front on semi-elliptical springs, and substantial rear springs are fitted. One two-seated car, one four-seated car, and one chassis are shown.

Phœnix.

Features: Driving and driven shafts parallel; silent chain transmission.

PHŒNIX MOTORS, LTD., Blundell Street, N. (138).—The chassis with an 8-10 h.p. engine follows the general line of the vehicles turned out during the past year, whilst the 10-12 h.p. pattern has been made during the past two years, and has given general satisfaction. The engine in both models is fitted with the crankshaft transverse to the side members of frame, the drive from the left-hand side of the crankshaft being by a Renold silent chain to the three-speed gear box, whence the drive is taken to the rear axle from the right-hand side of the gear box. The drive on the third-speed gear is direct, the layshaft meanwhile being idle. On this model a B. and B. carburetter is employed, and a Bosch DA2 magneto in conjunction with an ordinary accumulator and coil system of ignition. Either system can be brought into action on one set of plugs by the simple operation of a switch. A single plate clutch is fitted to the enclosed type of flywheel. The brake takes effect on the drum arranged at the right-hand side of the primary-shaft of the gear box, whilst the hand brake acts upon the differential box brake drum on the rear axle, both brakes being of the contracting type. The steering gear on this small model is made up of two worms contained in the steering gear box, so that, as wear takes place on any



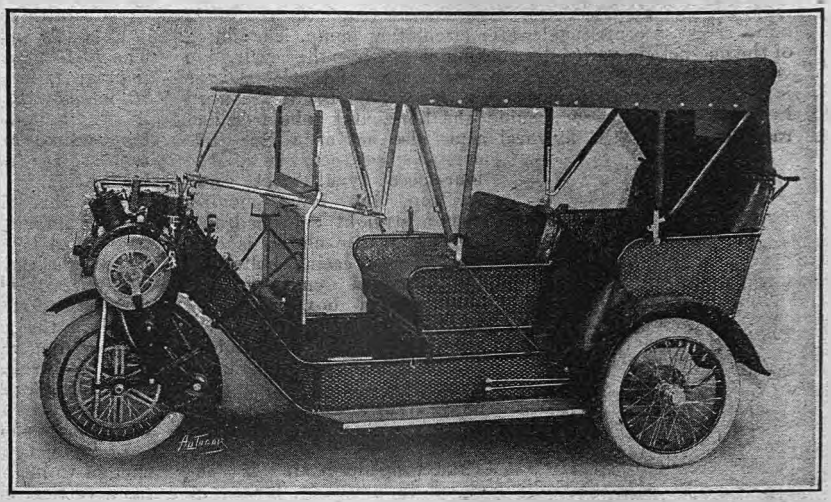
The two-cylinder 10 h.p. Phœnix chassis showing the two driving chains, and the engine set transversely across the frame.

part of the worm and wheel, the wheel can be moved round and a fresh portion brought into action. The larger model is similarly arranged, with the exception that the engine has a Trier and Martin carburetter and that both brakes take effect on the rear axle, the hand brake acting on the differential box drum and the foot brake on the interior of the rear road wheel brake drums. The final drive chain is adjustable by means of two pressed steel rods of strong construction and neat appearance. Finished vehicles include a two-seated ordinary touring car and a modèle de luxe two-seater, both on the standard 8-10 h.p. chassis, whilst a four or five-seater touring model and a de luxe model of the same seating capacity complete the exhibit. The petrol tank is arranged to form part of the dash, and gives a good finish to the vehicle.

Pilain.

Features: Gear box and differential in one; rigid back axle.

A. PELLANT, LTD., Shaftesbury Avenue, W.C. (88).—Taking the 16-20 h.p. as typical of Pilain practice, we find a four-cylinder engine carried on a sub-frame, the cylinders of 90 mm. bore and 120 mm. stroke cast in pairs with the valves on opposite sides, and cooled by pump circulation. Oil is carried at the side of the engine, and forced by a pump through gallery tubes having holes through which the lubricant is forced to the bearings. Timing of the Bosch high-tension magneto can be varied by a lever placed underneath the steering wheel, while a lever above the wheel controls the Zenith-Pilain carburetter. A plate clutch transmits



A four-seated Phanomobile.

the power direct to the transmission-shaft, which is without universal joints, as the gear box and differential are in one and secured to the frame. Four speeds are provided in the gear box, and as there are two bevel wheels, both the third and fourth speeds give direct drive. The wheels revolve on fixed bearings, and two short cardan-shafts run from the differential on each side into the centre of the wheel axles which they drive.

Pilot.

Features: Dent belt transmission; gear change by stepped cones.

MOTOR SCHOOLS, LTD., Heddon Street, W. (16).—A most interesting exhibit on the stand of Motor Schools, Ltd., is a chassis fitted with Dent transmission. A specially constructed leather belt 3½in. wide runs on two aluminium drums set transversely across the frame behind the engine and over the back axle. Each drum is in the form of a stepped cone, having three flat surfaces of different diameters connected by inclined planes. The power is transmitted to the forward driving drum by means of a bevel pinion on the end of the crankshaft engaging with a bevel wheel in an adjacent oil-tight casing. Coupled to this is a shaft on which a spur pinion is fitted, meshing with a larger wheel on the end of the shaft upon which the forward of the two cones is fitted. A main clutch of the leather-to-metal type is fitted and a dog clutch, which is controlled by a handle below the steering wheel. It has three positions—forward, neutral, and reverse, the latter being obtained by a type of epicyclic gearing. The power is transmitted from the axle-shaft to the road wheel by means of spur pinions engaging with internally toothed rings on the road wheels.

Renault.

Features: Thermo-syphon cooling; oil filler for gear box on side of frame; under-hung springs.

RENAULT FRERES, LTD., Newman Street, W. (46).—Practically no alterations have been made in the Renault models this year, and therefore no description is necessary.

Rapid.

Features: Large webs to frame members.

THE RAPID MOTOR CO., Foley Street, W. (148).—A 10 h.p. four-cylinder *en bloc* engined chassis, a 20 h.p. chassis, and a 40 h.p. four-cylinder engined chassis, both with their four cylinders cast in pairs, are exhibited here. The general design of all the three models follows accepted practice, the chassis being principally remarkable for the massiveness of frame members, the side members particularly being unusually wide on the top and bottom webs.

Rex.

Features: Detachable wire wheels; Timken combined load and thrust bearings to front wheels.

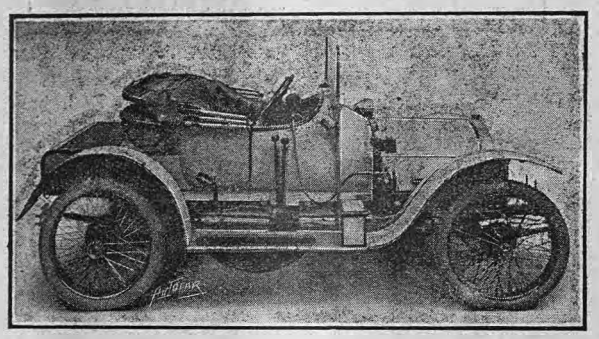
REX MOTOR MFG. CO., LTD., Coventry (58).—The Rex car for 1911 has a 15 h.p. engine with four cylinders cast in separate units. The detachable wire wheels carry a pressed steel frame of simple construction, and power is transmitted through a leather cone clutch to a three-speed gear box

with gate change and bevel gearing to the back axle. A torque rod is provided with spring forward connection. The cars are all of neat design, and a torpedo body is fitted as standard. The Timken combined load and thrust roller bearings are fitted to the front wheels.

Riley.

Features: Cylinders set at 90°; single blade distributer; rich mixture taken from jet chamber *vid* diluting chamber; automatic gear change.

The Riley Cycle Co., Ltd., Coventry (94).—The nimble little Riley car is here shown in its two forms—the 10 h.p. and the 12-18 h.p. Both patterns have been considerably improved by the fitting of larger wheels, these now being 32in. in diameter, and, of course, of the Riley detachable wire variety. Besides the increase in the diameter of the wheels,



A smart two-seated 10 h.p. Riley.

the chassis have themselves been lengthened, bringing them up to 8ft. wheelbase in each case. The V engine with the two cylinders set at right angles is still retained, and the public is now becoming alive to the considerable advantages of this design for two-cylinder motors. It makes a very compact construction, and gives a very even turning moment. The Riley carburetter is fitted, and the throttle and extra air valve are set in a convenient position high up at the front of the engine. The hand control is fitted as standard pattern, but a foot accelerator can be added to order. A high-tension Bosch magneto provides the ignition spark, and the cooling is by natural circulation, each cylinder having its own pair of inlet and outlet water pipes. The lubrication is effected partly by a pump, which directs the oil to the crank bearings, while the big end carries a scoop which supplies it with oil from the base of the chamber. Ball-thrust bearings are fitted to the steering pivots. The clutch is self-contained, and the firm's special form of gearing, which ensures changing without clashing of the gears, remains a standard feature. Instead of the gear being moved at once, positive springs are interposed, so that the teeth are not forced into engagement until in the proper relative positions. A great improvement is the fitting of the side levers wider apart, with the brake lever arranged to pull on. The bodies are on torpedo lines, the forward portions being specially well worked out so as to give ample protection without cramping the legs. Altogether the cars are thoroughly worthy of the improved position in which they are found in this year's exhibition.

Rochet-Schneider and Piccard-Pictet.

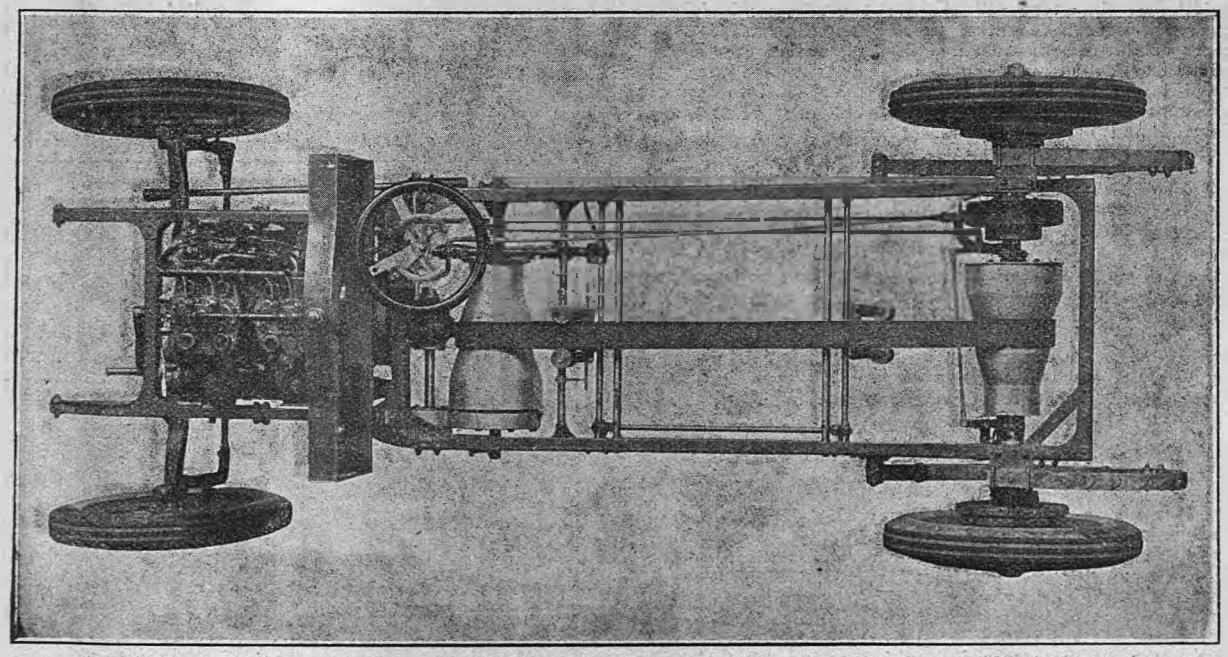
Features: Metal plate clutch requiring no lubrication; engine operated pump for filling tyres; three-point engine suspension.

Donne and Willans (1909), Ltd., Gillingham Street, S.W. (89).—Rochet-Schneider and Piccard Pictet cars constituted the exhibit on Messrs. Donne and Willans' stand. Rochet-Schneider's practice shows but little alteration from the already well-known design, so we will detail the 14 h.p. Piccard-Pictet. In this the four cylinders of 80 × 120 mm. are cast in one piece. As these cars frequently work in mountainous country an additional lever is placed on the dash board, so that the air supply can be adjusted to suit varying altitudes. Engine clutch and gear box are formed in one unit secured to the main frame, which, though very simply designed, affords a fine example of stamping, the lower flanges being extended so as to cover in all the space between the frames and the power unit. The metal-to-metal clutch demands attention owing to the fact that as hard metal is made to engage with soft no lubrication is required. The spring operating this clutch is carried from an extension of the clutch fork and anchored at the back to the gear box, so it is most accessible. Four speeds and a reverse are given in the gear box, which is also provided with a clever and useful fitting in the shape of a pump worked off a crank driven from the second speed gear on the layshaft. This pump is used for tyre filling. The bevel driven back axle is provided with a triangular torque rod, as well as side rods anchored at their front about midway along the length of the cardan-shaft. Ball bearings are employed throughout, and ball thrust washers fitted to the front wheels. It should be mentioned that engine lubrication is by means of an eccentric pump working at the bottom of the crank case sump, whence it forces the oil through hollow crankshafts.

Rolls-Royce.

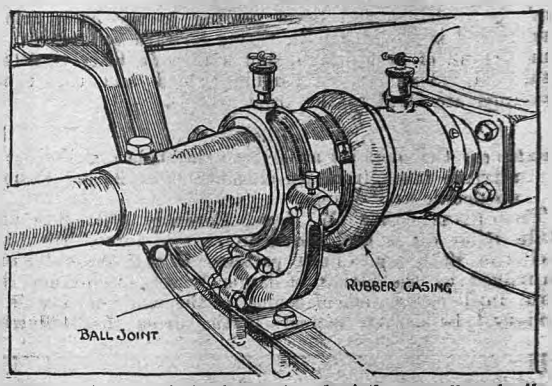
Features: A notable combination of design and highest class workmanship; refinements in detail

Rolls-Royce, Ltd., Osmaston, Derby (56).—Enthroned in solitary majesty upon the Rolls-Royce stand will be found a superlatively finished, silver-plated 40-50 h.p. six-cylinder chassis. Save in a few minor details, this chassis does not exhibit any radical departure from the Rolls-Royce practice,



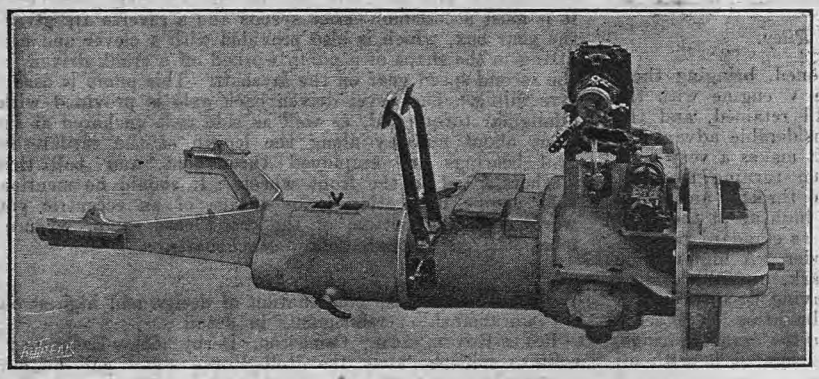
Plan view of the Dent bell transmission on the Pilot car. (See preceding page.)

but nevertheless forms another step towards perfection. The pair of tri-cylinder engine castings are made somewhat wider, and cover plates enclose the water-jackets over the combustion chambers. An effort has been made to clear the dashboard of various fittings. The ignition switch and petrol lever have now been removed to the steering wheel, where a lifting stud and rod in the centre of the steering standard operates as a switch, and a small lever, set above the ignition timing and throttle levers, controls the flow of petrol through the jet. The oil and pressure gauges are now kept flush with the inner face of the dashboard, and the air pump, instead of being parallel thereto, is set at a convenient pumping angle and partly through the dashboard. In order that the driver may be able to move the throttle lever to the slow-running position without mistake, a stop is fixed upon the sector at this point. The plugs firing from the magneto are now placed in the centre of the combustion chambers, the accumulator plugs remaining over the inlet valves as heretofore. Shock absorbers are now fitted to both axles; the oil pump and relief valve have been taken from the dashboard and placed beneath the footboard and frame level. A simple rocking disc adjustment is now provided to the brake tension wires. It will be remembered that the rear wheel brakes are compensated by means of an ingenious differential gear arrangement. A sounding well is formed in the rear of the petrol tank, so that the quantity of petrol therein can be at once estimated. The radiator is mounted on swinging brackets. In the elegantly-finished chassis in which these additional improvements are evidenced, visitors to the Show will be able to study the degree of perfection in automobile building which has been reached in this country.

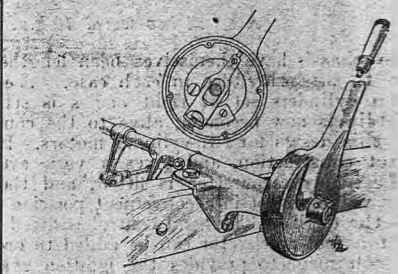


The anchorage of the forward end of the propeller-shaft on the 12 h.p. Knight-Rover.

fitted in conjunction with main rear springs. Both brakes are applied to the road wheels, the foot brake drum being of especially large diameter. The torque tube has a really well-designed ball and yoke support, providing freedom of movement, while sustaining torque and thrust, the springs being anchored in front so to serve also as radius rods. The gate change lever is carried by an extension of the gear box instead of by the frame; a universal joint and flexible connection are introduced between the plate clutch and the gear box. Ball thrust bearings are fitted to the steering columns and the steering pivots. The throttle of the two-jet carburetter is both hand and foot controlled. Lubrication of the engine is effected by a plunger pump delivering oil from a sump into troughs beneath the big ends. Bosch dual ignition is fitted, and is controlled from the steering wheel, both the control levers being friction held instead of employing the usual ratchet quadrants. In the 8 h.p. single-cylinder model



The single-cylinder 8 h.p. Knight-Rover unit.



The side brake lever ratchet and casing on the two-cylinder Knight-Rover.

Rothwell.

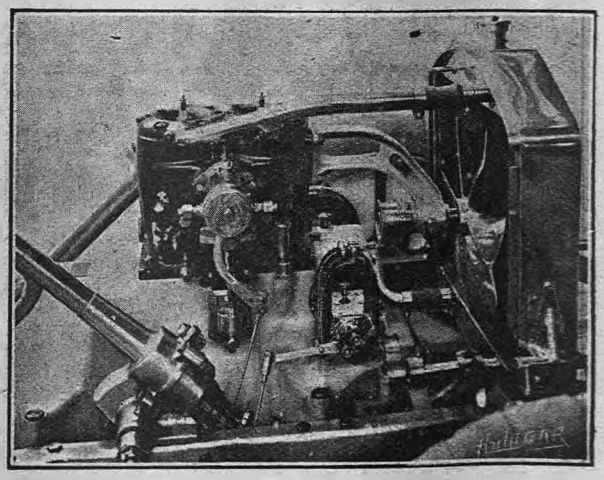
Features: One type only shown; two separate ignitions.

THE ECLIPSE MACHINE CO., LTD., Oldham (93).—The cars exhibited here are all of 20 h.p., one in chassis form. The four cylinders are cast in two pairs and are water cooled on the thermo-syphon principle. Two separate systems of ignition are employed. The inlet valves are inverted and operated by rocker arms. The White and Poppe carburetter has been adopted as a standard, and is controlled both from the steering wheel and by pedal. Ball bearings are fitted both to the steering heads and steering column. The clutch is of the leather-faced conical type, and to assist in picking up smoothly spring contacts are carried by the outer part of the clutch and bear against the face of the inner part. The gear box provides three forward speeds and a reverse. The connection between the clutch and gear box comprises a flexible joint and a modified universal joint. The universal joints on the propeller-shafts are carefully enclosed to exclude dirt and retain grease. A transverse spring connects the two semi-elliptic side springs, which latter serve as radius rods.

Rover.

Features: Sleeve valve engines to the one and two-cylinder cars; unit system of engine, clutch and gear box on single-cylinder models.

THE ROVER CO., LTD., Coventry (76).—This is certainly one of the most interesting exhibits in the Show, as for the first time the new one and two-cylinder Rover-Knight chassis are shown. In the Rover cars the large oil filler cap has a gauze top, shielded by a dome, which forms also the pressure relief passage of the crank chamber. A honeycomb radiator of a new pattern is now fitted to the Knight-engined Rover cars, the shield pattern having been discarded for a more general form. The new 12 h.p. cars have spiral springs



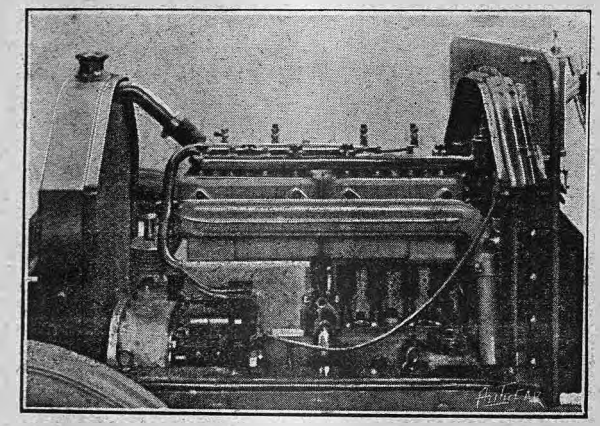
The two-cylinder 12 h.p. Knight-Rover engine, carburetter side.

the flywheel is arranged in front so as to preserve the company's unit system of construction in this model. The pump and magneto are operated by a cross-shaft, through worm gearing. Complete specimens of the Rover cars are exhibited, from the 15 h.p. four-cylinder poppet valve type down to the single-cylinder 6 h.p. type, with bodies of various designs, aluminium finish being a prominent feature.

S.C.A.T.

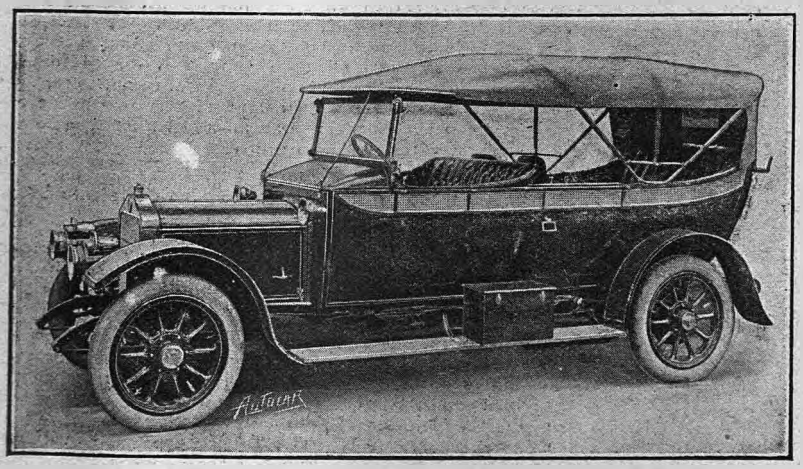
Features: Four speeds; the N.B. self-starting device.

NEWTON AND BENNETT, LTD., Manchester (147).—Two complete cars are shown—a 15 h.p. with semi-torpedo body, and a 22 h.p. with D fronted landaulet, also a 15 h.p. and a 22 h.p. chassis. The engines have four cylinders cast in pairs, the valves being all on one side and the valve stems enclosed by aluminium covers. Water circulation is by centrifugal pump placed on the left-hand of the engine operated by a shaft extending back from the timing gear case just under the magneto, which is placed on the same side. The lubrication is by means of forced feed supply to a hollow crankshaft, a regulating device being provided on the side of the base chamber by which the flow of oil can be adjusted as required. In connection with the filling of the base chamber a three-way cock is provided, normally shut, but in the second position regulating the amount of oil to put in to replenish supply, and in the third it is used for draining the base chamber. The carburetter is of the double jet automatic type, having hand and foot control. Ignition is by high-tension magneto controlled from the steering by a

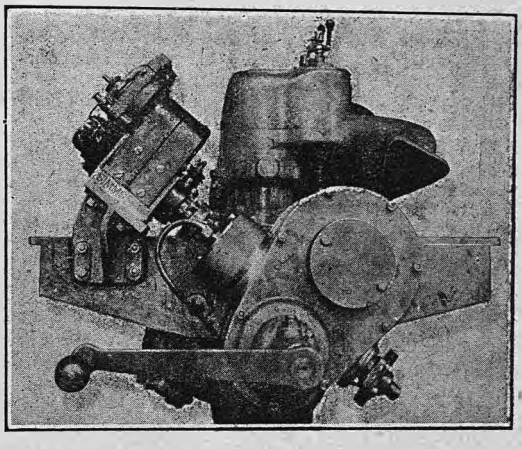


The off-side of the 22 h.p. S.C.A.T. engine, showing the self-starter air pressure pump. The photograph also shows one of the valve spring covers removed.

lever which is also inter-connected so as to control the throttle. The accelerator pedal operates the throttle only. The clutch of the multiple disc type is of the company's own make, and there is a double universal joint interposed between it and the gear box. The latter provides four forward speeds and reverse with gate change, the direct drive being on the fourth. The main shaft of the gear box is provided with packing glands to prevent serious leakage of oil.



A well-proportioned flush-sided body on a 20 h.p. Singer, by A. Knight & Co.



Front view of the engine of the 25 h.p. Sheffield-Simplex, showing the inclined magneto and oil pump drive.

The foot brake is of the external shoe type, of generous proportions, the shoes being applied by double helices, and the rear brakes are of the usual internal expanding type with a compensated movement. The propeller-shaft is of the enclosed type contained in a substantial tapered tube, the front end of which is suspended by a forked end to the cross member of the frame. The rear axle drive is by bevels, and the shaft and casing appear to be of substantial design. The wheels are all detachable on the company's N.B. patent system, and may be either wire or wood. All this year's models are fitted with self-starting apparatus.

Sheffield-Simplex.

Features: Worm-driven camshaft and magneto and oil pump; three-speed gear box incorporated in back axle; remarkable accessibility of magneto.

SHEFFIELD-SIMPLEX MOTOR WORKS, LTD., Tinsley, Sheffield (41).—The illustrated description of the new 25 h.p. Sheffield-Simplex, which appeared in our issue of October 29th, will cause visitors first to concentrate their attention on this chassis. We would draw particular attention to the position and method of driving the magneto and oil pump, also the generous provision made in the matter of thermo-syphon leads. Indeed, this chassis appeals to us from almost every point of automobile construction. It complies with the very latest practice in steering detail, width and shape of frame, provision for thrust and torque, and carriage of back wheels. The arrangement for the drive to the distribution gear, the construction of the assembled crankshaft, and other excellent points can be observed by the examination of detached parts shown upon the stand. There is also a beautifully finished chassis of the 45 h.p. Simplex, which presents very much the same appearance as the 1909 model, but has, nevertheless, been improved in several important details. A very simple form of thumb and finger adjustment to the fan drive has been fitted. The longitudinals of the frame have been increased in depth from five inches to six inches, and the wheelbase from 10ft. 8in. to 11ft. 3in., while the improvements with reference to replenishing the crank chamber with oil, detailed in the description of the new 25 h.p., also occur on this chassis. Visitors with a keen appreciation of refined engineering detail will find it hard to tear themselves away from this exhibit.

Singer.

Features: Three-point suspension to engine; thermo-syphon cooling; White and Poppe carburetter; four-speed gear box; Sankey-Singer detachable wheels.

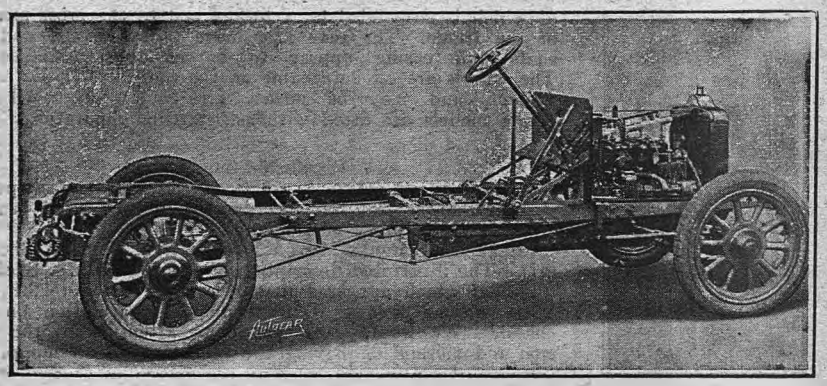
SINGER MOTOR CO., LTD., Coventry (55).—The Singer cars were dealt with at length in our issue of October 29th, page 592, when we referred particularly to the three-point suspension of the engine bed plate and the separate carrying of the four-speed gear box. These points should be noted, together with the Sankey-Singer detachable steel wheels. On the show chassis these are finished

in copper to emphasise the metallic construction, though they are usually painted to resemble wooden wheels. A flat tube radiator of simple design has been adopted this year in conjunction with thermo-syphon cooling. The latest White and Poppe carburetter with exhaust jacketing is fitted to the engines. The four-speed gear box gives a direct drive on top speed, and is coupled up to the clutch by a double universal joint. Lubrication is by pump to the main bearings, while the big ends splash through the oil well. Ball thrust bearings are fitted both to the steering column and to the steering heads, and thrust bearings are also provided on the front wheels. Control is both by foot and hand accelerator, in addition to the timing lever. A substantial torque column encloses the propeller-shaft, but there are no radius rods. The fan is mounted on an eccentric for belt adjusting purposes. The clutch stop is adjustable both as to position and strength of the spring. Among the finished cars the torpedo *de luxe* is specially worthy of notice, the sides being neatly sloped up to the level of the top of the back seat, giving a boat-like appearance, which is frequently lacking from torpedo bodies. The Bosch dual ignition is fitted as standard to both types of cars.

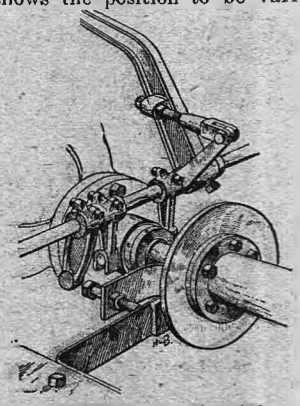
Sizaire and Crossley.

Features: A four-cylinder new design of light car; novel brake arrangement.

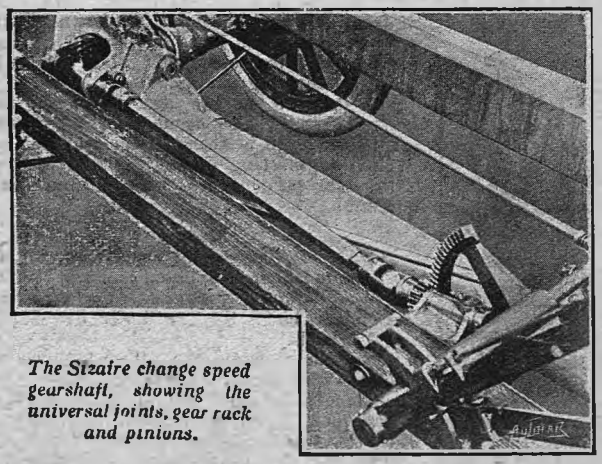
CHARLES JARROTT AND LETTS, LTD., Great Marlborough Street, W. (71).—Crossley and Sizaires are in evidence on the stand of Messrs. Chas. Jarrott and Letts. The Crossleys are in two powers, 20 and 12-14 h.p., and of each there are two examples, one car and one chassis. As, however, we have recently described these cars in *The Autocar* we will not enlarge on them here, but will devote our attention to the new four-cylinder Sizaire. In the engine, the four cylinders of 70 mm. bore by 120 mm. stroke are cast *en bloc*, and give a nominal engine speed of about 1,250 revolutions per minute.



An off-side view of the 20 h.p. six-cylinder Standard chassis.



Clutch stop, and pedal adjustment on the Standard car.



The Sizaire change speed gearshaft, showing the universal joints, gear rack and pinions.

The valves are all on one side with the inlet (which is consequently worked by rocking tappets) above, and all are encased. Thermo-syphon circulation is provided. From the engine a clutch with two flat plates conveys the power to the propeller-shaft, which in this model is encased with a very cleanly formed tube that, with its forked front ends, acts as a torque member, and the well-known Sizaire transmission at the back axle is retained. The back axle is trussed, and through elliptic springs carries the frame by brackets made solid with a U-shaped tubular member which constitutes the end of the frame and the back cross member. For the rest, a very simple design of ash frame with steel flitch plates is employed. The brakes are distinctly original, both sets working in the same drums on the back axle. The hand brake is actuated by two rods, which, however, are hollow, and consequently the wires which operate the other set are led through these rods and act on the brake shoes through a different set of levers on different fulcra. Ball bearings are employed throughout, the thrust from the worm in the irreversible steering being taken by a cone bearing.

Standard.

Features: Six and four-cylinder chassis; mechanical lubrication, with indicator which can be read by day or night; adjustable pedals; detachable wheels; very strongly constructed and easy steering; great attention to detail throughout.

STANDARD MOTOR CO., LTD., Coventry (53).—The 20 h.p. six-cylinder Standard remains very much on the lines which have proved so satisfactory for a long time past. One or two detailed improvements have been introduced, such as an adjustable and flexible clutch stop, and an adjustment on the clutch pedal which allows the position to be varied to suit different drivers. The steering column is fitted with ball bearings above and below the worm, and ball thrust bearings are also fitted to the steering heads. The engine is lubricated by an oil pump, the lubrication being fed through a distributer to all the bearings, while the crankshaft, which is made hollow, serves as a conduit. This model is fitted with steel detachable wheels of the firm's own construction, and they are certainly remarkably neat. The 12 h.p. four-cylinder car has also seen little change. It is worm driven, the worm being above the axle, thus avoiding the necessity for canting the engine. In both models the petrol is pressure-fed by an air pump worked off the camshaft, this system superseding the exhaust pressure previously employed. It will be remembered that the six-cylinder model is provided with tubular V-shaped torque rod, no radius rods being employed. Several complete models are exhibited, mostly touring or landaulet type, one model in grey with red upholstery and flush-sided body presenting a particularly tasteful appearance.

Stanley Steam Car.

Features: Multi tubular boiler; engine drive direct to back axle by single gear.

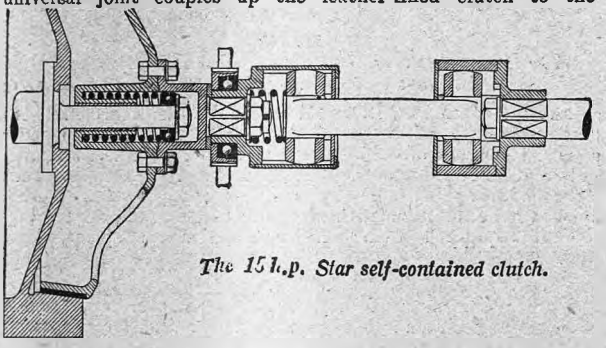
STANLEY STEAM CAR, LTD., Shaftesbury Avenue, W. (1).—The boiler is of the multi tubular type, and the burner is designed to consume petrol. The engine is two-cylinder double acting, with Stephenson link motion, driving direct through a single gear wheel on to the back axle. The whole of the engine and transmission are enclosed in a copper casing. The control is solely by throttle regulating the amount of steam entering the cylinders. A water gauge is provided on the dashboard showing the quantity of water in the boiler. The normal working pressure is 500 lbs. per square inch. The boiler is provided with a fusible plug, which blows out when the level of the water reaches 3in., thus leaving an ample margin. The working parts of the Stanley steam car are shown on a separate

stand, demonstrating the boiler, engine, control, and transmission, so that they may be easily and clearly seen.

Star.

Features: Four-speed gear box; neat adjustment to foot brake; Star detachable wood and wire wheels.

THE STAR ENGINEERING CO., LTD., Wolverhampton (64).—Two models of the Star are exhibited—the 12 h.p. and the 15 h.p. These resemble one another in general details, but whereas the bore of the 12 h.p. is 80 mm. that of the 15 h.p. is 90 mm. Both have a stroke of 120 mm., and four cylinders. A White and Poppe carburetter is fitted, and the throttle is controlled by foot accelerator and steering wheel lever. Bosch dual ignition is provided, with timing gear on the larger car, but with fixed timing on the 12 h.p. A double universal joint couples up the leather-lined clutch to the



The 15 h.p. Star self-contained clutch.

four-speed gear box. The particular gear as shown on the 15 h.p. chassis is adapted to drive direct on the top speed, but customers are given the option of a direct third if they prefer it. The foot brake has been redesigned and has a good hand adjustment, while the lining is of Raybestos acting on a metal drum. The propeller-shaft has a universal joint at each end, and drives the back axle through bevel gearing. Both torque rods and radius rods are employed. The rear springs are threequarter elliptics, and thrust ball bearings are fitted to the steering column heads. The wheels, which are the firm's own detachable wood or wire wheels, are mounted on Hoffmann bearings. The detachable wheels are supplied at a slight extra charge. The Henry Edmunds Trophy for the Shelsley Walsh hill-climb is exhibited on this stand. The complete cars comprise a good assortment of bodies, including a particularly neat two-seater and the 12 h.p. type with screen and hood.

Straker-Squire.

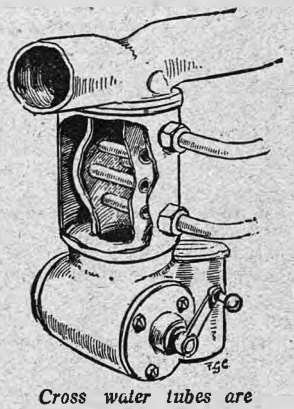
Features: The 15 h.p. *en bloc* engine on which the makers specialise.

SIDNEY STRAKER AND SQUIRE, LTD., Shaftesbury Avenue, W.C. (92).—This firm has specialised in 15 h.p. cars for four years, and offers some very well considered and practical vehicles. Many details were described in our issue of October 29th, page 595, and we need here only call attention to certain points, such as the Ware carburetter, which has what amounts to a by pass for running on slow speeds and a piston throttle for the ordinary control. This can be regulated both from the steering wheel and by pedal, and to prevent any accidental operation of the accelerator a certain amount of spare movement is allowed before it comes into operation. Cooling water circulates on the thermo-syphon system, and lubrication is effected by a pump and troughs with scoops on the big ends. The steering column and pivots are provided with ball bearings, while the front hubs run on three rows of balls. A Bosch DR4 magneto is depended upon for ignition purposes. An excellent double universal joint coupling is introduced between the split cone clutch and the three-speed gear box. There are universal joints at each end of the propeller-shafts, and the bevel pinion is mounted on a separate shaft rotating in the two separate bearings. The springs are of good length and nearly flat. The rear springs serve as radius rods, being anchored at their forward ends, and a torque rod is provided to prevent twisting of the back axle. This is designed with a large inspection plate to the differential box, allowing of the gear being withdrawn without taking down other parts.

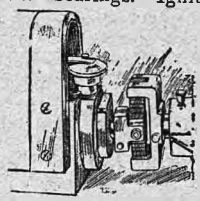
Sunbeam.

Features: Four and six-cylinder models; transverse warming tubes in induction pipe; laminated spring drive to magneto.

THE SUNBEAM MOTOR CAR CO., LTD., Wolverhampton (69).—Although three very handsome complete Sunbeam cars are being shown by John Marston, Ltd. the attractions were the chassis of the 12-16 h.p. four-cylinder, and the 18-22 h.p. six-cylinder designs. In the first-mentioned model the four cylinders of 80 by 120 mm. bore and stroke are cast in pairs with the inlet and exhaust on opposite sides, the valve mechanism on both sides being encased by easily detachable covers. Lubrication is by pump forcing the oil through the hollow crankshaft to the bearings. Ignition is



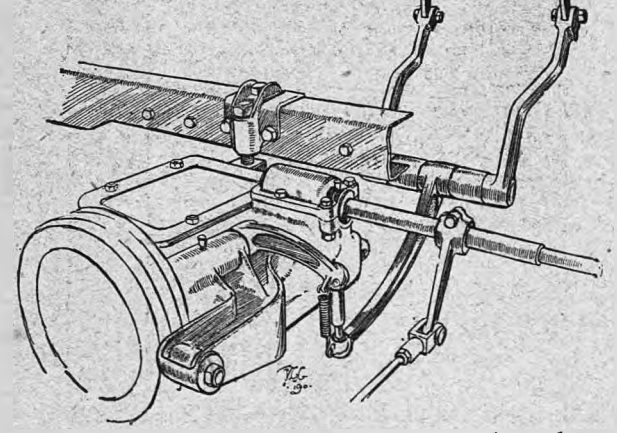
Cross water tubes are arranged in the induction pipe of the Sunbeam carburetter.



The laminated spring drive for the magneto on the Sunbeam car.

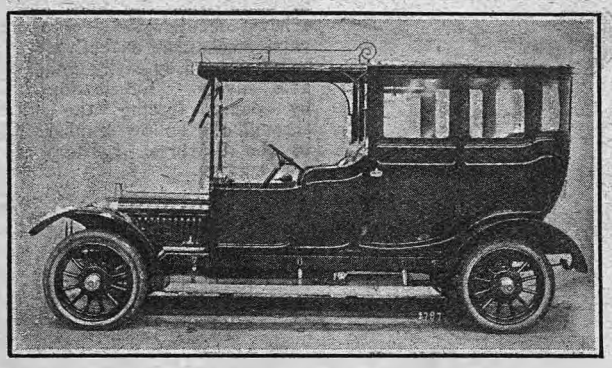
effected by h.t. magneto. As worm drive is employed to the back axle, the engine is tilted so as to bring the crankshaft into practical alignment with the rest of the transmission. The universal joints on the propeller-shaft are well designed examples of the ordinary ring type, and at the rear end the blocks on the pin are, as usual, rounded to a radius at their ends and work in grooves. The rear live axle with its worm underneath is of exceptionally strong design and trussed, running on ball bearings, as indeed do most of the parts of the car. At the back the frame is carried on threequarter elliptical springs with the front ends anchored, so that no radius rods are employed, nor is a torque rod deemed necessary. A beautiful 18 22 h.p. six-cylinder car is a good example of the car de luxe, although of moderate power. The cylinders are cast in threes, and the exhaust outlets are brought so together that a single specially shaped pipe can be utilised for all the exhausts from one casting, the two pipes being carried separately to the silencer. Control is by a spark variation lever operating the magneto from above the steering wheel, and a throttle lever is also provided in the same locality. An accelerator pedal is provided to work in conjunction therewith, the maximum opening being set by the hand lever, and

The method of fixing the steering gear on the six-cylinder Sunbeam.



Arrangement of pedal gear and brake motion on the gear box of the new Sunbeam cars.

subsequent control, if required, being obtained by the foot. Altogether, these machines constitute a very interesting example of the most up to date design combined with the best of materials.

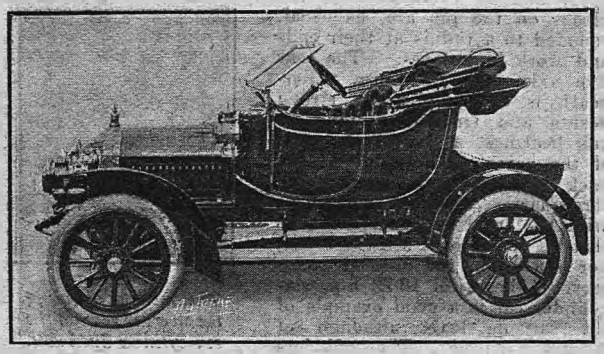


A handsome limousine body on a Sunbeam chassis.

Swift.

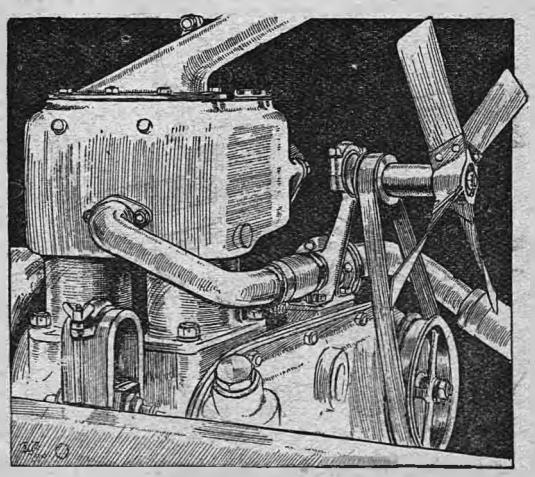
Features: Extension of under-flange of pressed steel side members of frame; slow-running by-pass to carburetter; thermo-syphon cooling; four-speed gear box.

THE SWIFT MOTOR CO., LTD., Coventry (44).—The 7 h.p. single-cylinder chassis and 10-12 h.p. chassis, both highly finished, command attention at this stand. Both these models



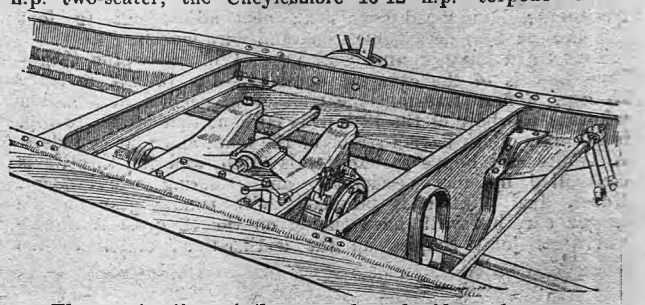
A smart two-seated body on a 10-12 h.p. Swift.

have done so well during the past year that it has been found hardly necessary to make any alterations in the design, the only departures from 1910 design taking the form of minor improvements, such as extending the under part of the frame on the 10-12 h.p. chassis, and fitting a slow-running by-pass to the carburetter on this model and the larger types. With regard to the 10-12 h.p. model it is only necessary to say that it has been the gold medal winner in the Scottish Trials for three years in succession, so that one can understand that



The engine of the 10-12 h.p. Swift, showing the combined fan bracket and water pipe coupling.

alterations are not necessary or desirable. The new models which are being produced for 1911 are the Coventry 10-12 h.p. two-seater, the Cheylesmore 10-12 h.p. torpedo two-



The construction of the pressed steel side and cross members of the 10-12 h.p. Swift car.

seater, the County 10-12 h.p. four-seater, the Ranelagh 15-18 h.p. four-seater with curved dash and flush torpedo side-panels, the Marlboro' 15-16 h.p. torpedo two-seater, and the Balmoral 18-24 h.p. touring car with 9ft. 9in. wheelbase and 4ft. 6in. track, this having a four-speed gear box. The finished car exhibits in each case take the form of open touring vehicles equipped with various contrivances against bad weather.

Talbot.

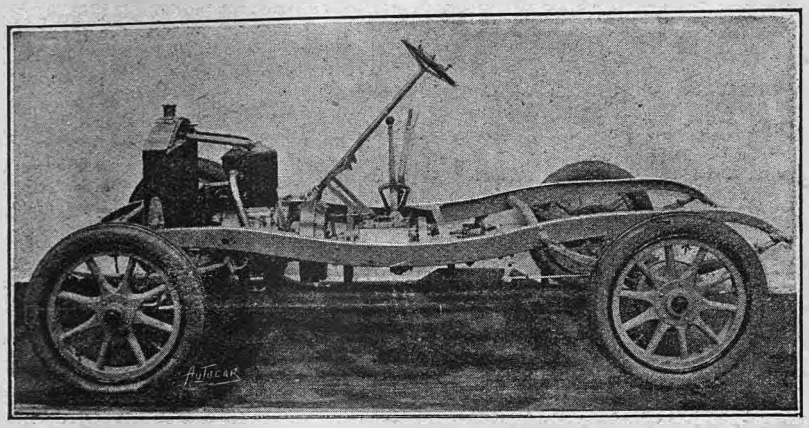
Features: The new 15 h.p. with long-stroke engine; disengaging clutch; four speeds; mechanical lubrication.

CLEMENT TALBOT, LTD., Barlby Road, North Kensington, W. (51).—The latest Talbot features are to be seen in the new 15 h.p. chassis. This has a four-cylinder engine and dual ignition, the separate high-tension distributer serving both for the Bosch magneto and the accumulator and coil. The steering gear has been well considered. Ball bearings are fitted to the steering column top and bottom, and the steering heads are provided with phosphor bronze bearing rings. Both the front and rear wheels run on combination load and thrust ball bearings. A flexible connection is introduced between the leather clutch and the four-speed gear, which runs direct on the top speed. The big ends of the engine pick up their lubricant from troughs, while oil is forced to the main bearings by a pump. The radiator is mounted on felt pads with springs to the holding bolts. The dashboard is built up separately from the frame as heretofore, and special means are taken to prevent chattering of the foot brakes, which have hand adjustment. The drum carries a ratchet for the sprag. It will be remembered that the Talbot clutches are fitted with a disengaging device, which allows the shaft to come to rest very quickly. Both radius rods and torque tubes are provided and adjustable ball bearings to the back axle. Lubrication has been very well studied, practically every moving part being fitted with a grease cup. The renowned 12 h.p. touring car is, of course, on view, and there is a very fine limousine landaulet by Rothschild and Sons, where, among other features, one notices that the folding seats can be fitted in either of two positions, that is to say, close to the fixed seat or in front of the body. The stand is well set off by a fine collection of trophies won by owners of these favourite cars.

Thames.

Features: A telescopic tank filler; provision for steadying indicator needles: the new 15 h.p. model; four speeds.

THE THAMES IRONWORKS, SHIPBUILDING, AND ENG. CO., LTD., Greenwich, S.E. (137).—The 15 h.p. four-cylinder chassis, staged for the first time, has quite a number of novel features. The engine has a bore of 80 mm. and a stroke of 120 mm., and the cylinders are *en bloc*, water-cooled on thermo-syphon lines. The mixture is supplied to the engine from a Polyrhoe carburetter, a one-piece induction pipe making a neat connection on the right-hand side. On the left of the crank case the Bosch magneto is positively driven from the distribution wheel case. The lubrication system is mechanical, oil being served under pressure to the bearings. At the rear of the camshaft a cam-actuated plunger pump produces air pressure for the petrol tank, which is carried at the rear of the frame. A bulb to steady the indicator needle of the gauge which shows the pressure of the petrol supply system is a detail to notice. The change speed gear box gives four speeds and direct drive on the top. The universal joints are neatly encased, and, in fact, throughout the vehicle every care has been taken to render it mud and weatherproof. In addition to the usual hand-operated brakes, which take effect on the interior of the rear wheel brake drums, there are front wheel brakes, pedal operated, both these and the rear wheel



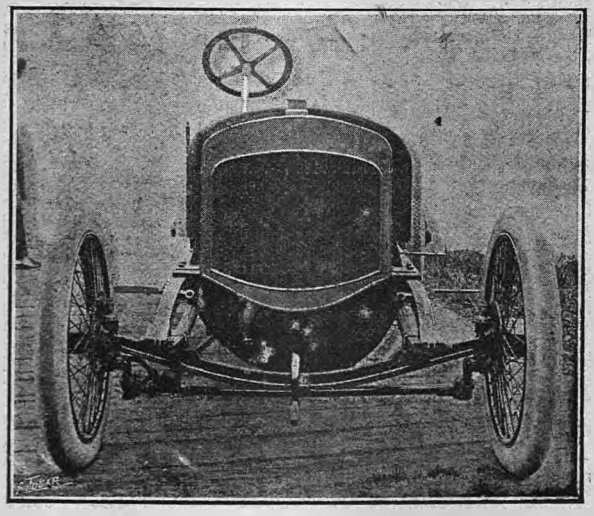
The new Thames 8 h.p. single-cylinder chassis.

brakes being internal expanding and lined with Raybestos. Torque and radius rods are fitted to the front axle. The single-cylinder 8 h.p. chassis which is staged has very similar features to the 15 h.p.

Thornycroft.

Features: Larger engine; worm drive; multi-disc clutch.

J. I. Thornycroft and Co., Ltd., Albemarle Street, W. (52).—The four-cylinder 18 h.p. Thornycroft, save for an increase in engine dimensions and the adoption of worm drive at will, is practically the same as last year. The engine is now 102 mm. bore and 114 mm. stroke, cast *en bloc* with all valves on left-hand side and exhaust trunk bolted to the left flank of the engine casting. The crankshaft is carried in four long bearings. Force lubrication is employed, the oil being circulated to all engine bearings from a pump placed in the sump; the magneto is carried on a bracket table bolted to the crank chamber on the left of the engine, and the carburetter is set high on the right, with the inlet leads formed through the engine casting. A heavy flywheel and multi-disc clutch convey the drive to the three-speed gear box, which is correctly three-point suspended, viz., by running pivots and brackets from the side members and a trunnion joint from the transverse tubular member in front of the gear box. Provision is made for the fitting of an entirely independent h.t. accumulator ignition system, the pump spindle being produced upwards through a bracket collar bolted to the engine casting to take the contact breaker and distributer of the alternative system. Thermo-syphon cooling is adopted, all inlet and outlet leads being well raked and of large diameter. The ignition is fixed, and the throttle is controlled either from the steering wheel or by throttle pedal. A tubular V shaped torque member is fitted. The back wheel brakes, which are of the internally-expanding order, are side lever applied through a neat compensating arrangement. Both fore and aft springs are of excellent length.

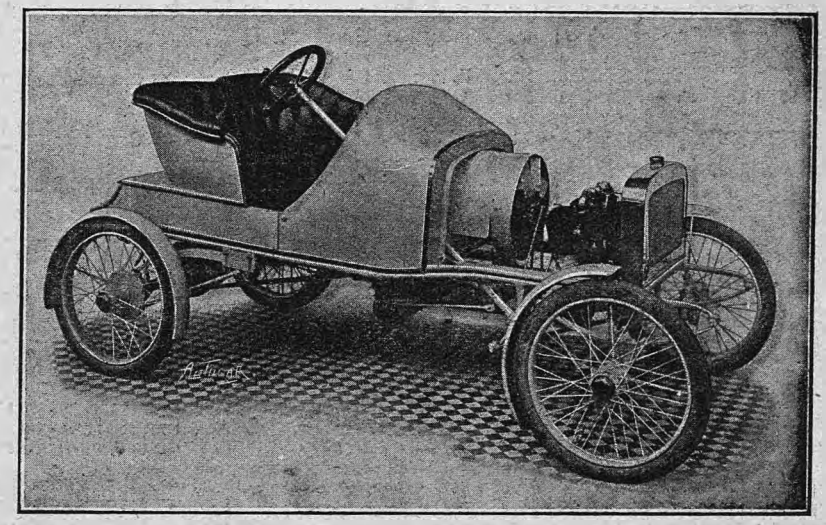


The front view of the 18 h.p. Thornycroft car.

Turner.

Features: A new two-cylinder petrol car. Turner steam car chassis with a variable speed gear.

Turner's Motor Mfg. Co., Ltd., Wolverhampton (27).—The novel feature among the Turner exhibits is the new 9 h.p. two-cylinder petrol car. This car has a double tubular frame, the special frame carrying the engine and gear box. The former is a two-cylinder air-cooled engine with cylinders set in transverse vertical plane at about 45°, bore 85 mm., stroke 95 mm. The drive passes to the gear box, which has two speeds and reverse, with friction clutch embodied, the clutches affecting the two forward speeds being operated by a lever on the steering wheel and a clutch operating the reverse by pedal on the footboard. The propeller-shaft conveys the drive to a worm set above the back axle. The back is carried on quarter elliptical springs, and the forward portion on semi-elliptical. Wire wheels are provided. The comfortable two-seated body has a well proportioned scuttle dash, affording good protection to both the driver and his companion. Mudguards of the cycle type are fitted. Immediately in the rear of the engine is a fan of special design which draws the air through two scoops formed on the inside of the bonnet by which the current of air is concentrated upon the cylinders. Visitors interested in steam cars will find a naked 12 h.p. Turner chassis. There is no particular deviation in detail over and above the car as shown last year, but one of the chassis is fitted with a variable speed gear.



The new 9 h.p. Turner car, with twin-cylinder air-cooled engine.

Unic.

Features: An ambulance car for use at Monaco.

The Unic Automobile and Marine Motors, Ltd., Brewer Street, S.W. (144).—This company are showing two types of Unic, the 12-14 h.p. and the 24-30 h.p. One of the larger cars is a very luxurious ambulance car, which has recently been sold to the Prince of Monaco, which, we feel sure, will be examined with considerable interest. In the case of the smaller cars the cylinders are cast *en bloc* with the valves all on the right hand side, which is somewhat contrary to prevailing practice. The cooling is by centrifugal pump. The lubrication is by pump and hollow crankshaft. The carburetter is of the automatic single jet type, with hand control on the steering wheel and foot accelerator. The clutch is a leather faced cone. The connection from the gear box is a double universal joint. The

Olympia.—Motor Carriages and Chassis

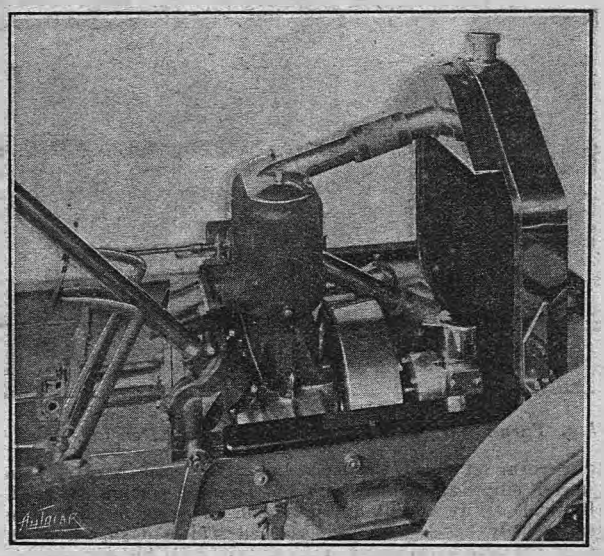
gear box has three speeds operated by gate change. The cardan-shaft is of the open type, with universal joints at either end, the final drive being by bevels. The frame is of pressed steel slightly inswept in front and upswept over the rear axle. The rear springs are of the threequarter elliptic type. One of the smaller cars shown is fitted with a very neat two-seated body, with hood and screen and scuttle type of dash, and looks as if it would be very weather-proof. There is also a folding dickey seat at the back.

MANN AND OVERTONS, LTD., Lower Grosvenor Place, S.W. (117).—This firm are showing a range of Unic cars, comprising two-seater, 12-14 h.p., with touring body, with folding dickey seat, and 16-20 h.p., with torpedo body in French grey, with a roomy body and rather straight doors, fitted with Cape cart hood and wind-screen. There is also a 12-14 h.p. landaulet with green body, upholstered in dark green leather, and fitted with high doors to driver's seat. An entirely new model of the 8-10 h.p. two-cylinder Unic is shown, with a four-seated torpedo type of body, rather low set, and fitted with scuttle dash. The engine is on the standard Unic lines, and has a pair of cylinders cast together, with a bore and stroke of 80 × 120 mm. respectively. A leather-faced cone clutch is fitted, and a three-speed gear box and live axle, with cardan-shaft of the open type. High-tension magneto is fitted, and the forced lubrication is by mechanically driven pump. This is a very handy and light little car, and should attract attention from the man of modern means.

Valveless.

Features: Two cylinders; one combustion chamber; 7½in. gear box; four speeds.

THE VALVELESS CAR CO., LTD., Princes Street, W. (15).—The Valveless car is one of those unconventional vehicles



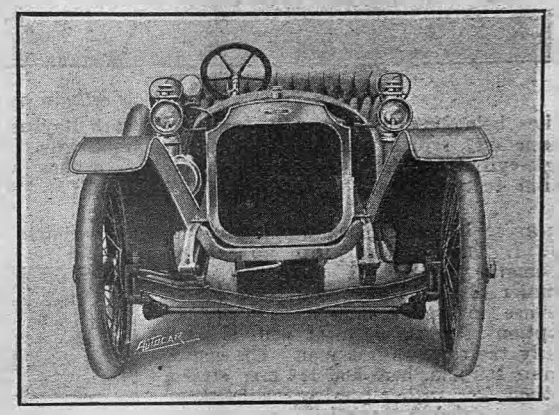
The Valveless engine, showing the high pressure oil distributing pump.

which has thoroughly justified its existence. The 15 h.p. model shown for the first time possesses the following interesting features: The engine follows the usual Valveless practice, being of the two-stroke type, and in which the two pistons descend together, and driving two flywheels which are geared together. The carburetter is of a special type, and the magneto is driven off the forward of the two crankshafts by a transverse shaft, at the other end of which is a plunger lubricating pump, which in appearance somewhat resembles a high-tension distributer and delivers the oil to all the necessary parts. The crankshaft is hollow, and the oil entering at one end passes into an eccentric groove in the flywheel which conveys the oil out of the crank case. The clutch is of the leather to metal type, and between it and the gear box are a universal joint and sliding joint. The gear box is one of the shortest ever made, the length being only 7½in., yet it gives four speeds and reverse. From gear box to back axle the drive is by a propeller-shaft. All three brakes are internally expanding. At the rearmost end of the frame is the petrol tank, the pressure to which is maintained by the compression in the crank case. Ball bearing thrusts are provided on the steering column and the steering pivots. The control is by hand throttle and foot accelerator. The 25 h.p. Valveless is practically identical with this car except that the circulation is by pump instead of thermo-syphon. With the 15 h.p. model no fan is provided.

Vauxhall.

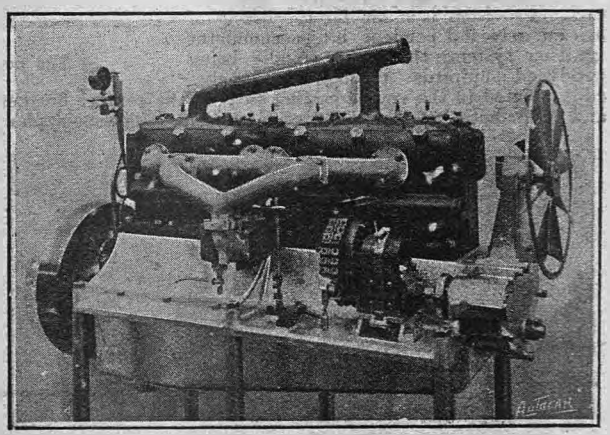
Features: Clean design throughout; thermo-syphon cooling; arrangement for varying air sleeve of carburetter from dash; lubrication under pressure from pump with indicator on dash; high tenacity steel employed throughout chassis; four speeds.

VAUXHALL MOTORS, LTD., Luton, Beds. (42).—When noting Vauxhall exhibits one is forcibly impelled to expect that the famous racers with which the firm have created world's records at Brooklands during this year would be in evidence, but although this is not so, there is a chassis which is prac-



The front view of the 20 h.p. Vauxhall car with a two-seated body.

tically the same as that which is credited with such great performances. The only difference is practically in appearance. From time to time we have described the Vauxhall productions, and so recently as Oct. 22nd we gave a lengthy illustrated description of one of the Vauxhall models. The White and Poppe carburetter fitted has a refinement added in the shape of a lever which can be operated horizontally from behind the dash by the driver, this lever serving slightly to vary the air sleeve of the throttle, so that it is possible to obtain even greater refinement of running than the usual adjustment of the White and Poppe carburetter affords. A pump arranged on the left hand rear



The 30 h.p. six-cylinder Vauxhall engine from the off-side, showing the dual spark magneto with double distributer.

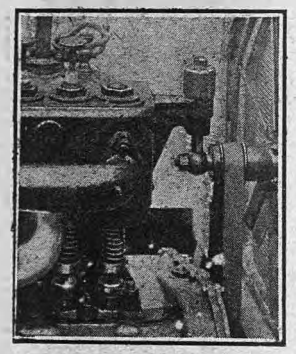
of the crank case serves oil to the crankshaft bearings and the connecting rod along the hollow crank. An indicator moving up and down in a slot on the dash serves to show that the system is working satisfactorily. The encasement of valve springs is also a very neat piece of work. The clutch is of the metal to-metal type. The outside of the fly wheel is surrounded below by the dust shield, and above by an aluminium casting which prevents any oil or water throwing on to the underside of the footboards. The gear box is of the four-speed type with direct drive on top gear

The wheels in this gear box are constructed of steel having a tenacity of 108 tons per square inch, a really remarkable material even in these progressive times when motor car requirements have stimulated metallurgists to their utmost. The foot and hand brakes are of the internal expanding type, the shoes being faced with copper. A double universal joint is fitted fore and aft to the propeller-shaft. A substantial V-type torque rod takes from the springs the driving effort. The control is effected by means of two levers arranged above the steering wheel. A subsidiary rod acts on the throttle by the medium of a pedal. A fine six-cylinder 30 h.p. engine is staged having cylinders cast in sets of threes.

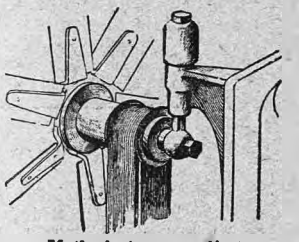
Vinot.

Features: Mechanical lubrication; rubber buffer valve tappets.

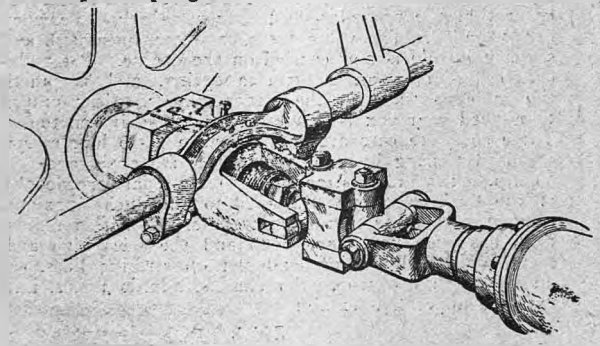
VINOT CARS, LTD., Great Portland Street, W. (18).—The 15.9 h.p. Vinot chassis is well worthy of inspection. The engine is of the *monobloc* type, with dimensions of 80×119 mm. The valves are enclosed, and are all on the near side, a special form of buffer tappet being fitted to ensure silence in this connection. The carburetter is on the off side, and is of the well-known Claudel type. The clutch is of the leather-to-metal cone variety, and is provided with first engagement springs under the leather. Between the clutch and the gear box are two universal joints and a sliding joint, so that crankshaft and gearshaft are freed from the possibility of strains from frame torsion. Both gear box and engine are supported on an under frame. The gear box provides three speeds by a gate change, the position of the lever being locked as required by a catch on the lever. A pressed steel torque member is fitted. All brakes are internal expanding type, threequarter elliptical springs being fitted at the rear and semi-elliptical springs in the front. Another model shown is a 25-30 h.p., which resembles the smaller car in general details. It may be mentioned that lubrication is by a force pump, maintaining a pressure of oil within leads to all the main engine bearings; very large central bearings are fitted to the crankshaft; all valves are on one side of the engine, and are enclosed by readily detachable covers.



View showing the large external dimensions of the Vinot valve tappets. Cup-shaped ferrules contain rubber buffers which prevent noise and keep the tappet heads tight against the stems of the valves.



Method of suspending and adjusting the fan of the 25 h.p. Vinot.



Universal and sliding joint between engine and gear box of the 25 h.p. Vinot.

Vulcan.

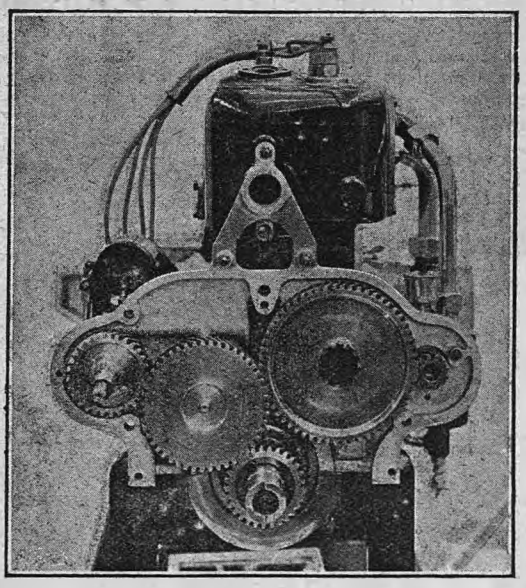
Features: Motor unit forming engine clutch and gear box; enclosed valves; brake drum independent of universal; ring type universal joint; overhead worm drive.

THE VULCAN MOTOR AND ENG. CO. (1906), LTD. (87).—The chassis of both powers of the well-known 15.9 h.p. and the 23.8 h.p. six-cylinder Vulcan cars are found at this stand. In an early part of the year we described and illustrated the lower powered chassis in detail, and upon examination it will be found that the chassis exhibited shows very slight departure from the model then dealt with. The visitor interested in these well-designed and moderately-priced cars should give attention to the neat design of the four-cylinder engine, with its cylinders cast in pairs, enclosed valves, cast exhaust trunk, and large thermo-syphon leads. It will be seen that the magneto and carburetter are most accessibly placed, and this remark also applies to the oil-filling arrangements to the crank chamber. The gear box, flywheel pit, and crank chamber are all bolted up together to form a motor unit of very rigid description. It will be observed that the change gear spindle is formed with a universal joint between the box and the base of the lever. The main universal joint has also been redesigned and is now of the ring type, to which lubrication is ensured by centrifugal force. It will also be noted that the spigot end of the primary gearshaft is carried in the intermediate gear sleeve in a double ball bearing. The foot brake drum now no longer forms part of the universal, but is separate therefrom, being carried on the end of the primary gearshaft, where it issues from the gear box. Overhead worm drive through a long stiff universal and flexibly-jointed propeller-shaft conveys the drive to the road wheels. The springs are threequarter elliptical at the rear, semi-elliptical at the front, long and easy. The 23.8 h.p. six-cylinder chassis is a fine example of motor engineering, and save that it possesses two cylinders more than the model already referred to, conforms to it throughout in general design. It is, of course, longer in the wheelbase, otherwise the recommendatory points of the 15.9 present themselves in this chassis also. Chassis of both types are shown carrying tasteful, well-constructed comfortable bodies, including a Birkdale D-fronted landaulet, a comfortable flush-sided torpedo touring car, a doctor's phaeton of very smart design, and a larger flush-sided touring phaeton with scuttle dash, screen, and hood, all of which are produced by the Vulcan Motor Co., and do them as much credit as their mechanical products.

White.

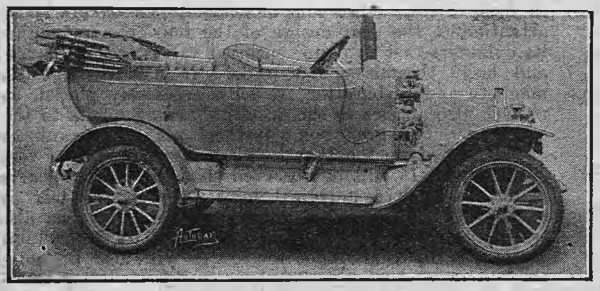
Features: Steam and petrol types; flash generation of steam.

THE WHITE CO., Carlow Street, N.W. (45).—Very few modifications have been found necessary in the famous White steam cars, but it is well to draw attention to the magnificent example of bodywork by Cann, Ltd., on the 40 h.p. model; this body is of the torpedo type, finished in a striking shade of green. As an example of the body builders' work this is one of the finest exhibits at the Show. The 15 h.p. White steamer double phaeton has a striking appearance, and it is difficult to see wherein its details could be improved. Larger section tyres are now being fitted. The 20 h.p. petrol propelled models consist of a landaulet in grey and a torpedo type of body finished in aluminium. This is fully equipped for all weathers with Cape hood and screen. The 20 h.p. petrol engine is shown separately, as is the 15 h.p. steam



The skew distribution gear of the 20 h.p. White petrol engine.

engine, the excellence of workmanship and design being features which appeal strongly to the mechanically inclined. As regards the petrol engine, the fibre distribution wheels have been discarded, and in their place steel skew-cut pinions are



A 20 h.p. White petrol car with an aluminium finished body.

fitted, which should conduce to extreme silence in running. The oil circulating plunger pump is operated from the tail end of the camshaft by means of a crank pin which operates through a slot at the upper end of the plunger. The pump takes oil from a sump cast on the left-hand rear part of the crank case, the oil being strained thoroughly before gaining access to the pump. The *en bloc* engine has only one set of bearings to each end of the crank, no central bearings being provided, but as the crankshaft is so massive in construction there is no tendency to whip. The valve springs and stems are enclosed by a neatly fitting aluminium cover. The appearance of the engine is particularly clean, for on the valve side there is only the single pipe from the carburetter to the centre of the casting and the connection from the water circulating pump. Generally speaking, it is the bodywork on this stand which draws the attention of visitors, but the mechanical details are well worthy of note.

Withers.

Features: Unusual back axle design; four speeds.

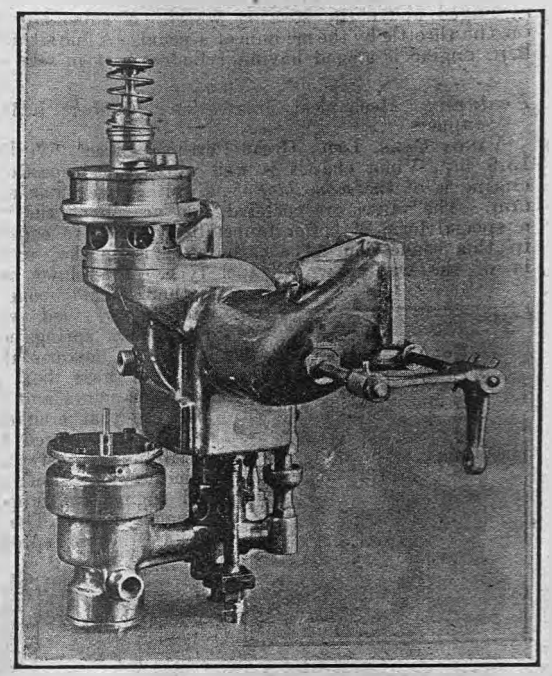
Withers and Co., Ltd., 35, Edgware Road, W. (139).—This company is now making four types, viz., 20 h.p., 25 h.p., 30 h.p., and 35-40 h.p. respectively. Describing the latter, the engine fitted is Messrs. White and Poppe's four-cylinder, with a bore and stroke of 120 mm. × 130 mm. respectively, the exhaust and inlet valves being arranged at opposite sides. Lubrication is by splash with a double pump, by means of which the oil in the crank chamber is maintained at a constant level. The gear box is of substantial proportions, providing four forward speeds and reverse, the direct drive being on the fourth speed. Transmission is by means of an open type cardan-shaft, with sliding-block universal coupling at the back and a double jaw type at the front, the latter being enclosed in a dust-proof casing. The final drive is by bevels to the live axle, and a noticeable feature in connection with the latter is that the outer ends of the casing are not brazed on to the tube as is usual, but are secured by double bolts, so that they can be unshipped if required. There is a tubular type torque member and a pair of long radius rods.

Wolseley-Siddeley.

Features: Four-speeds to all models but one; true universal joint between clutch and gear box: multiple disc clutch; *fac simile* of Queen Alexandra's 50 h.p. six-cylinder car; flush-sided Wolseley bodies: worm drive.

The Wolseley Tool and Motor Car Co., Ltd., Adderley Park, Birmingham (38).—Although the Wolseley Motor Car Co. construct seven models, but four of the 1911 types are shown upon the stand, the chief among them being the 50 h.p. six-cylinder polished chassis similar in all respects to the chassis supplied to Queen Alexandra, and which was described in detail in *The Autocar* of August 27th last. It is an example of a six-cylinder construction on special lines which is well worth the consideration of all interested in automobile engineering. In this particular case it will be noticed that the cylinders are cast in pairs, in order to get as much crankshaft bearing surface as possible. The engine is 4½in. bore by 5½in. stroke, and the whole chassis in general design conforms to the usual Wolseley practice save, and as pointed out in the article above referred to, the oil is carried in a tank on the left of the engine in lieu of in a sump in the

The oil troughs in the Wolseley engine, showing the supply reservoirs into which the oil first enters.



The three-jet carburetter of the 16-20 h.p. Wolseley car.

base of the crank chamber. The latter is kept emptied by means of a second pump, which raises the oil into the oil tank, whence it is drawn and forced to the crankshaft bearings and troughs by the ordinary oil circulating pump. It is specially noticeable that the gear box is also provided with a similar circulating system, and the pump, in addition to forcing oil to the shaft bearings, delivers a spray of lubricant to the enmeshments of all the gears. That popular model, the 16-20 h.p., is also shown in chassis form, and is seen to conform in nearly all detail to the higher power models, save that the worm is adapted in lieu of bevel gear drive. For this reason the engine and gear box are somewhat raked, in order that the propeller-shaft may remain lineable when the car is loaded. The valve areas have been increased, and the starting handle is now carried on the engine. The multi-disc clutch has now an adjustable spring, and is practically the same as those in the larger models. Very properly a four-speed gear box is fitted, with direct drive on top speed. Three complete cars are shown, one a 12-16 h.p. carrying a standard touring body of very attractive appearance. On a 50 h.p. six cylinder is mounted an Imperial torpedo phaeton of the flush sided type designed to afford the maximum of comfort and protection from weather. For this reason the dash has been kept very deep and the sides high and the seats low. A limousine landaulet on striking lines, carried on a 20-28 h.p. four-cylinder chassis, affords a most interesting and impressive exhibit.

Zédel.

Features: En bloc engine; balance wheel automatic carburetter; four speeds, with idle layshaft on the intermediate drives.

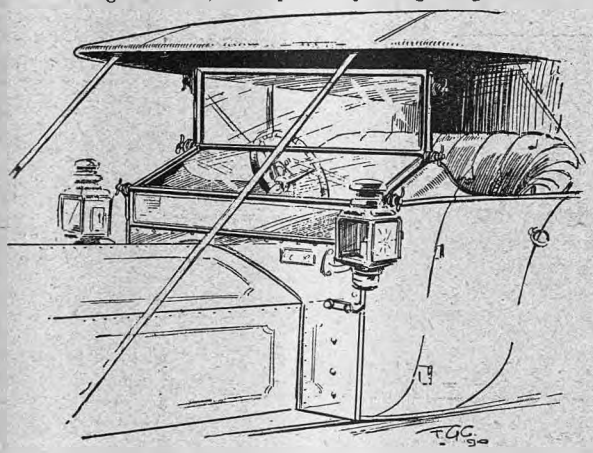
C. Bertrand, Long Acre, W.C. (22).—The 14 h.p. Zédel is one of the finest examples of French automobile engineering to be seen in the Show. The engine is a four-cylinder 72 × 120. The cylinders are cast *en bloc*, and the valves are situated on the near side. The magneto is also on the near side and the circulating pump and carburetter on the off side. The carburetter delivers practically neat petrol through a very small pipe to a mixing chamber above the top of the cylinders, and the quantity of this strong mixture is regulated by a throttle. The additional air is admitted through a valve controlled, not by a spring as is usual, but by a balance wheel. The lubrication is by pump from a reservoir to the three main bearings, and the rest of the lubrication is effected

by splash. The clutch is of the Hele-Shaw type, and between it and the gear box is one sliding joint. Both engine and gear box are carried on an inner frame, and the gear box contains four speeds and reverse. When the top is in engagement the secondary-shaft remains idle. From gear box to back axle the drive is conveyed by propeller-shaft. The forward universal joint of the propeller-shaft has an exceedingly neat cover, and the whole job is particularly well carried out. The propeller-shaft cover bearing is lubricated from the pump driven off the engine. The foot brake is of the external type, is of very large dimensions, and is lined with brass, while the rear brake is of the ordinary internal expanding type. Ball bearing thrusts are fitted to steering column, pivots, and stub axles. With the exception that the cylinders are cast in pairs, the 20 h.p. model resembles that we have just described.

Carriage Bodies and Bodywork.

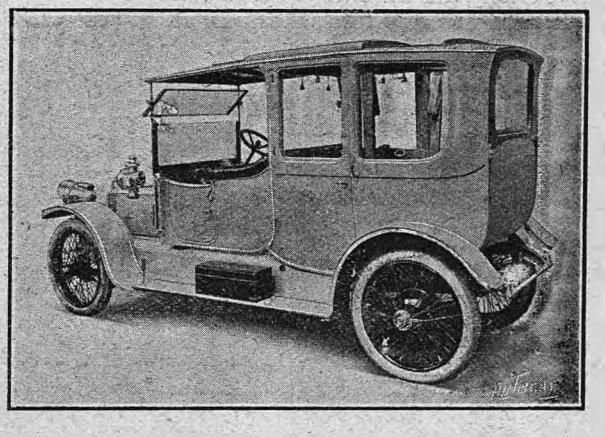
We dealt so fully with many of the leading exhibits of carriage work in our last issue that we now confine our report mainly to cars which were not then ready for inspection.

BARKER AND CO. (COACHBUILDERS), LTD., South Audley Street, W. (121).—The bodies exhibited in this stand have undoubtedly as fine a finish as any in the Show. This particularly applies to two—one an open touring car with Cape cart hood and the other a D fronted limousine landaulet, both on Rolls Royce chassis. The external finish of the former is an extremely delicate shade of green relieved with dark green lines, the upholstery being a light shade of leather to match. A notable point in the design of this body is the form of the scuttle dash, the lower half of the Auster folding screen forming the top panel of the scuttle, bringing the second swivelling glass panel well back to the steering wheel. On the offside no door is provided to the front seat, but the sides of the body are well extended, enclosing both gear and brake levers. The D fronted landaulet is finished in blue, with white and black relieving lines, upholstered as to the interior with light corded cloth and the driving seats with blue leather.



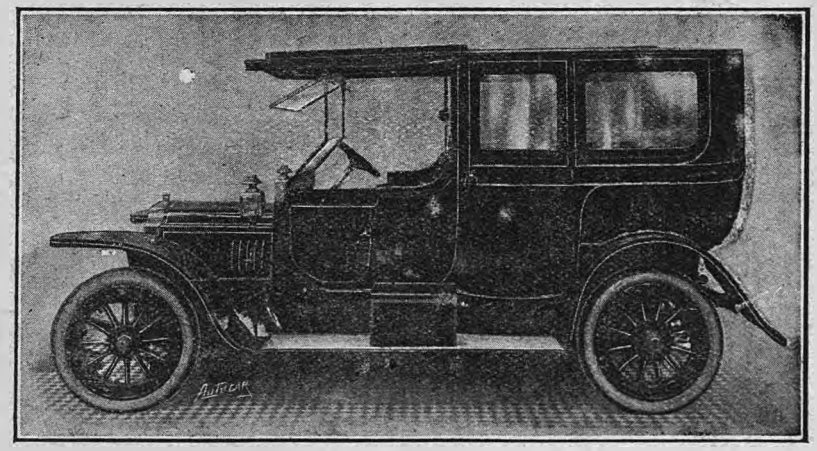
A glass-topped scuttle shown by Barker & Co. on a Rolls-Royce.

CANN, LTD., Camden Town, N.W. (132).—Of three particularly good examples of flush-sided bodies, the most taking perhaps is the Cabriocann, a form of body which combines the main features of both an open or a closed car at will. The finish of this body, which is mounted on a White petrol chassis, is a distinctive mole colour relieved with black and yellow lines, with cane panelling, the upholstery being in black leather. A second type of body shown is that styled the Medicann, this being normally a two-seated model, but having a third collapsable seat folding within the tool box under the luggage space at the rear. A striking finish is provided to the interior by the fitting of light cream leather upholstery. In this car ingress and egress can be made from the off side, a particularly wide door being available. The third example of Cann coachwork shown is an open flush-sided touring body with particularly high sides and high scuttle dash. It is fitted to a Minerva chassis and finished in green, with white and black lines. It is almost needless to say that a glass screen and Cape hood are provided, but the latter is worthy of special reference as being a particularly practical design, extending well over the dash and combining closely with the screen in preventing driving rain from entering from the front, and, at the same time, the driver's view is in no way interfered with. The lower part of the dash of this body is fitted with inset electric side lights, while the brake lever is carried outside the body and the gear lever inside near to the driver's hand.



A limousine body on a Vauxhall chassis shown by Alford and Alder. The roof of the rear portion is capable of being opened to afford additional ventilation.

W. COLE AND SONS, LTD., 92, Kensington High St., W. (122).—A blue limousine body on a Vauxhall chassis on this stand embodies several unusual features in its design. In the first place the roof of the rear portion is adapted to slide forward to a considerable extent, thus providing additional ventilation to the interior. The opening can be made by the inside passenger whilst the car is running. Another feature is that the interior is fitted throughout with walnut panelling. The width of the doors giving entry to the interior is more than ample, and while seating accommodation is provided for seven persons in all, the rear of the back seats does not extend beyond the overall limits of the chassis. The form

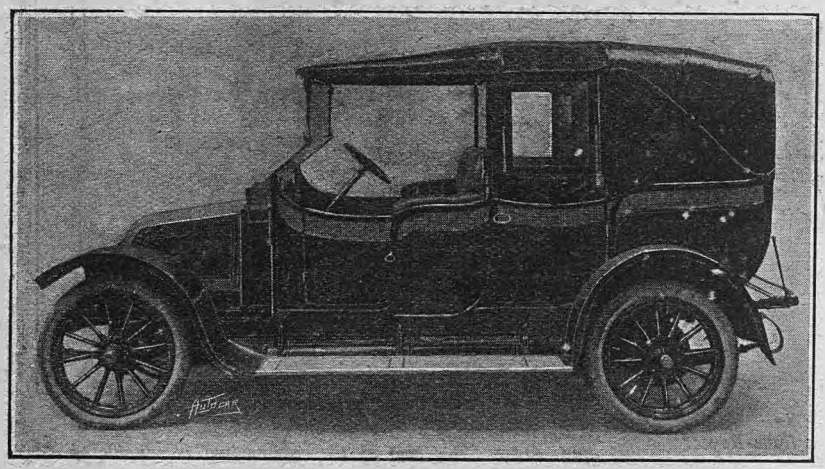


A 20 h.p. Vauxhall, fitted with a handsome body by W. Cole and Sons.

of folding seat adapted by Messrs Cole and Sons is worthy of notice. When in use these seats are more than usually comfortable, and when out of use they can be folded up quite flat against the sides of the interior. A limousine landaulet on a Dodson chassis, and a seven-seated *coupé* complete the exhibit. The former body is of the flush-sided type, with high sides to the driver's seat. The forward extension over the driver's seat of the *coupé* is fitted to a roller, so that this overhead portion of the body can be neatly stowed away while the back closed portion remains in use, the whole, if required, folding back together. In bringing the forward portion into use, extension arms are brought forward simultaneously, and secured by the vertical pillars of the front glass screen.

E. AND H. HORA, LTD., Peckham Road, S.E. (110).—This exhibit, comprising four cars in all, includes two five-seated touring bodies with deep scuttle dashes and high sides. The interiors of the scuttles are fitted with small cabinet drawers, and all the glass screens are brought well back to the steering wheels. A good example of the possibilities of fitting a four seated open body on a small chassis is that in position on a 10 h.p. four-cylinder Hurtu. This body has a neat scuttle dash and high side doors.

J. KEELE, LTD., 72, New Bond St., W. (114).—Although Messrs. Keele are not carriage builders, but agents for the



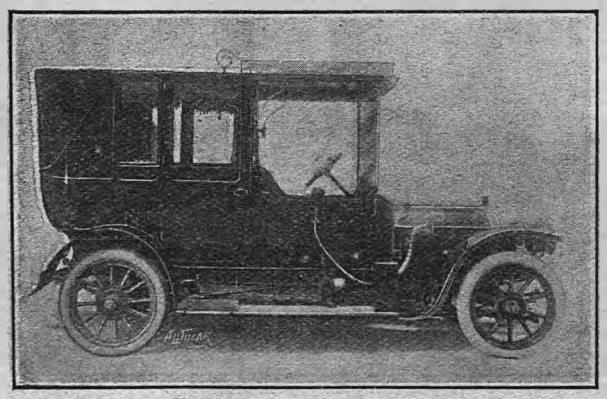
A cabriolet body on a Renault chassis, shown on the stand of J. Keele and Co., Ltd.

Belsize, Sunbeam, and other well-known makes, they always have some interesting bodies on their chassis, and we therefore include them in this section. A seven-seated curvilinear cabriolet is perhaps the most striking exhibit, but an open touring body on a Belsize chassis, although less pretentious, has, if possible, the more attractive finish. On this car, which is finished in light green with green upholstery and dark green lines relieving the panels, the high sides are fully upholstered with roll tops, not only to the seat backs and sides, but along the tops of the doors. Ample accommodation is provided for five persons, and the lines of the scuttle dash are particularly suitable for carrying a glass screen to protect the occupants of the front seats, although a screen is not fitted as shown. Two Sunbeam chassis are exhibited, one fitted with an open touring body, and the other with a single landaulet. The former has the back seat raised some inches above the level of the front seat, so enabling the passengers in the rear portion of the body to obtain a clear view ahead. The front seating accommodation is particularly roomy, there being ample space for the manipulation of the brake and gear levers, which are placed inside the body.

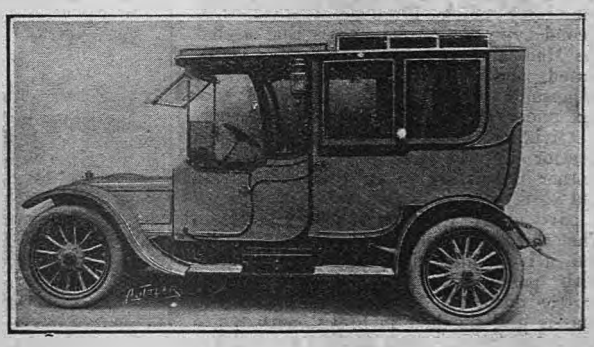
MAYTHORN AND SON, Biggleswade (113).—A saloon body shown is worthy of attention, for the essentials of this type have been carefully studied, and a very excellent design is the result. The body, which is fitted to a Lancia chassis, entirely encloses both the front and back seats. Entrance is afforded by a central door of considerable width, ingress to the driver's seat being obtained by a swivelling seat on the near side. The front driving screen is brought close up to the steering wheel with a deep scuttle dash. Of the three glass panels, which occur on each side, the two foremost are capable of being raised or lowered, and are of the frameless type. The external finish is a rich blue with fine blue lines, and the upholstery a light drab corded cloth. Two overhead electric lights are provided in the interior. This body forms one of the most attractive in design and finish in the Show. Two other bodies are shown, one a single landaulet and the other a three-quarter landaulet. The latter, which is finished in lake picked out black with fine lines of old gold, is provided with large glass panels on either side of the driver's seat, shielding both driver and front passenger to a considerable extent from cross-driving wind and rain.

H. J. MULLINER AND CO., Brook Street, W. (103).—The principal feature of this stand is a saloon body on a Rolls-Royce chassis, which was illustrated and described in the last issue of *The Autocar*. In addition to this, a cabriolet type of body seating four and finished in green with basket relief is shown on a De Dion chassis. Two other bodies are a six-seated limousine-landaulet on a Napier chassis, and a five-seated single landaulet on a De Dietrich chassis. All of the bodies shown are designed so that the gear and brake levers come within the side panels.

MULLINER (LONG ACRE, LONDON, AND NORTHAMPTON), LTD. (123).—Two very striking bodies are here. The first, a four-seated saloon with driver's seat enclosed, is finished in aluminium with fine red lines and red wheels, the upholstery also being red cloth. Entrance is afforded by a particularly wide central door, giving immediate access to the rear seats, entry to the driver's seat being obtained by a swinging near-side front seat. A deep scuttle dash is fitted with a square bevelled plate-glass window in the centre. Both the gear and brake levers are enclosed. The lighting of this body is provided by the large glazed panels at each side, in front and behind, and is added to by the provision of an overhead glazed panel. The cabriolet body mounted on a six-cylinder Vauxhall chassis, and fitted with a particularly deep scuttle dash, is a distinctly striking piece of design. The finish is a light khaki colour, relieved by dark brown lines. A noteworthy feature of the design is in the fact that the rear portion of the hood behind the side doors is fitted with two very large windows. To those who know the somewhat

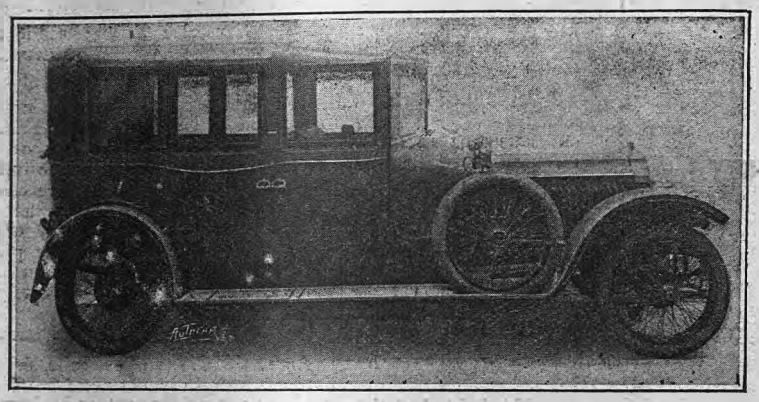


A Vincent landaulet on a Napier chassis.



A 25 h.p. Panhard fitted with a Windover body.

secluded corners formed by the back portion of a cabriolet hood this point will particularly appeal. The pillars for these windows, which are frameless, are disposed of by the rearmost folding back with the hood, the other two folding up and backward, and being secured to the top frame. Another point is the front glass screen, which is Vee shaped, and the top half of either panel can be raised independently of



A cabriolet body, by Mulliner, of Long Acre, on a 30 h.p six-cylinder Vauxhall.

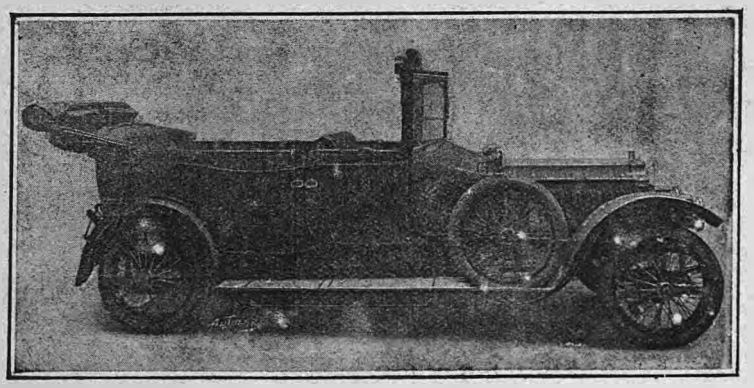
the other. A limousine landaulet on a Lancia chassis also presents unusual features in design. In addition to the window provided over the door giving entry to the rear portion of the car, and the second window to the rear, a third side light is situated between the door and the pillar immediately behind the driver's seat. Partly within the space thus formed in the inside by the setting back of the door are two unusually comfortable lift-up seats, upholstered and fitted with deep springs.

Salmons and Sons, Newport Pagnell (140).—A cabriolet type of body on a Benz chassis exhibited by this firm deserves particular attention. The general design and finish are decidedly above the average, and an unusual feature is found in the folding portion of the rear hood, which contains a second window behind the door on each side. The upper portions of the rear pillars forming the doorposts are hinged at their lower ends, and when the body is used in its open form these two pillars fold down neatly inside the body; the rearward pillar of the additional window folds back with the hood. This design affords a far better external appearance and also gives far more light to the interior when the hood is in use. The second carriage is of distinctive design, forming a combination of the cabriolet and open car with Cape hood. A light brown canvas hood is fitted, and this can be folded back in the usual way, but at will the rear portion of the body can be entirely enclosed when the hood is in use. Glass panels are in position within the side doors and folding pillars are also provided. These pillars when out of use are practically unnoticeable. Behind the driver's seat is another glass window with folding pillars, the upholstery of the driver's seat being raised somewhat above the contour of the body, so that when the pillars are folded they do not stand up above the lines of the upholstery. Messrs. Salmons and Sons are entirely justified in calling the body the "all weather" type, for when the hood is folded back and the glass panels lowered into the framework, it is extremely difficult to notice any unusual appearance in the body as compared with an entirely open touring car of the flush-sided type.

W. Vincent, Reading (130).—The *pièce de résistance* on the stand of this well-known firm, who have for many years specially laid themselves out to cater for the requirements of the all-weather motorist, is shown on a 15 h.p. Napier chassis, and takes the form of a flush-sided limousine landaulet. This body may be well described as a torpedo landaulet; in fact, such is the description given to it by the makers. The interior, which is fitted with frameless windows, has a curved front, allowing more room for the driver's seat and giving 6in. or 8in. wider doorway to the interior. The two front seats of this car are, in fact, exceptionally roomy and comfortable. Both the brake and gear levers are carried within the body conveniently to the driver's hand. A new type of torpedo body on a 16-20 h.p. Wolseley is shown. The rear panel of this body has a distinct sweep somewhat on the lines of the Roi-de Belge type. The panelled rear corners, introduced by this firm some years ago, are embodied in the design of this car, and afford a striking relief to the high back. The remaining car in this exhibit is a threequarter Victoria-front landaulet with curved back panels, which, it is claimed, add considerably to the comfort of the interior passengers. A very compact form of folding seat is fitted to this car, which provides accommodation for seven persons. The form of folding seat mentioned is particularly firm in use, and can be turned so as to allow the occupant to face backward or to either side. The finish of the cars on this stand is particularly commendable in every case, the general colour scheme being various shades of green relieved by black and white lines. In the case, however, of the open car, green lines relieve the outline.

Windham's Sliding Detachable Motor Body Co., Clapham Junction, S.W. (107).—The speciality of this firm is the design of a four-seated body, the back portion of which can be readily detached in order to make a two-seated car with luggage capacity. The rear seats slide upon tramways on the chassis, and are automatically secured in position when pushed home. Two complete cars are shown demonstrating the manner in which this principle can be adapted to an open touring body or a landaulet. The principle embodied in these bodies has now been before the public for some years, and so has stood the test of time and trial.

Windovers, Ltd., Long Acre, W.C. (118).—A particularly fine example of the threequarter landaulet type of body is shown, the window immediately behind the side doors being of more than usual dimensions—in fact, at first glance the body could be easily mistaken for a limousine. The finish and upholstery of this car are particularly noteworthy, the former being a rich lake relieved by light red lines, the upholstery being in a shade of crushed strawberry corded cloth. The most striking exhibit on the stand is a saloon limousine on a Panhard chassis. This is finished in a pale grey relieved with black lines, an overhead saloon light being provided at the rear portion of the body. Glass panels are fitted at each side of the driver's seat to protect the occupants from cross wind and rain. The suitability of the Metallurgique chassis for a torpedo body is exemplified in the remaining car shown. The design of the scuttle dash is well carried out so as to be in keeping with the contour of the bonnet, with its very distinctive design of V shaped radiator front. The finish is in a shade of khaki with green relieving lines and green upholstery. The method of carrying the rearward inclined portion of the front glass screen is worthy of notice, for although the scuttle dash itself is not particularly deep, the screen is so arranged as to make up for any want of protection in this respect. At the same time the smaller scuttle affords easier ingress to and exit from the front seats. The whole arrangement is so carried out as to constitute a design that satisfies the eye and, in addition, one that is decidedly practical.

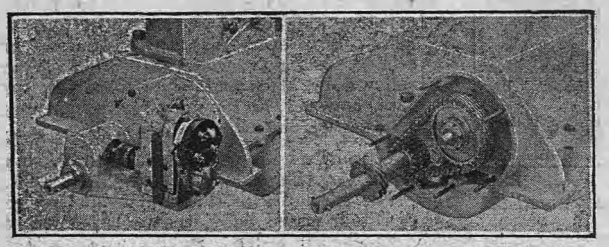


The car illustrated above with the hood folded back.

Tyres, Parts, and Accessories.

In our issue of 22nd October so many of the leading exhibits in the Gallery were described and illustrated that there is now no need to do more than refer briefly to them in this section of our Show Report.

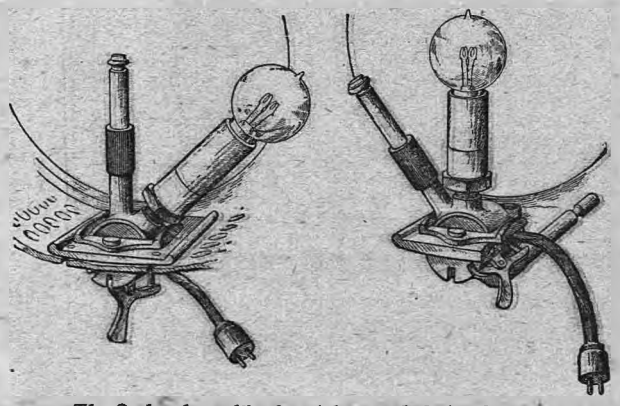
THE ASTER ENGINEERING CO., Wembley (211).—As usual some fine engines are on view at the Aster Co.'s stand, the most notable of which are the 14-16 h.p. two-cylinder engine with 110 mm. by 140 mm. bore and stroke; the four-cylinder 30-35 h.p. of similar dimensions, and the 16-20 h.p. four-cylinder 88 mm. by 120 mm. engine. In all these engines the cylinders are cast in pairs, and the valve mechanism is boxed in with neat detachable aluminium panels. In the 30 35 h.p. the single camshaft—all the valves in all the engines being on one side—is driven by a silent



The 30-35 h.p. Aster magneto and camshaft drive. The chain drive is shown with cover and magneto removed.

roller chain enclosed in a neat case. The cooling of the cylinders is by thermo-syphon, and for this purpose very large outlet pipes are fitted. We note a particularly neat method by which the valves can be timed as to their lift, in which a micrometer device giving adjustments by tenths of millimetres is used. The valves are of large diameter, and the engines finished with a neatness in casting which is very commendable. There is also shown on the same stand a small four-cylinder 12 h.p. engine of the *monobloc* type. The Aster carburetter makes its first appearance at this Show, and is one of the simplest we have seen. It is claimed to be entirely automatic over its full range, and for this purpose contains a very neat device in which a trunk furnished with dash pot and spring load alters according to the suction of the air a small orifice immediately above the jet from which the mixture is drawn. As the speed of the engine increases, its suction lifts the trunk, and in doing so not only alters the jet but opens up the air admission port.

AUSTER, LTD., Barford Street, Birmingham (201).—Messrs. Auster show a representative display of their well-known wind-screens fitted with their patent locking joint. The principal examples of these are the extending back screen and the torpedo dash screen, which have been dealt with so recently in *The Autocar* that they require no further detailed description here, except in regard to the first, which has been made neater and lighter, so that it adds to the appearance of any car. One enthusiastic lady, who has been using this extending back screen for a considerable time, went so far as to say in our hearing that she would sooner be without the car than the screen. There is no doubt that with it a considerable amount of comfort is obtainable for the occupants of the back seat of a touring car. The stand also com-

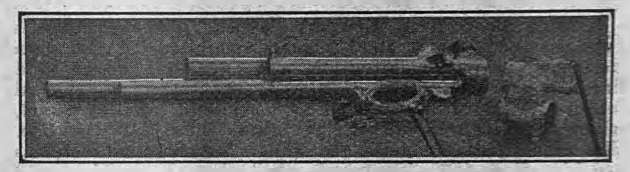


The Seabrook combined acetylene and electric burner.

prises an almost endless variety of body builders' fittings, in which Messrs. Auster specialise Several extremely neat folding seats for limousines are shown, the latest of which was recently illustrated and described in our columns.

BENTON AND STONE, Birmingham (224).—Several good novelties as usual are to be found on this stand. First, one notices a swivel hand pump mounted on the dashboard for keeping up the pressure in the petrol tank. The swivelling enables the pumping to be performed much more conveniently than with the ordinary fixed pump. Another hand pump is for feeding lubricant, and is provided with two ways. A new valve cup with bayonet joint and spring pad has considerable practical advantages over the usual screw-on cup in not wearing the washer, etc. The H.P. carburetter, for which the firm are wholesale agents, is exhibited, and also special devices for the improvement of forced feed lubrication.

BLERIOT, LTD., Long Acre, W.C. (207).—The Blériot P.H.I. electric lighting dynamo was fully described in *The Autocar* very recently, and this machine naturally forms one of the principal exhibits on Messrs. Blériots' stand, which, however, includes a very large range of handsome well finished electric and acetylene lamps. They are now made in nickel brass and black nickel finish. This firm are now placing on the market the Bleriophone, which is a combination of a musical exhaust horn and cut-out. The former has four pleasing notes, brought out by using pipes of different lengths, no reeds entering into its construction. The cut-out valve, which is controlled by a small pedal on the floorboard, has two positions, the first sounding the



The new Bleriophone exhaust horn.

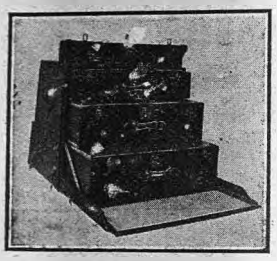
horn by deflecting the exhaust gases into it, the second completely opening the cut-out, giving free exit for the exhaust.

THE BOSCH MAGNETO CO., LTD., Newman Street, W. (267).—It may fairly be said that the Bosch stand bristles with new developments of their well-known magneto. The two-spark machine is shown. This is practically a single-spark generator with two distributers firing two distinct sets of plugs, either of which can be used separately or together. A new machine is shown for two separate ignition systems. This has two contact breakers and a double distributer, one set of plugs being used for the accumulator circuit and one for the magneto. Still another introduction is a small primary coil, which gives a self-starting effect and uses the high-tension winding of the magneto armature for intensifying the spark. In this case only a single contact breaker is used, a special fitting being provided on the contact breaker cover. Yet another new machine is one in which a centrifugal governor is employed automatically to advance and retard the spark, thus doing away with any necessity for hand control. The automatic arrangement is notable for its robustness and excellent workmanship. A new magneto has now been introduced with a hand-operated helical advance, by which means the armature is, as it should be, advanced uniformly with the contact breaker. The Bosch Co. have now introduced a special type of machine for use with very low speed engines, which is shown producing fierce sparks at below 100 r.p.m.

BRANSOM KENT AND CO., LTD., Great Eastern Street, E.C. (168).—This firm stage a very large selection of accessories of all descriptions, notable amongst which are pumps, motor clocks, and horns, including some of new and taking design. One little accessory particularly caught our eye, viz., a tyre lever in which the extremities of the prong are furnished with a ball situated in a socket, which forms a cage and allows the ball to rotate. The feature of this instrument is that it allows the lever to be more readily inserted under a stiff cover, so that the harm which

often results from hurried and forcible use of the lever is avoided. At the same time the new lever is in general appearance the same as the more usual type. Motorists who require to select a full or partial kit of tools will find all their wants stocked by Messrs. Bransom Kent, who display all kinds of tools in large variety. Mention must be made of their "Boko" and other plugs. Hall spare wheel, and the E.I.C. pistol switch for independent dual ignition systems, all of which are supplied by this firm.

J. B. Brooks and Co., Ltd., Great Charles Street, Birmingham (214).—This well-known firm are showing a large range of their motor trunks and tyre cases and general travelling equipment suitable for motorists. They also exhibit their special sparking plugs and magneto. The plugs are claimed to be absolutely gastight and rustproof; a good feature of these plugs is that they contain no packing. The special point of the trunks, apart from their excellent quality and finish, is found in the patent fastenings by which they are secured to the car or to each other. No straps are required. The fastening, which is a kind of metal buckle, can be instantly attached or released, and provision is made for securing it by a padlock. It renders the trunks perfectly immovable, and thus prevents any possibility of their rubbing against and damaging the panels of the car. The firm's patent extending tool cabinet is this year made to form a spare seat, which will be found most useful in emergency. Motorists will appreciate the company's chested trunks, an arrangement by which one or more are enclosed in an outer dustproof casing, so that at the end of a journey the trunks may be taken out entirely free from dust or mud. Almost every variety of trunk and fitment useful to motorists will be found on this stand, and will well repay examination.



A chested trunk to fit on the luggage grid, shown by J. B. Brooks & Co.

A Comprehensive Display of Accessories.

Brown Bros., Ltd., Great Eastern Street, E.C. (212).—This firm have a very representative display of motor accessories, the principal item amongst which is, perhaps, the Gabriel horn, which, in its improved form, *i.e.*, with four notes, we described in *The Autocar* of October 22nd. A large range of Autoclipse head lamps is shown, together with a great variety of smaller motor fittings, notable amongst which is the Twitchell tyre pressure tester and some neat adapters for avoiding the necessity to screw the pump on to the valve. This firm also exhibit the Roper patent speed control, and a host of other accessories.

The Collier Tyre Co., Ltd., 127-130, Long Acre, W.C. (296).—An unusually varied selection of tyres is to be seen on the stand of the Collier Tyre Co., most of which are manufactured by the well-known Italian firm of Pirelli. These tyres form the leading feature for next season, the main types being those of the steel-studded non-skid types and the plain patterns with square fluted treads. In addition to this are others manufactured in England, among which are the smooth round tread and the rubber non-skid. Other exhibits on the stand include the Collier "Bolted-on" tyre, in which are incorporated a number of threaded eye-bolts, and through which a continuous band passes in the beading. When in position on the rim, these bolts project through it and are retained in position by nuts. This device has been in use for some years, and is now re-introduced in an improved form. Another interesting exhibit is the Collier gauntlet sheathed tube, which is provided with a canvas-rubbered envelope or sheath.

The Continental Tyre and Rubber Co. (Great Britain), Ltd., Clerkenwell Road, E.C. (308).—The well-known Continental exhibits include an unusually wide range of tyres and allied accessories, for which this firm is famous. Made in a large number of sizes, they are suitable for all the lighter types of self-propelled vehicles, and, in addition, are supplemented upon this occasion by a solid tyre with wide ribbed tread attached in an ingenious manner to a detachable rim. This article is remarkably resilient, the manufacturers having obviated the dead feeling sometimes found with tyres of a non-pneumatic pattern. Very striking are the firm's red-black steel-studded pneumatics of well-known merit. Particularly strong in character in their later forms, they are noticeable for the first-class quality of material employed, not to mention the admirable system on which the studs are incorporated in the tread. There should be in future no trouble whatever with studded tyres, as a particularly clever process has been adopted, which incorporates all the details in one complete whole. Other exhibits on the stand include a fluted grey rubber tread and a similar quality with three circumferential ribs, both being designed for heavy cars of enclosed type. These articles are flanked by a sturdy brand of motor cycle tyre, also in grey rubber, manufactured with a variety of treads. It is worth while drawing special attention also to the repair outfits marketed by the Continental Tyre Co., among these being a large variety of patches of various shapes, ranging from small sizes suited to motor cycles to lengthy articles calculated to give admirable service on heavy limousines. Sections are also shown of pneumatic and solid tyres, which enable one to obtain a good idea of the excellence of their manufacture. In addition to the above there are also accessories such as car buffers, improved rubber security bolts, radiator fillers, lamp and tyre covers, and a number of waterproof canvas articles.

Silent Chain Drives.

The Coventry Chain Co. (1907) Ltd., Coventry (162).—A particularly interesting feature that should have been on view on this stand had not materialised at the time of our visit. It is a chain-driven gear box of new design, which has several excellent points, and which we shall have pleasure in describing later. The exhibits on the stand comprise the usual excellent type of Coventry roller chains and chain wheels to suit, designed for every type of motor vehicle. Then, again, there are the Coventry noiseless chains and gear wheels, introduced for use with camshafts, magnetos, timing gears, and gear boxes. The chains on view range from beautifully made, small, and delicate models, to very large sizes of the compound patterns. It goes, of course, without saying that the manufacture is of the best, and the design all that can be desired. On the stand are working models, in which the action of the chains can be seen, comprising in some cases magneto drive, and in others chain transmission of various sorts.

The Cowey Engineering Co., Ltd., Kew Gardens, W. (271).—In addition to the present types of the "All-British" Cowey speedometers, a new pattern is being marketed for light cars. This registers from five to fifty miles an hour, and sells at a lower price than the bigger patterns. The indicating dial has been improved by being made of metal, on which the figures are stencilled in a very clearly visible manner. The new Cowey patent engine starter can be seen working here. This enables the engine to be started from the driver's seat, and is easily fitted to existing cars.

Donne and Willans (1909), Ltd., Gillingham Street, S.W. (167).—The Kopalapso Cape cart hood shown on this stand is particularly notable for three features, namely, that it can be easily operated by one man, that it requires no adjustment to the front seats, and that when being folded back or erected it does not in the least incommode passengers in the back seats. The rear part of the hood is arranged on sticks of the usual kind, the extension forward involving members which work on the lazy tongs principle, but with considerable amount of extension in the jointing arrangements.

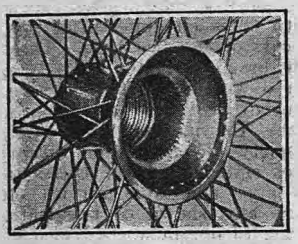
Drummond Bros., Ltd., Rydes Hill, Guildford (235).—This is always a fascinating exhibit to the motorist who has a taste for practical mechanics. In addition to the little five guinea cylindrically bedded lathe, a more elaborate lathe and a radial drill is exhibited, together with a new universal grinder. This latter appeals more particularly to the garage proprietor and repairer, but the former tools, as already indicated, are highly suitable for the private owner's use.

Everything but the Car.

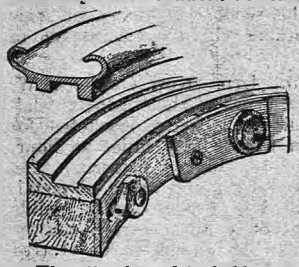
Alfred Dunhill, Ltd., Euston Road, N.W. (219).—This firm have a large display of motor clothing and various car accessories, including lamps, horns, sparking plugs, tyre holders, Thermos flasks, mirrors, etc., etc. Amongst other articles we noticed some rather neat looking movable spanners and the Adair jack, which has some useful features about it. Messrs. Dunhill's motto is "Everything for the motorist except the motor," and an inspection of their stand shows that they live up to this motto.

The Dunlop Pneumatic Tyre Co., Ltd., Birmingham (302).—Among the most attractive features on the stand occupied by the Dunlop Pneumatic Tyre Co., Ltd., are the newly-designed patent detachable wheel and the new Dunlop detachable rim. Both of these are the outcome of numerous

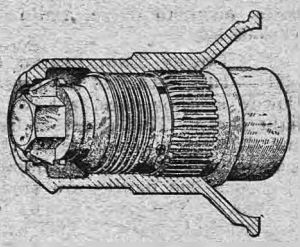
tests and great experience, and are presented in forms calculated to appeal to practical men. The Dunlop detachable wheel is notable for its simple action and accurate manufacture. There are no loose parts, and a few turns of a spanner draws the wheel off, a similar movement in the opposite direction replacing it. In a device of this sort it is highly essential, of course, to prevent any chance of a wheel coming adrift unexpectedly. This problem has been tackled, and, needless to say, overcome, the method being ingenious and simple. This device consists of a pair of double-acting pawls placed opposite each other in the hub cap. Actuated by a strong coil spring the pawls are protected from grit by a tubular cage, and there is also an emergency lock, consisting of the stops arranged on the pawls in front of the teeth. Its operation is automatic, as, when the wheel is put into position and the spanner removed, both pawls engage simultaneously with teeth in a ratchet ring attached to the interior of the nave of the wheel, the effect being, in fact, to lock the wheel twice over. What is particularly interesting about the Dunlop detachable wheel is the method of transmitting drive. The hub, so to speak, is serrated or fluted in a direction parallel to the axis, and the hub cap formed to correspond, so that when the latter is put into position the two engage with each other in something like sixty places. That this method is preferable to that in which the drive is transmitted by one or two points only is obvious even to the most inexperienced motorist. This wheel has been considerably improved since its recent introduction, and forms a valuable accessory to the automobile. The Dunlop detachable rim is another excellent feature, and will appeal to those whose cars are fitted with fixed wheels. It is easily operated, as one has merely slightly to loosen eight nuts on the flange and give the hexagon nut on the locking plate another quarter of a turn, contracting the flanged ring, the diameter of which thus becomes less than that of the steel hoop on the wooden felloe. This being done a tap with a mallet will loosen the rim sufficiently for one to pull it off by hand. It should be noticed that with this rim it is not necessary to remove the valve dust cap. Other exhibits on this stand include samples of the Dunlop grooved and studded tyres, the firm's new security bolt protector, specimens of Pfleumatic tyre filling, and numerous accessories.



The Dunlop detachable wheel. The inner side of the hub.

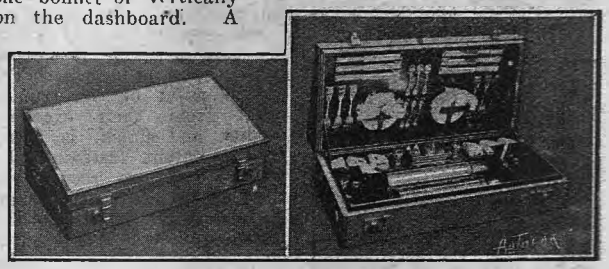


The Dunlop detachable rim, with the rim shown detached. The flanged nut is given a half turn to contract or expand the ring.



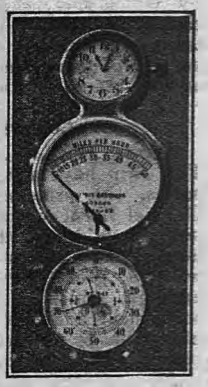
The Dunlop detachable wheel, part sectional view showing the driving serrations and square locking thread.

THE ELECTRIC AND ORDNANCE ACCESSORIES CO., LTD., Aston, Birmingham (252).—In addition to the Timken roller bearings, which we have already described in a recent issue, and which are shown adapted to the various parts of the car, several examples of the new Hall E.O.A. dual ignition magneto are shown, incorporated in which system is the neat dashboard switch, which we illustrated in the issue of *The Autocar* of October 29th. A special point of the Hall E.O.A. magneto is that a differential movement is given to the magneto contact breaker and the coil and accumulator contact breaker when the spark is advanced. This is carried out by coupling up the high-tension distributer and contact breaker combined and the accumulator system with the magneto contact breaker by means of a worm gear, both being operated by the same lever. The coil-distributer is contained in a neat vulcanite case and carried at the end of the armature case. It is instantly accessible, being fastened down by spring clips. Three different models are made, differing in the height of the distributer pillar, and it is thus possible to obtain a magneto which will suit any particular engine as regards its arrangement. The distributer brush is very ingeniously made to form a bridge piece between the collecting stud and the four delivery fillets, a single spring keeping it in good contact position against both. In the two-cylinder model two-spark gaps are used, so that the sparks for each cylinder can be distinguished and inspected. The coil used in this system can be mounted either horizontally inside the bonnet or vertically on the dashboard. A special feature of this coil is its ready detachability from the dustproof case in which it is enclosed; it can, in fact be instantly and bodily removed without disturbing any of the switch connections, so that the car can be run on magneto ignition alone.



A combined footstool and canteen for six persons, by Finnigans, Ltd.

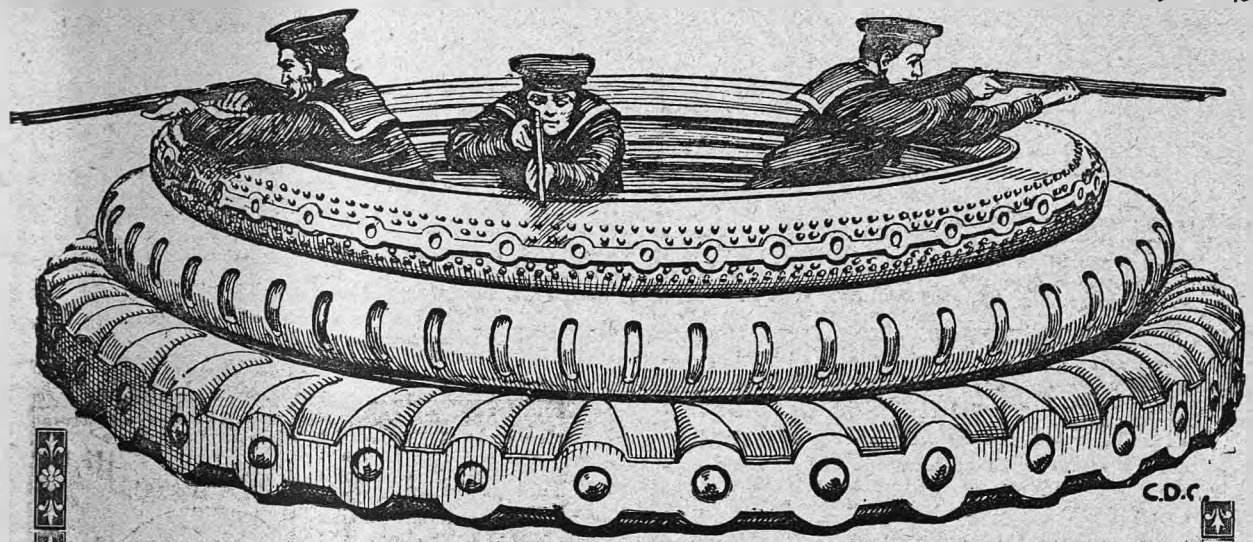
ELLIOTT BROS., Leicester Square, W.C. (237).—The Elliott indicating and measuring devices are shown here in complete form and dismantled. The well-known speedometers are, of course, the leading line, and they are shown combined with other indicators, a most complete type being the No. 9, which shows the speed in miles per hour, the distance run, trip distances, in addition to providing a clock and a barometer. Another apparatus shows the gradients of the road as the car passes over it. Lastly, we may refer to the Wimperis accelerometer, which indicates both the positive and negative acceleration; this instrument was fully described in a recent issue of *The Autocar*. The firm are also manufacturers of micrometer gauges, specimens of which are on view.



A three-dial instrument by Elliott Bros.

ANDRE A. GODIN, Red Lion Square, W.C. (164).—The principal feature on this stand is the well-known Ducellier car-lighting dynamo, which was described in detail in *The Autocar* of October 22nd. No further description is therefore necessary except to say that a small refinement has now been added in the form of a fuse, which is disposed in the circuit between the dynamo and the battery of accumulators, and prevents the dynamo feeling the effect of any mishap which might occur to the accumulators. The fuse is mounted on a fibre plate and screwed to the aluminium case which surrounds the permanent magnets. A capital series of electric head lamps suitable for use with the Ducellier system is shown. The sets, which comprise two head lamps, two side lamps, and a tail lamp, are made in three types of design, all of which are notable for their ease of cleaning and graceful lines. We notice a particularly ingenious side lamp of the square pillar type, which can be used either for electric light or for benzoline. The adapter carrying the glow lamp can be unscrewed and its place taken by a very neat benzoline lamp with a porcelain burner, which is normally screwed into the ventilator of the lamp and withdrawn from the inside. The stand also contains a wide range of Ducellier acetylene head lamps and oil side and tail lamps, together with examples of the Godin electric horns, exhaust whistles, and acetylene generators.

THE B. F. GOODRICH CO., LTD., Snow Hill, E.C. (300).—The well-known Goodrich Co. have on view their usual attractive display of practical articles that have stood the test of time and wear under all conditions. One of the features of



"BESIEGED."

The KEMPSHALL

STAND AT OLYMPIA

has been besieged by visitors anxious to see

THE ONLY TYRE WHICH HAS GAINED R. A. C. CERTIFICATE FOR NON-SKIDDING,

together with the Kempshall Anti-skid Tyre, Grooved Tyre, Patent Fearnought Liner, Detachable Rim, Pressure Gauge, Double Action Pump, and Emergency Patch.

THE KEMPSHALL TYRE CO. (OF EUROPE), LTD., 1, Trafalgar Buildings, Northumberland Avenue, LONDON, W.C.
Telephone: No. 244 Gerrard (2 lines). Telegrams: "Studless, London."
Birmingham: Reginald G. Priest, 71, Lionel Street. Paris: 46, Rue St. Charles. Antwerp: 61, Rue Haringrode.
Agents for the United States: Cryder & Co., 583, Park Avenue, New York.

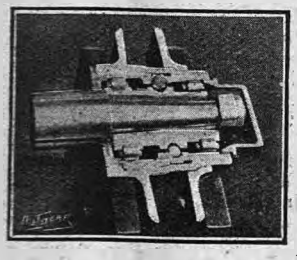
the stand is the Goodrich non-skid tyre of the metal studded type. In addition to the metal studded type there is a large range with rubber studs, the advantages of which have been obvious ever since their introduction. These tyres are the result of much painstaking experiment on the part of a numerous scientific staff who have every facility at their disposal. Suitable for road or track alike, the Goodrich rubber studded anti-skid tyre is unusually resilient and durable, and possesses the by no means insignificant advantage of being easily handled. For the first time this firm are introducing what they term their flush-sided tyre intended for use with detachable flanges such as the Goodyear. It may be briefly described as a tyre with a square-shaped bead, that is to say the foot of the tyre or the portion that lies next the rim is straight-sided, and has none of the projections necessitated with the ordinary motor car rim. By the way, another interesting point on this stand is the cushion beneath the tread on the steel studded portions—a principle introduced recently by the firm with great success. Manufactured of the best Para rubber, it adds greatly to personal comfort as well as to the life of the tyre.

GROSE, LTD., Northampton (284).—The well-known firm of Messrs. Grose, Ltd., have a highly interesting number of exhibits of an eminently practical character. They are divisible into three groups, one being their complete tyre, with, of course, their non-studded tread, the others comprising their patented non-skid tread intended for both vulcanising to ordinary plain tyres, and also for use as a separate and detachable article. In all cases the treads, which are of excellent manufacture, are attached firmly to a band of specially treated chrome leather that is flexible and waterproof. In the case of the detachable band a number of small clips are placed round the beading, the intention being to slip them into position underneath the flange of the rim, where they are held by air pressure. The metal studs are of high quality steel, specially hardened and embedded in a stout band of rubberised chrome leather, which in turn is attached again to another still wider, combined with the chrome leather tread proper. The latter, it should be remarked, embraces the whole of the outer cover from tread to beading. Special provision has been made in the metal clips attached to the beading of the detachable band, and while light, they are immensely strong, and of a shape calculated to give complete satisfaction. Carefully riveted to the beading of the main chrome surface they entirely obviate any chance of tearing out.

Steam Vulcanisers.

HARVEY FROST AND CO., LTD., Great Eastern Street, E.C. (208).—The H.F. stand comprises a series of vulcanisers of different sizes, amongst which particularly may be mentioned the Baby, and a car instrument which is eminently suitable for use by private owners. The former of these was, however, described a very short while ago in *The Autocar*, and the latter is so closely akin to it, but on a larger scale, that it requires no detailed description. In principle these vulcanisers employ steam heat, the heat being indicated by the pressure of steam which is produced by a small methylated spirit lamp. One instrument without any alteration is designed to mend both cuts in the cover or put patches on the inner tube, the former being done whilst in position on the wheel. The body of the instrument is made of gunmetal, and it is fitted with a safety valve as a preventive against danger. Special mention should also be made of the H.F. inner tube, in which the makers have sought to reach the highest possible point in quality, and after examining it carefully we must admit we have never seen finer rubber put into a tube. The tube, it may be added, has an invisible joint which for strength and symmetry is indistinguishable from the remainder of the material.

THE HOFFMANN MANUFACTURING CO., LTD., Chelmsford, Essex (279).—Hoffmann balls and ball bearings are shown in the many ways in which they are applied in motor car practice. Sections are shown of the new combined roller and ball bearings front hub, as well as of the usual pattern with double thrust and load carrying ball bearings. There are also on view several testing machines, showing the small effort required to start a heavy load from rest with ball bearings as opposed to the ordinary plain type, whether of hardened steel or the usual bronze. These ball bearings have been successfully applied to both the crankshafts and big ends of engine connecting rods.



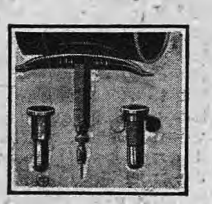
The Hoffmann combined roller and ball bearing.

ERNEST H. HILL, LTD., Sheffield (226).—The latest inflator exhibited here (and inflators are this firm's speciality) is the Nesthill three stage compressor. The feature of this is that the air, instead of being delivered direct from the outer barrel to the tyre, is transferred first to a container into which it is compressed, this, it is claimed, rendering the work considerably easier, a light man being able to inflate the tyre to 80 lbs. pressure without difficulty by hand. The firm have recently taken up the manufacture of mirrors for motor cars, and these are made flat, convex, and in other forms.

A Tyre Deflation Alarm.

H. M. HOBSON, LTD., 29, Vauxhall Bridge Road, S.W. (206).—On this stand are shown several varieties of the famous Pognon plugs which are now made, some with double platinum electrodes, some with single platinum electrodes, and some with the usual type of double nickel point. The Claudel Hobson carburetter is now shown in several varieties as adapted to particular makes of cars. A new model is shown which is entirely hot water jacketed, but otherwise the carburetter has undergone no change from last year. Two interesting little accessories noticeable on this stand are the Hobson tyre clamp, which takes the place of the ordinary valve adapter and renders the use of security bolts unnecessary, and the Crick-crack tyre alarm, a neat little contrivance, consisting of a pressed steel plate, which is put on the inside of the wheel and bolted up to one of the spokes. Upon the tyre going down the plate comes into contact with the road surface, and in rotating gives forth a series of sharp penetrating sounds which cannot fail to be heard by the driver. On this stand is also shown a range of Eisemann magnetos, including the new dual ignition type and the automatic advance machines, both of which have been recently described in *The Autocar*.

THE KEMPSHALL TYRE CO. OF EUROPE, LTD., Northumberland Avenue, W.C. (299).—The Kempshall stand is noticeable for its unusually large display. In addition to their well-known tyres, there are a couple of new patterns, the Fearnought liner and many attractive accessories. The Kempshall ribbed non-skid tyre is reinforced as at the last Olympia Show, by buttresses extending from the turrets on the tread to practically the edge of the beading. This pattern has been long enough in use to give us ground for expressing our belief in its good qualities. Another novelty is the grooved Kempshall in which there is a specially compressed tread, the idea being that should it puncture the wound will automatically close up. There is yet a further new comer in the Kempshall combined steel and rubber studded tyre placed on the market in response to numerous enquiries. Yet another group of the Kempshall exhibits is that in which rubber alone is used on the tread. For example, there are the all rubber heavy non-skid and the all-rubber anti-skid, both being of excellent design and admirably answering to their name. Then again, there are lighter patterns of similar character, which, as well as their predecessors, have gained numerous awards, including gold and silver medals, as well as team prizes. In addition to the tyres on the stand, there are interesting accessories, such as the Kempshall pressure gauge, the Kempshall bolt valve, and the anti-burst device already referred to in the Fearnought liner. The Kempshall bolt valve is an instrument intended for fitting to ordinary tubes to obviate the ordinary security bolts that give so much trouble when one has to change tyres. It is manufactured in various sizes.



The new bolt valve fitted to Kempshall tyres.

J. LACOSTE AND CO., Shaftesbury Avenue, W.C. (172).—In addition to the Vulcan automatic vulcaniser recently described and illustrated in our columns, Messrs. J. Lacoste and Co. exhibit a wide range of accessories, including Lacoste coils, contact breakers, switches, high tension distributers, and the Trion shock absorbers. There are also samples of the Lacostiso, moulded insulating material for all types of electrical work, and the Titan special leather covers for steering and cardan joints. Very compact forms of contact breakers and small electric lamps for use with speedometers are also on view. A neat coil known as the Mors with a single trembler blade is also shown, and numerous electrical switches and pushes, which are turned out very smartly and in a great variety of colours. The stand thus includes a wide range of articles that would appeal to all practical motorists, as they are invariably the outcome of a lengthy experience.

Olympia.—Tyres, Parts, and Accessories.

LAKE AND ELLIOT, LTD., Braintree, Essex (209).—Several Millennium specialities are shown on this stand, amongst which may be mentioned a very effective garage jack, which, besides having a very quick and easy action and being furnished with rollers for quick transport, is so made as to have an effective range of heights between 9½in. and 18in. This jack works with a long lever. The Millennium motor car jack for ordinary use has its lifting performed by a pump-handle lever, and lowering by a worm gear, which gives a very rapid action. This jack is specially made for use with detachable wheels. Amongst other accessories mention may be made of handsome and useful sets of box spanners put up in neat cases, and complete sets of tools for valve trueing and valve re-seating.

LAMPLOUGH AND SON, LTD., Willesden Junction, N.W. (255).—The principal exhibit on this stand is the Lamplough-Albany multiple two-cycle motor, which, while extremely ingenious and interesting, cannot for lack of space be adequately dealt with in this report. It will therefore be fully illustrated and described in an early issue of *The Autocar*. There are also shown numerous examples of the firm's radiator work, prominent amongst which is the Aerotype radiator, in which a series of flat tubes are coupled together with innumerable diagonals of thin plate, the result being a radiator which the manufacturers claim to be the lightest and most efficient produced. The Lamplough hydraulic clutch is also shown. This contains a neat mechanism whereby oil is pumped by the engine-shaft between two cones, thus separating them when the clutch pedal is pushed down; when it is released the cones are brought together with a spring and make a positive, though exceedingly gentle, and progressive engagement. A new sparking plug which the firm is introducing is particularly interesting and ingenious, as by the special design of the porcelain of its internal connection the leads can be attached and detached in infinitesimal time, the connection, however, being perfectly positive, while it is impossible for the adapter to become loose. This firm also shows an exceedingly neat self-locking washer for use with nuts, bolts, studs, etc., which has the advantage of simplicity, while it locks, not only the nut, but the bolt securely into position.

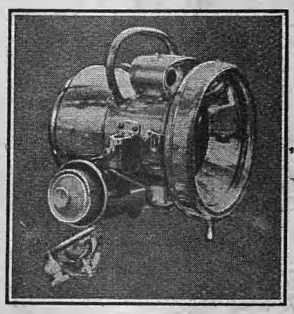
Front Wheel Brakes.

J. LIVERSIDGE AND SON, LTD., Old Kent Road, S.E. (281).—Messrs. J. Liversidge and Son, Ltd., have much that is attractive, as they are marketing the Allen-Liversidge front wheel brakes, the Liversidge non-skid tyre, and the De Nevers tyre, not to mention front axles with wheels and brakes designed for use with any make of car. The Allen-Liversidge front wheel brakes, which are well known and need but little description at the moment, are intended to obviate dangers arising from skidding as well as to give a remarkable reserve of braking power, and they will appeal to people who prefer to be up-to-date in every respect. In their latest form these brakes are neat and compact and very easily handled, and are free from harshness or irregularity of action. The Liversidge tyres comprise an interesting range, including those with plain rounded treads, others with transverse grooves, and others again with a treble row of studs in which rubber and metal alternate. Another highly interesting exhibit is the pawl detachable rim and flange, which is one of the simplest things of the kind on the market, all that is necessary to operate it being a small carriage key of ordinary pattern. The rim is strongly constructed, and consists of the bonding band which is fixed to the felloe of the wheel, the detachable rim itself which carries the inflated tyre, and the detachable flange. The last-mentioned is fixed to the rim by means of a ring lying in a groove and automatically self-locking. The detachable rim is very ingeniously held in place by a series of bolts—twelve in number in that which we inspected—fixed to an endless flat ring, which is rotated by means of a sliding block. The pawls are wedge shaped, and when the ring is moved their lower ends are depressed, engaging with the edge of the bonding band. The locking action has the effect of forcing the taper edges of the rim on to a couple of corresponding tapers on the bonding band. By the way, this firm are also manufacturing a new form of generator for acetylene lamps, which, in addition to being adapted to cars, is being widely used in other directions.

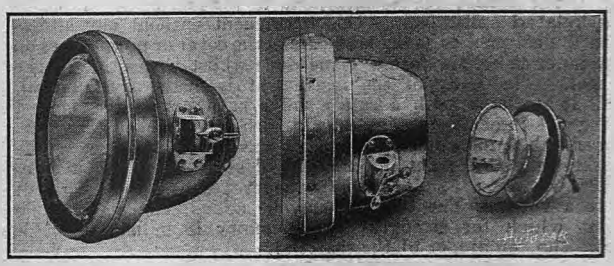
LODGE BROS. AND CO., Birmingham (269).—The Lodge special system of ignition by accumulator and the Lodge coil, in conjunction with a special distributer, is too well-known to need detailed description. The sparking plugs are made in many patterns, with the points protruding different distances into the cylinder. A new pattern has just been brought out with flanges turned on the body to radiate the heat more effectively. The new Lodge spark lamps for ignition testing have been recently described in our columns.

LONGSTRETHS, LTD., 190, Queen's Road, Battersea, S.W. (178).—The principal feature on this stand is the Lithanode dynamo, which is designed on quite mechanically sound lines. Unlike any other improvements of this type, it has two mechanical cut-outs which limit both the output at which it cuts out and also the output which at any speed it can pass to the accumulators, and through which it always lights the lamp. The Lithanode electric lamps used in conjunction with this set are well made, and, in spite of the low voltage, all the lamps are capable of producing a highly-penetrative light. The special feature of the Lithanode accumulators is that they are absolutely unspillable, this effect being obtained by introducing a very cleverly-arranged intermediate chamber between the cell and the air, which allows gas to escape, but successfully traps any liquid. The firm also make a neat inspection lamp, which has the advantage that, in case of need, it can be used as a tail lamp, as the cowl over the lamp is furnished with a couple of red doors.

JOSEPH LUCAS, LTD., Birmingham (213).—The most important feature on this fine stand is the new Lucas King of the Road electric lighting set. As might be expected, a firm of this note have not introduced a car lighting dynamo without subjecting it to exhaustive trial. The new machine is exceptionally well made, and embodies simple principles which are unlikely to go wrong. The battery is cut out by an automatic electric switch as soon as the output of the dynamo reaches a pre-determined minimum, whilst it is prevented from being driven above a safe speed by a very clever automatic clutch, which, at above a certain number of revolutions per minute, allows the armature-shaft to lag behind the driving pulley. The mechanism to perform this consists of a series of half-inch steel balls, which by centrifugal force, are thrown outwards, and in this action tend to open a split cone, into the base of which they naturally try to force themselves. This cone works against the action of a spring which is adjustable, so that the output of the dynamo can be altered to suit any lamp circuit. The machine is strongly made, and, specially designed, weighs when complete 35 lbs. It may be belt driven from the clutchshaft between the engine and gear box. The switchboard for use with this machine is particularly noticeable, as it has been made entirely by Messrs. Lucas in their own works. It comprises a voltmeter and an ammeter, the former of which can be switched into the accumulator circuit to show its condition.



The Lucas N50 with lamp carbide container open.



The Lucas G50 model electric lamp complete, and with "bayonet" secured back removed.

Switches control also the head lamps, side lamps, and tail lamps, the last being connected up in series with a magnet which brings into the circuit a telltale lamp on the switchboard should a filament of the tail lamp break or its connection come adrift. A special switch is provided whereby this telltale effect can be cut out and the lamp used to illuminate the meter dials, or a plug with an inspection lamp can be substituted for it. A fine set of electric lamps have been made to go with this installation, and when we say that they are of true Lucas quality everything possible is said. A new acetylene lamp with self-contained generator known as the Landalite is also shown. The Lucas hydraulic jack, which is really a misnomer, as it uses oil, is an extremely neat piece of mechanism, and the makers guarantee that two tons can easily be lifted with it. A long handle works a small piston

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up and down for forcing a plunger up and lifting the car. The same handle is then taken off and replaced upon a small projection which operates the release valve and allows the car to descend by its own weight. A dual magneto system is shown in which a very clever device is incorporated in order to allow the coil and accumulator ignition to be considerably more advanced, and proportionately so, than the magneto circuit, this being necessary on account of the permanent lag in the coil system. There are two contact breakers under one cover, one being attached to the walls of the cover and the other to the end plate. They are keyed together in such a way that whilst only one lever is used two contact breakers are moved differentially.

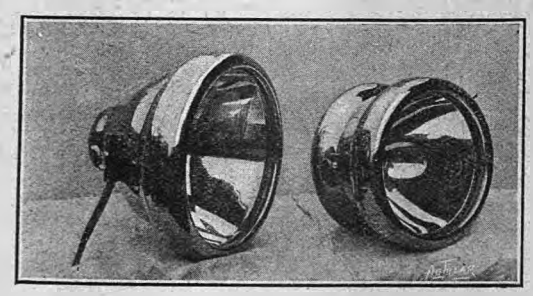
A Well-tried Speedometer.

MARKT AND CO., 6, City Road, E.C. (232).—This firm are devoting the greater portion of their exhibit to the Jones speedometer. This instrument depends upon centrifugal force for its action, and is shown in operation. In addition to speed indication, the distance run is also shown on the dial. The Jones speedometers are made either for gear or belt drive, and in the latter case an adjustable pulley is provided for attachment to the cardan-shaft, for instance, thus allowing the instrument to be set accurately to the car. A special and valuable feature is the provision of a maximum hand, which may be either set to zero instantly when required or fitted with a key release. The Sonoscope will be recognised as a special name for a stethoscope for ascertaining the locality of noises arising from imperfect running.

JOHN MARSTON, LTD., Wolverhampton (272).—Various samples of this firm's radiators are exhibited on this stand, but they can also be seen on many of the best known cars in the Show. They are made in the Megevet honeycomb type, and two new patterns are the M.W. film type, as used on Vauxhall and Lanchester cars, and the new straight oval tube type. Various examples of sheet metal presswork, such as scuttle dashes and body panels, are also exhibited.

MANN AND OVERTONS, LTD., Commercial Road, Pimlico, S.W. (251).—On this stand is shown a number of N.F. magnetos, which are constructed on standard lines, and in which the workmanship is worthy of particular attention. The most interesting exhibit is the Solax carburetter. This instrument has two jets; one, the main jet, is situated in the ordinary mixing chamber, and is furnished with a choke tube, which can be changed to suit various types of engines. The secondary jet is in the float chamber, where it forms the spindle upon which the float slides. This second jet opens into a small chamber in the float chamber lid, whence communication is made to a special form of throttle valve, which consists practically of two butterfly throttles locked together. When the throttle is closed to the main jet it still allows the subsidiary jet to provide a small volume of mixture, but at a position beyond this both jets are cut off. A neat arrangement is included whereby the slow running of the engine can be adjusted to a nicety. On this stand are also shown the Sauser plugs, some of them being fitted with very neat detachable spring terminals.

THE MICHELIN TYRE CO., LTD., Sussex Place, S.W. (307).—Among the features of the Michelin exhibits are the Michelin "Semelle" non-skids and the Michelin "Jumelle" twin tyres, intended more particularly for heavy touring cars. The former are remarkably cleverly constructed, a thick foundation of unwonted durability and tenacity affording admirable support to the rubber and tread. The latter is of the best quality chrome leather, pliable and waterproof, having undergone the severest tests with excellent results. In the chrome leather are incorporated steel studs of peculiar hardness, the method of attachment being such as entirely to obviate any chance of their tearing out. This pattern is made in a large range, and, in spite of its strength, is so flexible as to be readily mounted or removed. We inspected the twin tyres handled by this firm, and were much struck with their practical qualities, as they are calculated to give remarkable steadiness in grease, long life, and uncommon resiliency. The term "Jumelle" is merely the French for "twin" and the articles we saw are of the Semelle pattern, though, no doubt, purchasers may fit any brand they prefer. Other exhibits include the Michelin square-tread tyres, which, being moulded in one piece, form one of the most durable motor car tyres in existence. Then there is the firm's detachable rim, so easily manipulated as entirely to disabuse one of any fears in respect of these articles. Indeed, by the use of an appliance of this nature delays arising from tyre troubles are reduced to a minimum. In addition valuable incidentals are to be seen in the form of the Michelin cylinders, which are very light and compact, filled with compressed air, which is admittedly preferable to the usual carbonic acid gas. In spite of their modest size each of these cylinders is capable of inflating ten medium-size tyres. Practical motorists will note here a couple of little fittings marketed by the Michelin Co., which are their bolt valve and tyre tester. The former is really a valve combined with a security bolt, and proves so efficacious as entirely to do away with necessity for the usual security bolts. This device has already been long enough on the market to gain for itself many friends. The pressure tester explains itself, and, being simple and inexpensive, is an accessory that should be in the possession of all practical motorists.



Two new Ducellier lamps, Nos. 1614 and 1600, shown on Stand No. 164.

THE NEW MOTOR AND GENERAL RUBBER CO., LTD., Euston Rd., N.W. (287).—An industry that will be welcome to motorists is that recently established by the N.M. and G.R. Co. in their process of retreading all makes of tyres with their patented Almagam. On this stand are exhibited a variety of tyres very representative in character, all of which have been repaired by the firm. Even in the case of the steel-studded non-skid tyres the job is to all appearances certainly a very sound one. In addition to repairing motor tyre covers, the firm also manufacture inner tubes of excellent quality and accessories relating to the repairs of tyres. Among them is the R.M. vulcanising compound, intended particularly for use by motorists owning their own vulcanisers. They also manufacture prepared canvas and cement for the same purpose. In addition, the firm are also marketing brushes, pliers, moulds, and other tools. Retreading is carried out on a large scale at Harpenden, where it is surprising what excellent jobs are made of articles apparently far beyond repair. The Almagam itself is, of course, a secret compound, but that it is efficient appears to be beyond question.

Exhaust-heated Steering Wheel.

TOM NORTON, LTD., Llandrindod Wells (184).—Here several interesting novelties offer. The principal exhibit is the Norton stove for use in garages. It is now made with a vent top, which can be connected up to the open air with a fume pipe. There is also an oil lamp designed for safe use, where petrol may accumulate. This gives a good light, and has large glass sides protected by bars. Another lamp for a similar purpose is on the lines of the Davy miner's lamp. The Norton garage tidy is a neat arrangement, in which the chauffeur or car cleaner can carry all his brushes, metal polish, soap, sponge, and leathers, whilst a separate chamber is provided for cloths which have to be kept dry. Quite a new introduction is a specially heated steering wheel, in which the exhaust gases are used to provide extra comfort. The device consists of a tube forming threequarters of a circle, which is placed underneath the main steering, and capable of being coupled up with the exhaust by flexible tubes. The heat can be regulated by a tap.

THE NORTH BRITISH RUBBER CO., LTD., Castle Mills, Edinburgh (286).—The North British manufactured articles have always proved extremely popular with motorists, and cyclists before them. There is an unusually fine exhibit on view, including the company's well-known tyres in full variety, a patented detachable rim that is very easily handled, and a number of highly interesting accessories. The tyres include their plain ribbed tread pattern A, the vacuum grooved tread pattern B, rubber studded tread pattern C, and the steel studded tread pattern D. Then again, they have also a full range of Ducasble cushion tyres, which are so well known as to need little reference at the moment. Whichever tyre we select for examination, the same high quality is noticed throughout, special attention having been paid by the firm to secure the best possible fabric and the highest quality of rubber, and to the important process of building them up

Olympia.—Tyres, Parts, and Accessories.

into a satisfactory article. The North British Rubber Co.'s detachable rim is absurdly simple. Beneath the wooden felloe are six spring clips, which have merely to be pressed downwards to allow the outer flange to be drawn off. This releases a bonding band at the same time, the whole operation being instantaneous. The replacing of the cover, which, by the way, carries the inner tube with it, is equally simple, and the time of the operation required merely a fraction of time. It goes without saying, of course, that the rim is designed to exclude moisture and grit, and to prevent any chance of the rusting of the working parts.

A Resilient Wheel Without Springs.

OSBORN AND CO., LTD., Great Marlborough Street, W. (298).—On this stand are various types of the Lynton resilient wheel, among them being a new form introduced for the first time for use with pneumatic tyres. In this example there is no rocking or oscillating action around its centre. Moreover, it is much lighter in weight and more adapted to private cars. In essence it consists of a metal disc stamped out in usual Lynton pattern and somewhat dished. The periphery of the disc forms the outer flange of the tyre rim, the wheel being in one piece. The disc is retained in position by a conical hub shell, which screws on to a thread of the hub proper, eleven threads being used to an inch, giving, as there are four locking positions in each revolution, forty-four different adjustments per inch. The locking device is simple and effective. This type of Lynton wheel is suitable for any kind of pneumatic tyre, and provision is made for excluding wet and grit by means of a metal band between the flanges. The ordinary types of Lynton wheel are also on view, their chief feature being their power to oscillate around their centres in response to road shocks. They are also shown made in twin form specially suitable for heavy road work.

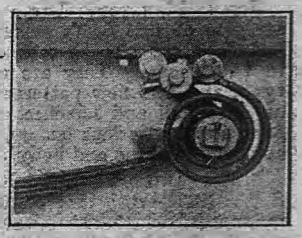
PANHARD AND LEVASSOR (Accessory Department), Acton Vale (218).—On this stand are found a large assortment of spare parts for Panhard cars, together with lamps and various other accessories, including the company's Monogram oils and a mechanical tyre pump driven from the clutchshaft.

THE PARSONS NON-SKID CO., LTD., Store Street, W. (273).—A full range of Parsons tyre accessories are staged, which include the well-tried non-skid chains, the "Sparklet" inflators, and the "Gauntlet" sheathed tube, which should prove a valuable stand-by in case of a burst cover on the road. The Marshall tyre jackets, which were recently described in our columns, are shown on the same stand in an improved form. These are made in several types, including the steel-studded non-skid pattern, and are designed to fit over new or worn covers. They are claimed to relieve the ordinary outer-cover of all abrasive wear from the road, and to relieve it of 95% of the driving and braking stresses. If the makers' claims are fulfilled they should inaugurate a new era in tyre economy.

THE PETER UNION TYRE CO., Great Portland Street, W. (283).—The Peter Union tyres are exhibited in great variety on this stand, where practical motorists will find articles that will give them perfect satisfaction. The special feature of the stand is the new steel studded and rubber non-skid outer cover. In essence similar to their three-ribbed rubber cover, this article has the advantage of a strip of red rubber round the tread, carrying a double row of specially hardened steel studs, the whole being attached in place of the middle rib. It therefore contains excellent non-skidding qualities, as the rubber ribs are of a form and quality calculated to prove of eminent service in this respect. Moreover, the skids are strongly attached to the casing, and are guaranteed to give a long life. Another brand of Peter Union tyres is the flat tread, which carries on it a slight fluting, similar to which is their flat tread of the reinforced type. Having a thicker tread the latter is intended for rather heavier cars than the former. Yet another model is their steel studded tyre intended for heavy touring cars, and is constructed upon a method discovered by the firm after many experiments. Another interesting article on the stand is the Peter Union puncture-proof band. Manufactured of red Para rubber, it is an endless ring of crescent sections, designed to lie between the cover and the tube. Among its good points are that it does not creep, and is valuable as a puncture preventer. Peter Union tyres have gained many honours at home and abroad, and it is interesting to read the list of Continental meetings at which they have scored successes during the past year.

PETO AND RADFORD, LTD., Hatton Garden, E.C. (187).—Attention on this stand is centred in the new P. and R. electric lighting system, which is made in three sizes, differing only in the amperage of their output, the voltage used being uniformly eight volts. In order to allow the dynamo to cut in at the right time an electric switch is used which is operated by coiled electro magnets shunted into the voltmeter circuit. To prevent the dynamo running beyond a prescribed speed a slipping pulley is provided in the drive, which is operated by means of brake pads, which lift themselves off the driving rim on the armature-shaft by means of centrifugal force. In the largest sized set a very neat aluminium switch board is used, which contains a volt-meter and ammeter operated by small push switches and switches controlling the head, side, and tail lamps. In the smaller size sets the switch-boards contain an electric cut-out, which in the larger size is carried as a separate mechanism. A fine set of lamps is made for use with this installation, and is notable for the fact that the electric bulbs are let into the base of the parabolic reflectors and have their glasses frosted in front, so that the reflection of the filament, which is frequently to be seen on the road in front of one, is entirely eliminated. The wiring system is particularly neat and simple, all the wires for the lamps and other fitments being sheathed in brass and diverging from a neat aluminium box. Two other accessories on this stand which call for attention are the P. and R. electric vulcaniser and a foot warmer designed to be used with the car-lighting set.

THE PIONEER ENGINEERING SYNDICATE, LTD., Broad Street, W.C. (246).—The Lever Spring Suspension is a device for supplementing the action of the ordinary leaf spring. The shackle of the leaf spring is carried on the shaft of a coil spring instead of direct. The joint is provided with a ball bearing, and the device may be introduced between the parts of a three-quarter elliptic spring. A model is on view for showing the apparatus in action. It has been proved to be a wonderfully good thing, and is being extensively adopted.



The improved form of Lever Spring Suspension.

G. T. RICHES AND CO., LTD., Store Street, W.C. (222).—The chief novelties on this stand are the Facility rim, Barron's patent security gaiter, the Brooklands non-skid band, and a small novelty in the shape of a malleable bracket for opening petrol cans. This latter can be attached to any convenient part of the car, preferably underneath the platform, and obviates the necessity of taking out spanners or other tools in loosening a refractory petrol stopper. The Facility rim is designed to enable anyone to change the largest and stiffest of covers without effort in a remarkably short space of time. The rim is flanged and circumferentially divided, having an outer ring which bolts up to the side of the wheel with a dozen bolts which pass through the felloe. The inner edge of this ring is flanged inward and provided with a small groove in the inside corner, into which is put a piece of tarred cord. When the rim is bolted up in place this cord forms an absolutely watertight joint, and keeps the tyre entirely free from moisture. An 820 mm. by 120 mm. cover and tube can be removed from the wheel in one minute, and the process of replacing takes but a few minutes longer. Barron's security gaiter is made with inside locking flaps of leather, which securely hold the gaiter in place. In the Brooklands non-skid cover the band has, in addition to a substantial layer of leather over the tyre, two extra treads which form practically a triple tread with a combined thickness which gives almost absolute security against punctures. It is impossible for the studs to come in contact with the tyre, and thus there is no danger of heating and destroying the tube. Plenty of air space is left between each portion of the undertread, so that efficient ventilation of the tyre is ensured, and its resiliency is not affected. The cover is made up in sections, so that any of these can be renewed at slight expense. The whole cover is made of the best chrome leather, and it is stated that it will not stretch, whilst the cost is moderate. Messrs. Riches and Co., in addition, show a large variety of accessories of all kinds.

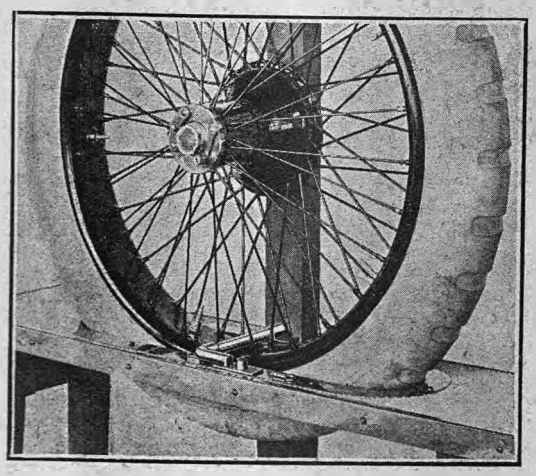
THE RILEY CYCLE CO., LTD., Coventry (306).—The Riley Cycle Company, Ltd., are specialising in their already much-used detachable wire wheels. In effect they may be described as follows: The hub is in two portions, the inner member of which is attached to the axle in the usual

manner, and is not disturbed when the wheel is dismounted, as the outer portion alone is, in this case, removed with the wheel of which it forms an integral part. Both members are conical, their diameter increasing from the outside so that the two members grip so strongly as to take up the major portion of the stress. Attached to the inner flange of the interior member is a stud, used merely as a safeguard, which, together with the gripping qualities just mentioned, makes it impossible for the wheel to shift unexpectedly. The Riley detachable wheel has steel wire spokes set at a slight tangent to the hub, and is both rigid and resilient. Easily dismounted by means of a single key these wheels are bound to be of great service to motorists, as they facilitate tyre changing under all conditions. The Riley wheels can be used with all sizes and sections of tyres, and readily lend themselves to tyre removal or remounting.

A System of Electric Lighting.

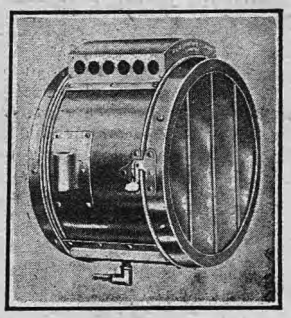
THE ROTAX MOTOR ACCESSORIES CO., Great Eastern Street, E.C. (171).—The principal item on this stand is the Leitner car-lighting system. The dynamo is of quite small proportions, and it is claimed that for its size it has extreme efficiency. The range of output is controlled on the minimum side by an electric cut-out, consisting of two coils operating relays which are in circuit, one with the dynamo, the other with the accumulator battery. When the output of the dynamo reaches a pre-determined limit the cut-out actuates until the pressure reaches twelve volts, which amount of current over balances the reaction due to the twelve-volt battery circuit, and throws the dynamo into full action. When the dynamo generates a current in excess of its normal output the increase of current is automatically kept within small limits, so that the excess is very slight over a large range of speeds. Used with this dynamo is a new switchboard containing an electric cut-out, an ammeter, and also a rotary switch, which controls the head, side, and tail lamps, and also has two positions, by the use of which the accumulators on a long day's run can be steadily charged at a slow rate. This firm makes a large range of electric and acetylene lamps, one of the most notable of these being the Rotax Electrolight, which is not only effective, but neat in appearance and easy to clean. Two special features are the attachment of the front glass by means of a screw-locking ring and a plug adapter, which, situated in the base of the lamp, communicates with the glow lamp by means of internal cables. On the same stand is shown the "Cooper" speed indicator, which works on a simple principle, in that a column of coloured liquid is caused to ascend and descend a vertical tube by means of centrifugal force. It is claimed for this instrument that it reads speeds below ten miles an hour with perfect accuracy. The Simplex one-lever wind shield, designed specially for use with torpedo dashboards, has already been described in *The Autocar*. A notable point about the Rotax stand is that all the goods shown are of British manufacture.

RUDGE-WHITWORTH, LTD., Coventry (290).—Owing to the general satisfaction that Rudge-Whitworth detachable wheels have given since their introduction, the firm have found no reason whatever to make any further modification. Being such valuable adjuncts to motoring, it is certainly worth while drawing attention to the principle of their design and to the numerous successes that stand to their credit. Rudge-Whitworth detachable wheels are made in three types, viz., the double spoked, the artillery, and the triple spoked patterns. We mentioned the artillery wheels just now, which the firm are willing to supply to order; but it will be found preferable to use the stronger and more reliable wire types, in which the firm are specialising. The third model—that of the triple spoked type—is somewhat flatter than the others on the inside, being designed more especially to give a narrow track. These wheels are admirably suited for cars already fitted with wood spoked wheels. The wheels are made in large variety to take practically any kind of tyre, and are suitable for all classes of motor cars. As was the case last year, a safety device is incorporated, which the firm term the hand-operated bolt, and until this is removed, it would be impossible for any malicious individual to tamper with the wheel. For the purpose of dismounting the wheel, a neat form of spanner is provided, a few turns of which effect the operation. It is not without interest to point out that the speedometer plate is not attached directly to the removable portion of these wheels, as is the case with those of the artillery type. Another admirable point is that lubrication can be effected without disturbing the wheel at all. These wheels are made in four different sizes, each of which again, as we have just mentioned, is made in four forms. Rudge-Whitworth detachable wheels are fitted to His Majesty the King's Daimler cars, the new Daimler just purchased by H.M. the Queen, and to the Hispano belonging to H.M. the King of Spain.



A Rudge-Whitworth wheel in position on a running board, showing the new safety locking device to prevent the theft of the wheel.

RUSHMORE LAMPS, LTD., Brewer Street, W. (275).—The famous Rushmore lamps can be seen in all patterns here as well as the automatic shaking grid generator. These lamps are designed on scientific principles after a long experience of naval searchlights. The ground glass lens mirror is wonderfully effective, whilst the new Multiflex front lens should appeal to those who like a wider beam of light than the standard pattern affords. The Sireno electric horns are made in three sizes, and are claimed to be wonderfully effective road clearers. They can be sounded by the usual 6 or 8 volt accumulators used for lighting purposes.



The Rushmore lens mirror plain front head light.

JOSEPH SANKEY AND SONS, LTD., Bilston (292).—The well-known all-metal wheel known as the Sankey is shown here. Manufactured upon well tried lines, there is little in the way of modification to call for comment. An improved locking device, however, is now in use which acts as a safety catch and entirely obviates any danger of detachment. The wheels are remarkably well finished and neat in appearance and enhance the look of the car. Weight for weight they are rather lighter than the average artillery wheel—for example, the 815×105 size weighs 19 lbs. These wheels are immensely strong and lend themselves to being kept clean, as they have no sharp angles or recesses to catch and retain the dirt. With the detachable pattern the Sankey patent detachable hub is incorporated. It is a simple and admirable piece of mechanism. The operation of dismounting the wheel occupies but a few seconds. Sankey's hub can be adapted to any make of car, and is water and dust tight.

A Magneto Self-starter.

THE SIMMS MANUFACTURING CO., LTD., Kilburn, N.W. (249).—There is the usual fine range of exhibits on the Simms stand, including a variety of their magnetos, some of which are in action, and show their efficiency by the length and strength of the spark. Then again, there is the firm's magneto switch starter intended for use with engines with three, four, or six cylinders, designed to obviate the need for magneto dual ignition. It is very simple, one having merely to press a button when the magneto will start the engine. Among the leading types of Simms magnetos are SD4 and SD6, the former being driven at crankshaft speed, and suited to four-cylinder engines of any power, the other turning at one and a half times engine speed and designed more particularly for six-cylinder motors. In each case the armature carries two windings; that is, low and high tension, and there is a safety gap which has recently been lengthened, with a view to prevent the spark passing at this point too readily when a very high compression is used.

Olympia.—Tyres, Parts, and Accessories.

Other types include SU1, SU2, and SU4, designed, as the numerals indicate, for engines with one, two, or four cylinders. In addition, there are many other types, such as those for single and multi-cylinder motor cycles, and others again for gas engines.

THE SIRDAR RUBBER CO., LTD., Crawford Street, W. (285).—The well-known Sirdar Rubber Co., Ltd., are making a special feature on this occasion of their improved pneumatic tyres, in which there is an important modification in the fabric foundation. All their new tyres will have a specially manufactured brand of first-class cotton duck, which when tested recently by the Manchester Chamber of Commerce proved unbreakable under a stress never yet applied to such fabric. In fact, the limit of the testing apparatus (1,000 lbs.) on both warp and weft was reached, and the stress had not the slightest effect upon the fabric. It will be noticed, moreover, that the steel studs in the 1911 Sirdar pneumatic tyres are remarkably hard, and cannot be cut with a file. They are attached to the casing in a specially strong manner, and should prove wonderfully durable. The firm are also adding an extra ply to the casing, which is manufactured on the most up-to-date lines at their works at Bradford-on-Avon. All these tyres are guaranteed for three thousand miles. A special department handles repair work and the manufacture of inner tubes, while to another is relegated the firm's solid rubber tyre industry. The Sirdar Rubber Co. are, moreover, introducing a new solid tyre for commercial vehicles known as the steel banded pattern. The firm have also been honoured by receiving the Royal warrant by favour of H.M. King George V.

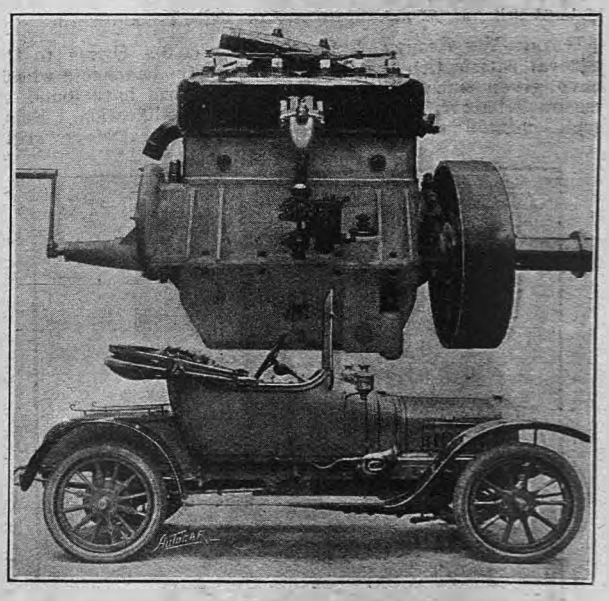
Electric Welding.

SMITH, PARFREY, AND CO., LTD., Fulham Palace Road (262).—As pointed out in our preliminary notice, examples of machine work, electrical welding, and forgings, are shown on this stand. We particularly noticed a crankshaft which had been broken, mended by this firm's electrical welding process and machined up, forming a shaft equally as strong as when it was new. This firm, whose name as wheelmakers has been a tower of strength from the primal days of the horse-drawn carriage, are now making a speciality of laminated springs for car suspension.

S. SMITH AND SON, LTD., Strand, W.C. (115).—Messrs. Smith's latest fitment for the interior of cars is in the form of a plated folding case with an eight-day clock at the top and underneath a small tablet for making notes. The case folds down and discloses in the interior a mirror and two small compartments for pins and a powder puff, which will no doubt be appreciated by ladies. Another interior fitting which is more useful for the male sex is a silver cigarette case with an ash tray on top, from which the cigarettes are ejected one at a time by pressing a small button underneath. The Smith Perfect speedometers are, of course, in evidence, the popularity of which may be judged from the fact that out of 263 cars in the Show which are fitted with speedometers 164 are of the Smith make. The Smith Goldenlyte side lamp and a new type of Goldenlyte lamp fitted with mirror lenses attract attention. In connection with head lights, Messrs. Smith are showing a new type of generator known as the "A.L." In this the carbide is contained in a chamber with slightly tapered sides, and the water can only pass to the carbide in the form of an extremely thin film by what might almost be called capiliary action, and it is said to reach the carbide in the form of vapour. No action at all can take place until one of the taps at the top is opened, and Messrs. Smith state that carbide may be kept without deterioration for at least a week with the container fully immersed in water. The apparatus is strongly made and extremely simple in its parts, and looks a thoroughly good job. A good range of motor horns is shown, including the Adnil electric, which is stated to require but little current. This horn can be arranged to use either 4, 8, or 12 volts. It is substantially made, and looks strong and capable of standing hard usage. Messrs. Smith are showing their car-lighting dynamo with fixed magneto entirely cased in and very compact, and which they state gives entirely satisfactory results. There is a neat switchboard with a four-way switch, by means of which either a tail, side and tail, head and tail, or all lamps together may be put in operation. On this board there are also a couple of two-pin plugs for inspection work. There is also a neat little lamp for illuminating the dials of speed indicators, fitted with a small four-volt bulb.

GEORGE SPENCER, MOULTON, AND CO., LTD., Cannon Street, E.C. (305).—The Spencer-Moulton detachable rim consists of a rim of ordinary type cut circumferentially, so as to form two portions, the narrow one being one-third of the total width. Attached to the back or inside position are eight lugs on the underside, corresponding to an equal number of brackets on the front portion, the latter being secured by bolts passing through the brackets to the lugs. Additional security is given by what is termed a bonding band, which, as well as the rim, has its contracting surface tapered. The rim is maintained in position on the bonding band by a quartette of bolts, which operate in the same lugs as do the front bolts. The effect of the bonding band is to secure the accurate position of the tyre on the wheel. In addition, it keeps the bolts perfectly tight. Simple and clever in construction, this device is strong, and, what is more important still, easily dismounted, so that tyre replacements can be carried out by inexperienced amateurs. The Spencer-Moulton rim has this peculiar feature, which is admittedly valuable in that the rim can be removed completely with a damaged tyre, and replaced by a spare one, or, if preferred, the front flange alone can be dismounted. In this case, the tyre and tube can be drawn off together, and replaced by sound articles without disturbing the major portion of the rim. Among other exhibits on this stand are samples of the well-known Spencer-Moulton tyre, one being particularly suitable for heavy cars, as it is of large section, and of the best possible material. On its tread there are three circumferential ribs separated by a couple of deep grooves, which should give great anti-skid qualities. Another attractive article is the grey rubber steel-studded non-slipping tyre, which is made in a great variety of styles, and a cross-grooved touring tyre that combines resilience with great steadiness on greasy roads. Very interesting also are the sections of tyres on this stand, enabling one to get a good grasp of the special points of construction. It will be noted in the more recent articles that the rubber has been strengthened on the tread by an extra couple of canvas plies in wave section, which, in addition to increasing the strength enormously, in no way interfere with resiliency. There are also on view sections of the firm's solid rubber tyres of their own particular pattern, the quality of which is beyond question.

THE STEPNEY SPARE MOTOR WHEEL, LTD., Llanelly, Wales (280).—There is always much of great interest on the Stepney stand, as the firm are continually introducing new articles or improved types of old patterns. In point of novelty the most interesting, perhaps, is the Davies-Stepney wheel, Type 6, which is intended specially for cars fitted with extra strong beaded tyres, such as Palmer Cord, etc. Then there is a combination Stepney wheel, which is suitable for cars having different sizes of tyres on front and back wheels. Intended for flange attachment, this wheel carries a tyre of the greatest diameter in use, and, in addition to being easy to fix, obviates the need for carrying



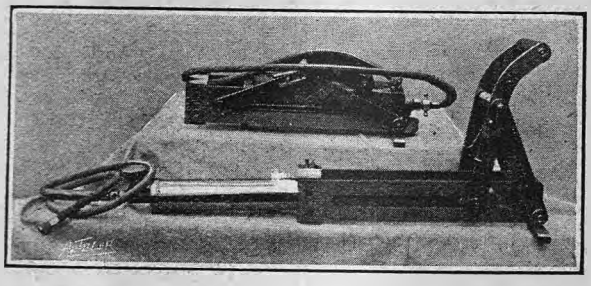
The new 15.7 h.p. six-cylinder Delage engine and a chassis complete with two-seated body. The engine has a bore and stroke of 65 mm. × 125 mm., and, as shown in the upper illustration, is cast en bloc.

two spares. The Stepney wheel is thus made in five patterns, of ordinary and combination types, one intended for cars with wire-spoked wheels, the improved pattern for flange attachment just mentioned, and the Stepney combination flange wheel with four flanges, in addition to which there is the new Davies-Stepney wheel just referred to. Other articles on the stand include a large range of pneumatic tyres, among them being the Stepney grooved pattern, the Stepney smooth-treaded tyre, the Stepney road-grip tyre with strong transverse rubber ridges on the tread, and their well-known steel-studded patterns. There is also a selection of black leather cloth waterproof tyre covers, and the firm's air pressure and motor pump. Nor must we forget to mention the Stepney mudguard extension and the firm's tube corsets.

THE STEWART AND CLARK MANUFACTURING CO., Denmark Street, W.C. (261).—Stewart's speedometers have undergone no change either in mechanism or construction, the only fresh feature being the neat black nickel finish in which these instruments are now to be obtained. The principle of these speed indicators was fully described in a recent issue of *The Autocar*, and they are so well known and favoured by the public that a detailed description is unnecessary at the moment.

THE TORMO MANUFACTURING CO., Bunhill Row, E.C. (163).—Here are shown numerous examples of the well-known Tormo bearings, the particular features of which are that the rings and cups are made to very close gauges and of special chrome nickel steel, which is hardened throughout. A particular split form of case is used, which is made of a special light alloy of aluminium. For road bearings the double ball race is used, which is capable of taking very high radial stresses, and at the same time sustaining end thrust.

UNITED MOTOR INDUSTRIES, LTD., Poland Street, W. (221), show a large variety of motor accessories, including head lights, lamps, horns, sparking plugs, tyre inflators, spare wheel carriers, and the like. The firm are showing samples of the D.W.F. ball bearings, for which they are sole agents; also the Mea magneto, the principal feature of which is its unusual shape. The advance and retard are obtained by rocking the carcase of the machine on its stand. There



A new U.M.I. foot pump shown folded and open for use.

is a useful attachment on this machine by which the particular cylinder which is firing is indicated by a number appearing in a small window. The machine is very neat and compact, and requires no straps, it being held down to the motor by two bolts. All the parts are extremely accessible, and the whole machine can be dismounted in a few minutes with the aid of a screwdriver. This type of magneto was fitted to the Benz car which was successful at the Gaillon Hill-climb, in which the world's record was beaten. The firm are agents for the Hall spare wheel, of which samples are shown. They are also showing the Castle Marathon tyre pump, a foot-operated pump with toggle lever action, by means of which, with the small car size of machine, an 810 by 90 mm. tyre may be pumped up to a pressure of 70 lbs. in two minutes. This pump can be folded up into very small space, and is very neat and compact. A larger type of pump is shown suitable for garage work, which is double the power of the one previously mentioned. A full range of the well-known L.M. plugs is shown, and also the Castle coils, accumulators, jacks, and other accessories.

VAN RADEN AND CO., LTD., Coventry (278).—A full range of the Van Raden ignition specialities and accumulators are shown, including the new type of woven glass accumulators in celluloid cases for a high discharge rate, specially adapted for electric lamp work. There is also a complete set of well-finished electric lamps for car lighting. A special type of battery in a strong wooden case is made for this work. The company make a good show of induction coils, in the manufacture of which they have specialised for a number of years past. Prominent in this connection is a four-cylinder synchronised coil. This has five units, the centre one being devoted to the condenser and trembler. The trembler mechanism is readily detachable, and a spare one is supplied.

C. A. VANDERVELL AND CO., Warple Way, Acton Vale, W. (195.)—The C.A.V. car lighting system is naturally the *pièce de résistance* on Messrs. Vandervell's stand, and as this device and the lamps which are used in conjunction therewith were so recently described in *The Autocar* (September 24th), it is unnecessary to go into further details. However, there is also to be seen a large range of accumulators and coils, the Ruthardt magneto in various sizes, and also the new C.A.V. magneto, which is being fitted to Daimler cars.

WHITE AND POPPE, LTD., Coventry (250).—In addition to their wide range of engines, described in *The Autocar* of Oct. 22nd, Messrs. White and Poppe, Ltd., are showing the latest types of their popular carburetters. The new modifications are designed with a view to obtaining greater efficiency and silence in action. Among them is the variable jet type, suitable for all classes of petrol engines. The new carburetters are very smart in appearance, being turned out with dark grey float chambers, light grey attachments for the induction pipe, and finished in highly polished brass. The variable jet is a system already well known to our readers, and in this a rotating cap alters the jet aperture in size in accordance with the throttle position. The quantity of fuel that passes through the jet is automatically regulated to suit the air admitted at any given position.

The Oil Section.

Although perhaps not so strongly represented as in some previous years, the Oil Section of the Show, the exhibitors in which are all located in the Gallery, is of special interest to the motorist, since progress would indeed be slow if it were not for petrol and lubricants.

There are two prominent absentees from the petrol exhibitors, these being the British Petroleum Company (the importers and distributers of Shell spirit) and Messrs. Carless, Capel, and Leonard.

In regard to the display of lubricating oils and greases, it is interesting to note that each passing year the firms who specialise in this respect are extending their range of oils until at the present Show we see some firms with as many as a dozen different kinds of lubricants, all of which have their special functions. There is no doubt that in regard to lubricants the advent and growing popularity of the motor car have brought into the market lubricating oils of the finest qualities; and in this respect, progress has been great.

THE ANGLO-AMERICAN OIL CO., LTD.—It is almost impossible to conceive a more attractive stand than that which, upon its somewhat limited space, the Anglo-American Oil Company have arranged for the display of their well-known Pratt's Perfection spirit.

THE BOWRING PETROLEUM CO., LTD.—This young but enterprising firm in the petrol spirit trade make a very brave show with their motor spirits and lubricating oils. Since its introduction to this country, Mex spirit has found an increasing number of consumers; in fact, so great has been the success of the introduction of Mexican spirit that the Bowring Petroleum Co. are now putting upon the market a heavier brand known under the Mexican name of "Aztec." This spirit, whose gravity averages about .745, is eminently suitable for heavy vehicles or taxicabs, and several London garages have already taken it up. "Aztec" spirit is packed in pale blue tins, and, like other heavier spirits, works out a little cheaper than the lighter gravities, in addition to giving more power. The firm's "All's Well" motor oils and lubricants are too well-known to need comment here, the recent achievement of gaining five world's records by their use going a long way to show their perfection.

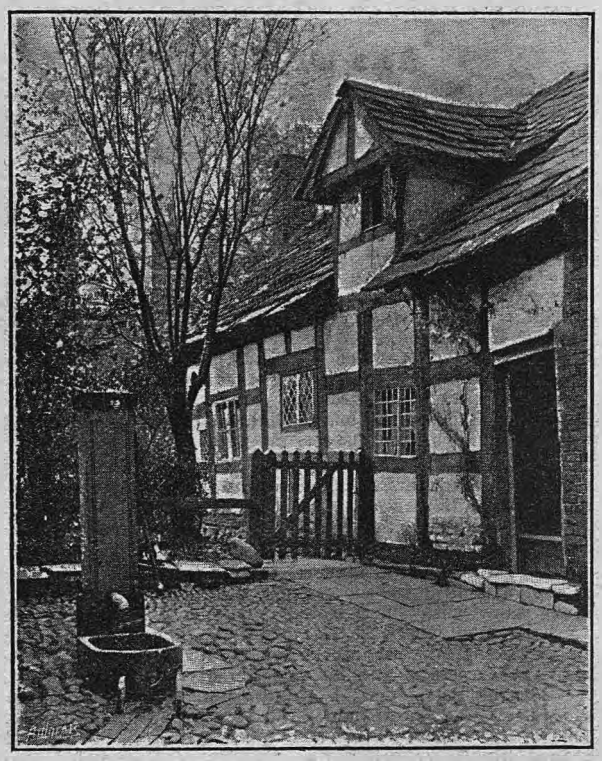
S. BOWLEY AND SON, S.W.—This old-established firm in the lubricating oil and petrol trade have a very comprehensive corner display of their innumerable lubricating specialities. Their Champion oils and greases are on view. It is in regard to lubricants that Messrs. Bowley make a special feature, and their catch words "Every drop lubricates" must have by this time become quite a household phrase with numerous motorists. Another speciality of this firm is their Elastica tyre and mat paint, which will not blister or crack.

PRICE'S PATENT CANDLE CO., LTD.—In a corner of the Gallery is to be found the display of Messrs. Price's Patent Candle Co., whose motor lubricants are so highly appreciated by every careful motorist. This company are making specialities of the whole of the range of their lubricating oils, which are all guaranteed to be absolutely neutral and free from any oxidising or gumming tendency. In order to prove their assertion, the company welcome applications for samples of their various lubricants.

The Motorist and the "Magpie."

A Reference to some of the Chequered Buildings so prevalent in parts of Cheshire.

THE county of Cheshire is prolific in the oak-timbered dwellings known as "Magpies," and we know of no more interesting quest than to seek them out and photograph or sketch them. Cheshire is one of the fairest counties in England, with excellent roads free from heavy gradients, and the motorist who drives about its leafy lanes in search of these ancient homesteads is sure of an enjoyable time. These old half-timbered dwellings were coeval with the "wooden walls of England," and it is to be regretted that they are gradually disappearing in the devastating march of modern improvement. Nothing catches the eye of the motorist so readily as the beautiful chequered fronts of these ancient "magpies." Bars, vertical and horizontal, angles and curves, mingle curiously, but

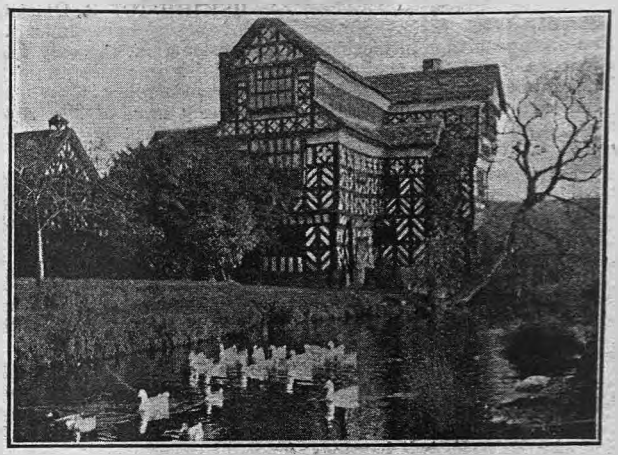


Bengy Fold, Bramhall, near Stockport.

always elegantly, with numerous gables breaking the skyline. In the humbler dwellings the chequer work is generally simple in arrangement, but in the more pretentious buildings the external decoration is most elaborate, and the uniformity so common in modern structures is happily non-existent. The "magpies" are invariably substantially built, withstanding the wear and tear of centuries remarkably well. Storms that have wrecked many a nineteenth century building have left these ancient homesteads unscathed, and to-day their greatest enemy is the restorer, or the man with a mania for brick and mortar.

It may be interesting to the motorist with a love for ancient domestic architecture to furnish a few notes as to the best means of finding out the most notable examples in Cheshire, the Vale Royal of England. Manchester or Chester make good centres for an exploration of the county, and it should be possible to see most of the homesteads referred to in this article in the course of a day's journey.

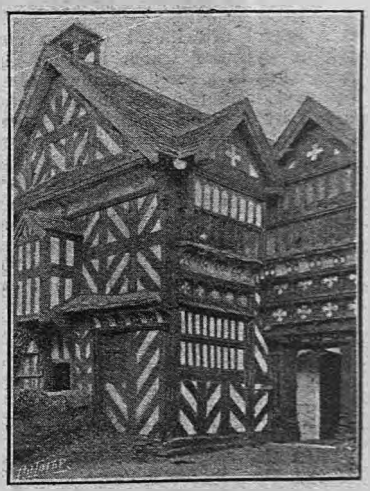
Bramhall Hall, on the outskirts of the village of Bramhall, a few miles west of Stockport, is the ancestral home of the Davenports, and has been occupied, up to recent times, by that family since the



Little Moreton Hall and moat.

reign of Edward III. The interior is not shown, but a request to view the exterior is generally very courteously granted. There was formerly a right of way through a portion of the house, and, it is said, refreshments were provided for travellers free of charge. This laudable custom has, unfortunately, lapsed, but it is fully described by Harrison Ainsworth in "Rookwood." There are several picturesque "magpie" cottages in the village of Bramhall, notably those in Bengy Fold, near the railway station.

Little Moreton Hall is situated on the southern borders of the county, a few miles south of Congleton. It is considered to be the best remaining example of a half-timbered building in this country. It was erected in 1540, and is now occupied as a farmhouse. The public are admitted to view the whole of the buildings, and refreshments are served to motorists and others in the banqueting hall. Three sides of the building are now standing, surrounded by the moat. The entrance is gained by a stone bridge on the south side, and through an ancient gateway to the courtyard. The scene here is one of great beauty, and cannot fail to impress the motorist with its quaint architectural feature-



A corner of Little Moreton Hall showing the carved doorway and the bell cot.

Open Letter.

(9) To a Golfing Motorist.

The Club House,
Magillicuddy's Reeks.

To Sir Roger de Coverly,
The Bunkers, Chertsey.

My dear Coverly,—Adore the new champion! All records gone by the board. I have carved me a niche in the temple of fame. Shall be known in future as all the other immortals are known, not as Tommy Dodd, nor Mr. Thomas Dodd, nor old Tommy, but just Dodd—like Shakespeare, and Moses, and Napoleon, and Marat, and Crippen. I am the mighty driver, the Tee King (sounds like Lipton, doesn't it?), the "Nut," the—well, I am "IT."

But perhaps you've heard already. The news is flashing around the world as I write. Deputations are arriving every half hour with bay leaves. The local wire shop is overwhelmed. My village has sent a mounted messenger offering me the freedom of the parish pump. And a crowd which no man can number surges around the Club House, occasionally sending up a great cry of "Dodd," or cutting lumps out of Murphy's six-cylinder (which I am using out here) for souvenirs! It is very exciting!

Salaam Roger! I have arrived! But, oh! it was a mighty drive. We were playing off the last hole. That is down hill, and we could see home. If I could do it in three, I could tie. Otherwise I lost the pot. The odds were awful. "I felt the world a—spinning on its nave: I felt it sheering blindly round the sun." In other words, I was most confoundedly sick. Hole in three—couldn't be done. Not in *these* trousers so to speak!

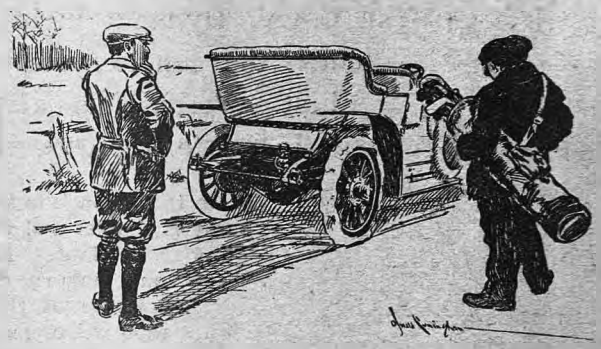
And then I had a sensation. It was as if the soul of all the Dodds of all time (we descended from Adam, you know—fine pedigree) entered into me crying, "Show us here the mettle of your pastures"—and all that sort of old foozle. Anyway, I got a cracked idea into my head that I might do it—took out my best Sunday driver and kissed the iron; sent the kid forward (I dunno why) right away to the green: gave the pilule good tee; swung the club once—twice, and—smote!

Man, you never did! It went singing away as though it knew, straight for the green. The kid saw it coming, but why he cleared the hole heaven knows—unless the soul of the Dodds had got into him also. In a great arc of glory the ball dropped. I saw the kid dancing about with the flag in his hand like a bally marionette mafficking; somebody said, "Oh, good gad!": and I sat down in a puddle of water and wept. I had holed in one!

Ah, well! It is just Kismet. I knew I should add lustre of some sort to the family name before I finished. But it's lucky I bought those new Victor tyre levers you told me of. The back tyre went flat as I was driving down to the links (I wonder what poor old Murphy will say when he sees what the crowd has left of his coachwork). If I hadn't been able to get that tyre off and the new tube in mighty swiftly, I should have been scratched as a non-starter and lost my fame. So I have to thank you, some, for your tip.

The levers acted splendidly. One doesn't have to be a prestigitateur with three levers while trying to dig the fourth in. These Victor levers hold themselves *and* the cover in position. They are really as good as an extra pair of hands. Dirt cheap at 3s. 6d.

Of course, if it had been my own car, the wheel would not have gone flat. No more punctures or bursts since I took on those new **Victor combination tubes and sheaths.**



I wonder you haven't tried them. They are made by the same people who make the levers—Challenge Rubber Mills, Eagle Wharf Road, City Road, London, isn't it.

Try them. They are built up with fabric imbedded in the rubber on the rim side. On the tread side it is all rubber for expansion and resiliency. The sheath of rubber and specially woven fabric is enormously strong, but quite pliable, and covers the tube right down to the reinforcement. So you get protection all the way around. Very easy to fit. Just tuck the tube, slightly inflated, inside the sheath, and put them both into the cover together. I find them easier to handle than the ordinary sort. Levers and security bolts can't nip; sheath simply cannot creep; no bursts or punctures—although I am running on retreads only nowadays, and saving 50% on tyres. I used to save about 33% when I used the Challenge Company's retreads alone. Since they brought out the combination it's 50% quite.

That, of course, is due in the first place to a sound retread on a sound casing. These Challenge people will give you a sound cover free if the cover you send them is rotten. But I think you know that already. Anyway, it's a great idea. Sound material, because they are rubber manufacturers and make their own. Sound retreads, because they have a finely equipped works. That retread will give you at least half the running life of a new cover at a third the cost. Plus the combination, and you get a running life equal to a new cover at half the cost. And now the Victor levers have killed the other bug-bear of changing tyres. That old chap is, together, just plain Eureka!

Thought I'd let you know, as I was writing. One good turn deserves another. Good-bye. I go to address the cheering crowd below!

Yours ever,

TOMMY.

Over the windows the following inscriptions may be read:

"God is al in al thing."

"Thies windows whire made by William Moreton in the yeare of oure Lord MDLIX."

"Richard Dale, carpe'der, made thies windows by the grac' of God."

From the courtyard, entrance is gained to the little chapel, which is only ten feet in length. Service is still held there four times a year, and the main building is surmounted by a bell cot for summoning the retainers to service. In the upper part of the south front is the ballroom, entirely panelled with oak, in which Queen Elizabeth is said to have danced.

The main doorway at Adlington Hall.

On one of the windows of this homestead, some courtier in Elizabethan times scratched the following lines with his diamond:

"Man can noe more know weomen's mind by kaire
Then by her shadow hide ye what clothes shee weare."

A short distance from Little Moreton Hall is the half-timbered hostelry, the Brereton Arms.

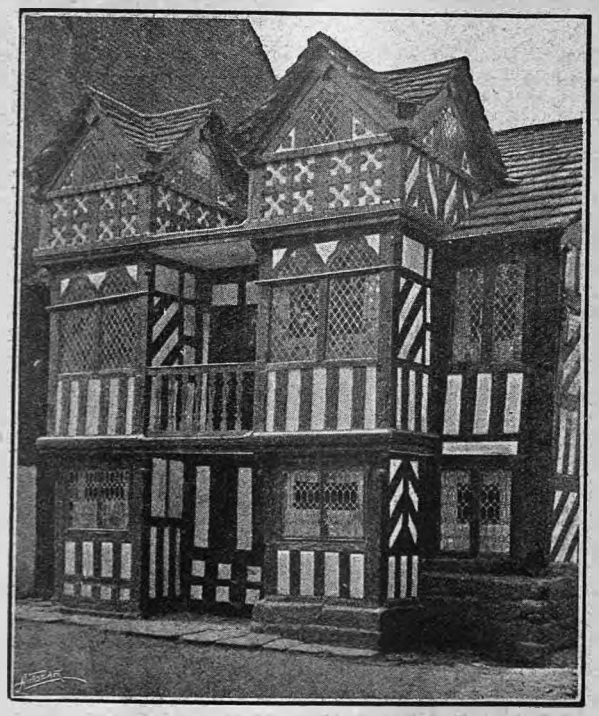
Adlington Hall lies about half-way between Stockport and Macclesfield. It is the ancestral home of the Leghs, and is still in the occupation of that family. Visitors are courteously permitted to view the exterior of the house. Over the Elizabethan doorway in the courtyard is the following inscription:

"Thomas Leghe, Esqyer, who maryed Sibbell, daughter to Sir Urian Brereton, of Hondforde, Knight, and by her had issue foure sonnes and fyve doughters, made this buyldinge in the yeare of or Lorde God 1581, and in the raigne of our Soveyraigne Lady Queene Elizabeth the XXIIgth."

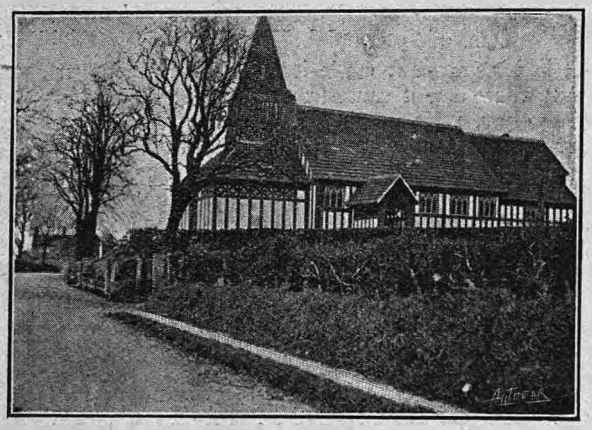
During the Civil War it was besieged by the Parliamentary forces. It held out for a fortnight and then surrendered. The house still bears marks of the conflict at that time. The chief feature of interest within the building is the Great Hall, with its open timbered roof and rich decoration. In a gallery stands the organ upon which Handel delighted to play.

Handforth Hall, now a farm house, which contains one of the finest oak staircases in the country.

About three miles south of Adlington is the somnolent little village of Prestbury, which possesses a beautiful little "magpie" known as the "Priest's House." It dates back to the fourteenth century, and was formerly the residence of the priest, who in Cromwell's time is said to have preached from the balcony to a congregation in the street below.



The Priest's House, Prestbury. The balcony was at one time used as a pulpit.



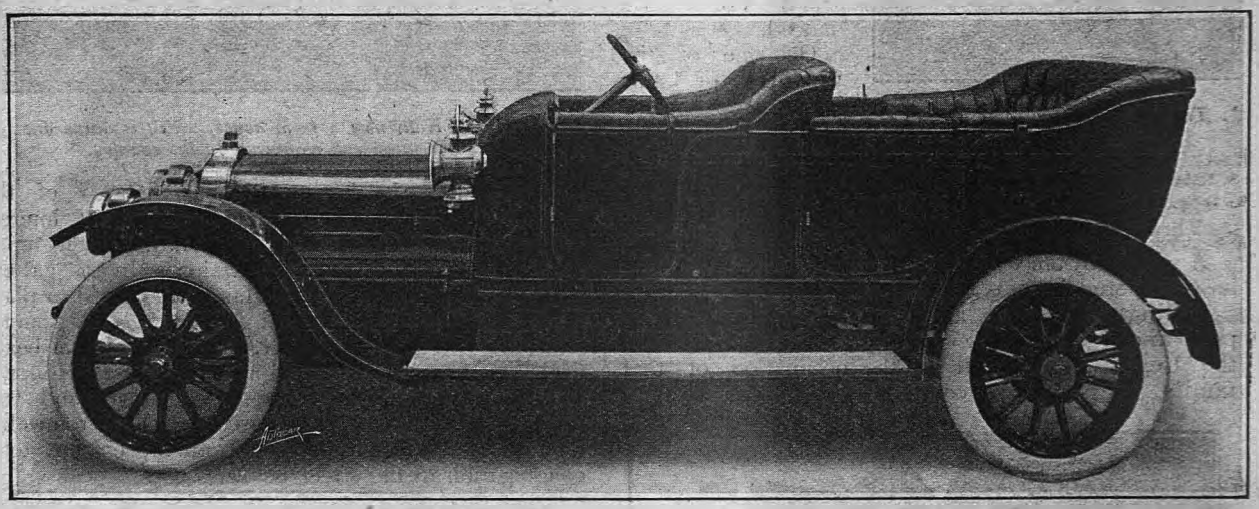
The magpie style as exemplified in Marton Church.

Handforth Hall is situate on the outskirts of the village of Handforth, between Cheadle and Wilmslow. It is now occupied as a farm house, but was formerly the residence of the Breretons. The hall contains one of the finest oak staircases in the country. The magpie style was not confined to domestic architecture, and in Cheshire there are at least three churches built wholly or partially in the half-timbered style.

On the Road.

Insurance Policies. The "Mechanical Breakdown" Clause.

IT had been my intention to devote this page this week to a dissertation on the gentle art of criticising sleeve ports, but a look at the pages of *The Autocar*—First Show Number—unnerved me, and a note to the effect that the next one would be quite large, and if I wanted my article to appear, it had better be well up to time, decided me that, valuable as my *résumé* of the evidence would have been, a few remarks on motor car insurance would be more easily written and stand a better chance of getting "linotyped" in time to be included. To begin with, I am much indebted to the writer "BH 985" [letter 16238], who, while he quite rightly finds fault with my ignorance on the subject, yet says that "whatever Owen John may write will be beneficial if it makes your readers consider some of the difficulties and complicated questions involved." BH 985 has exactly expressed my intentions, and has realised my value. There was a Latin saying (possibly the man who put it in his grammar made it up, for I have never found out where else it came from), *Fungor vice cotis*, which is to say, "I perform the function of a whetstone," or, more modernly, "I am useful as bait"; and it was for that reason that I ventured boldly into the insurance field knowing that, even though I were to be slaughtered, that very fact would cause other amateur and ignorant motorists to see for themselves whether or not they were thoroughly acquainted with all the ins and outs of their policies. But BH 985 does me wrong in thinking that I am of opinion all premiums are too high. My argument has always been that insurance companies mix tares with their wheat (invaluable things, tares, for cleaning the ground or attracting other people's partridges, I believe), or, like the rain, do not differentiate between the just and the unjust, because most of them charge just the same to a careful amateur, who only drives about in his own neighbourhood, as for a chauffeur-driven car that lives and moves in London traffic, never away from the perils of the imminent and deadly cannon's mouth. Between these two poles there is a great gulf fixed, and in that space lies a wonderful quantity of latitude. But there is no need to labour this point, because it is evident to the most prejudiced partisan, and, after all, the question over which most of my correspondents (private and in print) have fallen foul of me concerns actual value, and how much of it the owner of a car entirely consumed would recover. Concerning this point much ink has been shed—if that includes type-written documents—and it is over the answer to it that authorities differ so widely, and policy-holders will suffer so diversely. Therefore, I will leave it, for I feel sure that, should any reader want full information on the subject, redress if he be treated unfairly, or his case upheld even to the Supreme Court of Appeal, he has only to tell his club, union, or association, and it—whichever it be—will be only too glad to use its enormous and rusting unused funds in fighting the case, I don't think. We will now discuss the question of "mechanical breakdowns" by quoting a letter from a correspondent who is a man of great standing in a very important part of this country. I cannot do better than use his own words.



AT OLYMPIA. The 20 h.p. six-cylinder Talbot with a smart flush-sided body.

not only because they cannot be improved on, but also because it will save me time and trouble. He writes: ". . . My recent experience may amuse you. I was driving gaily along when bang went something, and we came to an abrupt halt. The something turned out to be the strap of a big end, and the damage included a bent connecting rod. The whole job only came to a five-pound note, but I thought I would experiment on my 'mechanical breakdown' clause. The company's engineer, after examining the broken parts, reported that the accident was caused by a loose bolt, and was evidently due to fair wear and tear, and was not such as, etc., etc. I wrote to say that I only wanted to ascertain what their policy was worth, and that, as waste paper was not in great demand down here, I proposed to save its further importation at renewal time. Somehow they had got it into their heads that I was one of the female sex, and they wrote me a long dissertation explaining that, owing to my not being an engineer, I could not understand that my position was absolutely untenable. I told them that they were quite right in assuming that my wife was not a member of that profession, and it also did not appear to matter whether I was or not, and then I gave them a nut to crack. It so happened

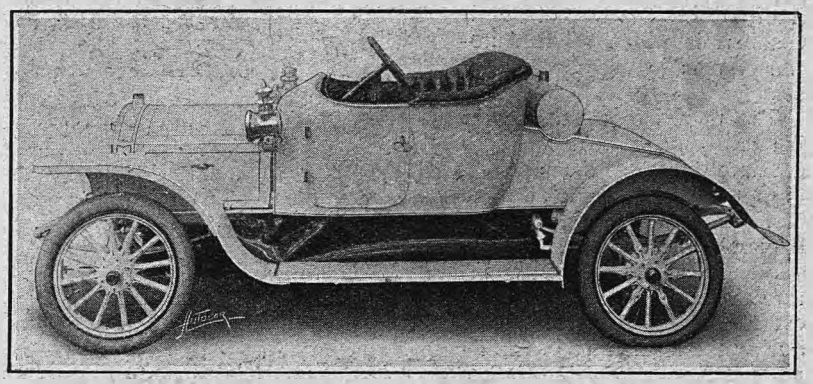
that I had had new brasses to the big ends a very short time ago and the car recently overhauled at the works. The other big ends are, I need not say, as tight as a drum. The insurance people had exp[illegible] disclaimed bad work, so I invited them to subm[illegible] an alternative. I still await a reply. Now, you will see that if they can ride out of their contract by attributing to long use and fair wear and tear an accident to a recently fitted part, it is evident that they can make long noses at me over any imaginable breakdown. If any of this experience is likely to be of comfort to other sufferers, by all means make any use you please of it." Which I do to the full, for I am quite sure that my correspondent's cheerful account of his sorrows will strike a sympathetic chord in the hearts of many another disillusioned motorist.

I wish I could quote extracts from many other letters, and also from explanatory notes on policies forwarded by some of those responsible for them, but I refrain because I might make the unquoted jealous. According to most of the latter, there is no reason why any motorist should ever have an accident that will cost him anything, if only he takes the trouble to insure with the one and only company (mentioned). And here I have a suggestion. Let each company quote typical cases, such as: "A man insured with us ran over a pig at thirty miles an hour. The pig was killed, the car smashed, and the driver hurt. We paid for pig, car, legal expenses, and driver's injuries. As the car had cost and was insured for £500, we paid the owner that sum." Or: "Because B, insured with us, put on his brake so hard, to avoid a collision, that he broke it, and the car swung round and knocked a lamp-post through a plate-glass window, setting fire to the contents, and frightening the proprietor's mother-in-law, so that she never spoke again, we paid the full amount insured to the motorist, half price to the Urban District Council for the lamp, and came to a perfectly satisfactory understanding with the shopman for damage of all kinds sustained."

These two examples of quite ordinary short and simple annals of the car would suffice, for every motorist would see how all-embracing they are, and consequently rush to secure the chance of similar benefits.

Since I wrote this last paragraph, I have been reading a little more of the three hundred page number of *The Autocar* issued last week, and I have come to the conclusion that, because it might be humorously interpreted, it may also come under Mr. Claude Johnson's sweeping dictum that it is ludicrous, and "to be ludicrous is to be undignified. What's worse, it is not argument." Which quotation brings me back to the subject I am really dying to write about, because never since the days of the four and six-cylinder discussion have the drums been beaten so bravely, the dictionaries so ransacked, and the contestants so entirely wide of the original point and object they started talking about. It could have been known to history as "Pot v. Kettle," if the applier of that phrase to it, Mr. Lanchester, had not in his desire to use the same weapons set me wondering if that title now ought not to have added to it the words "Frying Pan intervening."

OWEN JOHN.



AT OLYMPIA. A 12 h.p. two-seated Enfield.

To the Editor of *The Autocar*.

(See p. 637.)

Owen John would like to know
The plural of *incognito*.
At cricket did he never try
Conclusions with th' *incogniti?*
When some great lady travels far
She often goes *incognita:*
In case of ladies two or three
(Or more) the term's *incognite*.
Now I've dispersed his mental fog,
And I remain, Sir, yours, INCOG.

The Protection of the Public.

Is it necessary to ascertain the exact number of miles, yards, and possibly inches, that a motorist may be travelling in a given time in order to prove that he is driving to the danger of the public? Many police authorities and benches of magistrates seem to think that it is. Only recently we reported a case which came before the Potteries Stipendiary Magistrate's Court, in which evidence of this kind was gravely given and accepted in support of a charge of dangerous driving. The stipendiary magistrate afterwards sought to justify this method of proving danger. Other cases of the same kind occurred recently at the Cannock Police Court, before a bench of unpaid magistrates. The police had set a 440 yards trap and installed an elaborate timing apparatus at what they sought to make out was an exceedingly dangerous place on the road between Bridgetown and Four Crosses, and covering the cross-roads constituted by Watling Street and the road leading from Wolverhampton to Cannock. The solicitor who presented the cases for the police stated that the object was to protect the public, as the spot was a dangerous one. Upon this point the defending solicitor elicited from the police witnesses that there were no danger signals there, and he drew the legitimate conclusion that the County Council did not consider the spot dangerous, or they would have carried out their legal obligation under the Motor Car Act, 1903, of putting up danger signals. Nevertheless, the magistrates thought otherwise, and convicted the defendant of driving to the danger of the public. Even assuming the spot to be dangerous, it may be asked in what way a few hidden policemen can protect the public from danger. Let them come out in the open and regulate traffic.

Flashes.

The Searle unburstable tube, which was described in *The Autocar* of October 1st, is to be found in Olympia, though we missed it in our report. It is on Messrs. Benetfink and Co.'s stand No. 194 in the Gallery with a great array of motor accessories.

* * *

In our Show Report, engine and other dimensions are only referred to in special cases. Dimensions of all cars, as well as price and other leading particulars, can be obtained from *The Autocar* of 29th October, in which "The Autocars of 1911" was published.

* * *

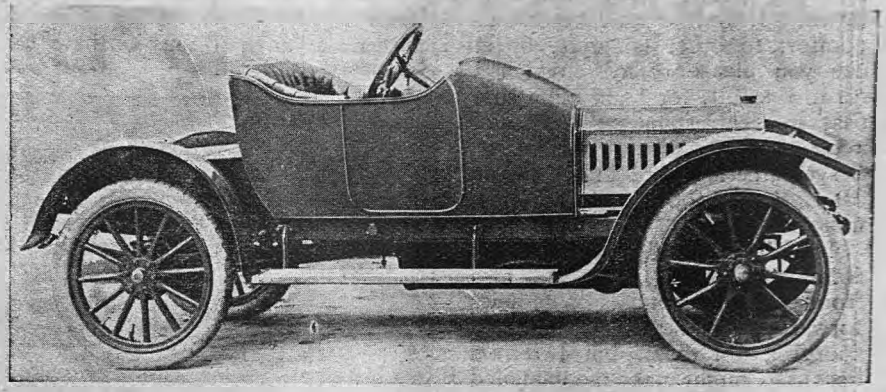
The thanks of all the motor journalists with real work to discharge during the opening days of the Show are due to Mr. C. D. Clayton, the Society's press agent, for his efforts to smooth their ways before them, and to render them every assistance in his power during the maelstrom of the report. Time was when officialism appeared undesirous of aiding pressmen as much as they could have desired, but at the hands of a man whose profession teaches him the value of publicity, the press have this year found much aid and comfort.

* * *

An inset directing the attention of those readers of *The Autocar* who are not already members of the Motor Union to the advantages that may be enjoyed by joining the association is included in the present issue.

* * *

Those who have had the experience of trying to overtake a dust-raising car, only to be baulked by the unmannerly behaviour of the driver in the leading car, will be interested in the defence set up in a recent case at Carlisle. The alleged offence of excessive speed took place at Moorville, and the defendant, Mr. Chas. Wilfrid Lancaster, of Burnley, wrote to, instead of appearing before, the Carlisle magistrates. He explained that for eight miles he had endeavoured to get in front of another car, but the moment he tried the leader swerved his car across the road and prevented him. One last desperate effort to forge his way to the front was made in a police trap, with the result that he was summoned and fined £2 2s. and costs.



To meet the demand for two-seated cars of the semi-racing type Messrs. De Dion Bouton have introduced a special model of their 10 h.p. four-cylinder chassis. This has the control levers placed farther back than usual and somewhat shorter, and the steering column has a considerable degree of rake. A complete car built on these lines is shown in the above photograph. The deep scuttle dash contains the petrol tank, the filler of which may be seen protruding slightly. The design of this body and the arrangement of the chassis as a whole strikes us as being very commendable.

The Management Committee of the Society of Motor Manufacturers and Traders met on Thursday, November 3rd, at Olympia, in accordance with the custom of several years, in order to view any stands or other matters which might be considered to be infringements of the Society's regulations. On this occasion, for the first time on record, it was reported that there were no such cases.

* * *

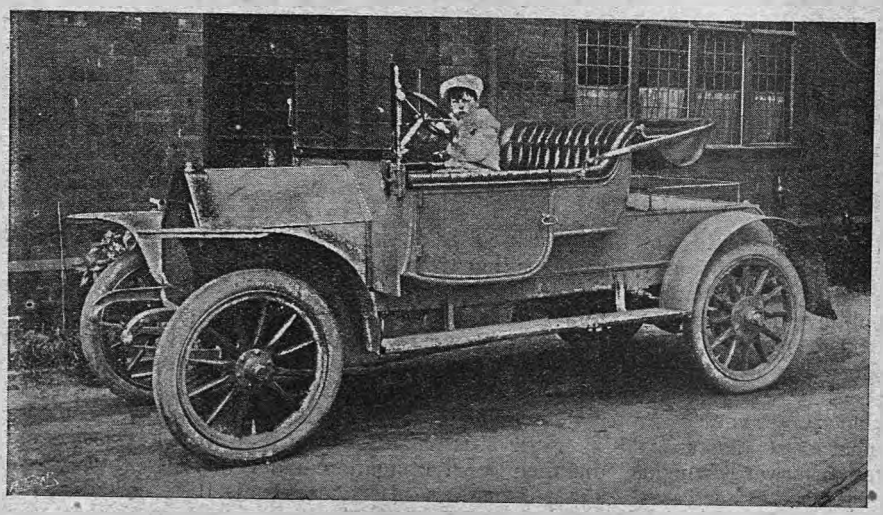
Owing to the inability of Messrs. John Barker and Co. to obtain adequate space at Olympia for the exhibition of the Barker tyres, the construction of which offers several points of interest, this well-known West End firm have arranged an extensive and instructive exhibit of their tyres in the motor department at High Street, Kensington. Motor omnibuses pass the door on the way to and from Olympia.

* * *

The County Clerk of Morayshire must be numbered among those who courteously send an intimation to motorists of the approaching expiration of their driving licences.

* * *

In giving an illustration of a 12-16 h.p. Renault car last week (page 639), it should have been stated that the body was by Messrs. H. J. Mulliner and Co., Brook Street, London. The address of Messrs. J. Keele, Ltd., who are making a speciality of this car complete is 72, New Bond Street, W.



A 14-16 h.p. Belsize, owned by Mr Daryl Grenfell, Parkgate, Chester. The driving seat holds three comfortably and is placed well back. The sham hood is used for carrying rugs and parcels and acting as a dust screen. The owner considers it is doubtful whether many hoods are used for any other purpose. The gear and brake levers are inside the body. The spare wheel and spare tyre are carried in the rear box.

TESTIMONY.

SHEFFIELD-SIMPLEX

An owner of a 45 h.p. GEAR-BOX-LESS "SHEFFIELD-SIMPLEX" writes as follows:

Cobham,
October 10th, 1910.

Dear Sirs,

It may interest you to know that the 45 h.p. gear-box-less car fitted with a landaulette body which I bought of you has now run about ***8,000 miles and has given me the greatest satisfaction.*** In my opinion it would be difficult to improve the general running of the car; everything works extraordinarly quietly and smoothly and is most reliable in every way. I should like to say that I had the car in ***Devonshire and Cornwall*** this summer and ***with only one or two exceptions it took every hill on top speed with six passengers and the heavy body,*** which speaks volumes for its hill-climbing capability; in fact, if one has to slow down for any reason going up hill ***it is marvellous how the engine picks up again without changing the gear.*** I also think the ***sliding pedal control*** on your cars is a most distinct improvement on the ordinary pedal; it is ***much less tiring, more easily worked*** and controlled ***especially over rough roads,*** and I am convinced that anyone having once tried it and experienced its advantages would never go back to the ordinary accelerator.

I may also mention that the car travels 15 miles to the gallon of petrol, and that ***the same set of Palmer Cord Tyres has been used the whole time without a puncture.***

A new model 25 h.p. 6 cylinders, built on exactly the same lines as our 45 h.p. "Gear-box-less" type will be exhibited at Olympia, Nov. 4th-12th, 1910,

STAND 41 (Just inside Addison Road entrance.)

Catalogue post free on application to Dept. "A."

SHEFFIELD-SIMPLEX MOTOR WORKS LTD, Tinsley, Sheffield, Eng.

Correspondence.

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

Letters of a personal nature will be withheld.

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

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

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

HAWES-BUCKDEN HILL.

[16256.]—I have just seen Mr. R. C. Hills's letter [16126], in which he asks if any reader of *The Autocar* knows the Hawes to Buckden Hill. I know it well, and a bad, rough, mountain road it is. I have been over it in fast time in an 18-22 h.p. Armstrong-Whitworth with five passengers, on third speed, only once for less than a minute dropping to second when the rear wheels did not grip in the deep sand and rolling stones. These cars are powerful, also fine climbers, and though the engine has no fan its cooling water never boils. I am the happy possessor of two of these cars, but have no connection with the firm. F.R. (LEEDS.)

RUNNING EXPERIENCES.

[16257.]—I think the idea of your correspondent, Mr. Pazolt, that owners should from time to time give their experiences of their cars after considerable use, an excellent one. Any decently made car ought to show good service for at least a few thousand miles, but it would be of interest to learn what unbiassed users think of them after longer service. And especially valuable would those opinions be when the writer has owned or had personal experience of several cars. Personally I have found it a little more difficult to publish an unsatisfactory criticism of a car than a satisfactory one. One's letter is referred to the firm, and as a rule the firm ignores the criticism, but publishes a list of the usual letters from superlatively satisfied owners, which even the most impossible makers seem able to command.

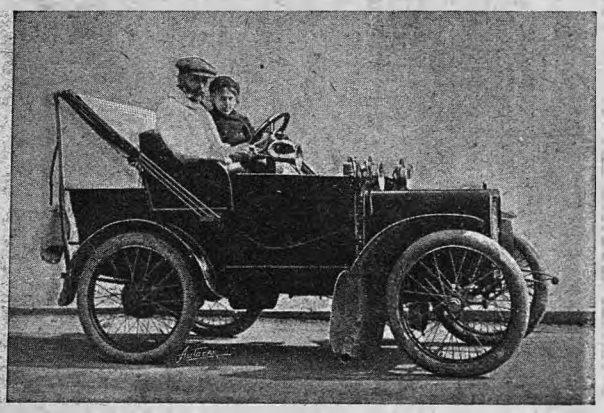
Your correspondent refers to the Lanchester car, and speaks of his 6,500 miles good service. Well, I have now in work an old 20 h.p. Lanchester ordered in December, 1905, and delivered very early in 1906. It has been in daily use ever since, and although it is getting on for five years old, and has seen life, it is as up to date and looks as smart as any 1910 car of any other make. It has the much vaunted box body, forced lubrication, worm drive, clean dash, high tension magneto ignition, and every other refinement that any car can boast. I can even go one better than most, for few of the ordinary cars can boast but one lubricant and single oil control automatically worked for every part of the motor unit, including the gear box. There is no filthy mixture to prepare or to clean out every now and then. I have only once seen my gears, and that was when the car was being done up last month. And I have enjoyed these advantages for nearly five years. For silence, speed, and power it is more than equal to any car of similar horse-power hereabouts, and I reckon to pass other cars on the hills. The car has been very much knocked about, as the list of accidents I give will testify, yet I have had no trouble due to strains and losses of alignment anywhere.

I once at night charged into a central lamp standard. Then I was run into by a milk cart. Again, I had the whole of one front wheel, the front axle, and the radiator smashed up by a heavy runaway horse and dray. The car was fortunately empty at the time. Another time a heavy tram hit the car broadside on and broke the chassis girder. Lastly, it has been severely overloaded from time to time. Yet the car has never shown any weakness of construction, and I have never had to wait more than a week for repairs, except when the coachwork was damaged. I keep careful note of repairs as distinct from my own additions or alterations. The upkeep on this account is about £25 a year, including a yearly clean and overhaul. As a matter of fact, I spend more if I include coachwork and my own "gyms." My petrol still keeps about twenty to twenty-two miles per gallon. My tyres for the four and three-quarter years average 3,400 miles each, taking all sorts. My tyres are only 870 × 90 or 100, which I find, for me, the most economical. I have just overhauled the car, and even to-day the gear wheels are still as good as new. The worm wheel and worm are just as free from wear or play as when first assembled. The engine is in very fair condition. The crankshaft was a little oval, the gudgeon pins and pistons needed replacing, while the front main bearing was renewed.

The car is out every day, and has done nearly 50,000 miles. The other day it took me up a certified 1 in 5 gradient from a standing start on the incline at eleven miles per hour all the way (in touring trim). The car is good for another four years, and looks as modern as any.

O-2050.

[16258.]—I have much pleasure in sending you a photograph of my car. It was the forty-second one that left the Rover works, and this was in August, 1905, so it is now over five years old. Originally it had a platform behind and no side doors, no force oil pump, no hood, no accumulator cupboard, and no lockers; but since from time to time I have added them with my own hands in my coachhouse in winter time, and even painted and varnished them. In addition, I effected various improvements to the engine, clutch gears, and ignition. Now, after five years, the car still runs remarkably well, and is wonderfully reliable and always ready to do anything and go anywhere. It weighs just 10 cwts. loaded with tools, accessories, petrol, etc., but without passenger and driver, and the R.A.C. horse-power is 5.6, the bore being 65 mm., or 2⅝in. The average consumption of petrol is 25-30 miles to the gallon, the former in town and the latter in country. The average speed per hour over give-and-take



country is 17-18 miles. The highest possible speed on the level under favourable conditions is 30 miles per hour. Its longest non-stop run on record is 103 miles in 6¼ hours. The route was over very hilly country, and the average speed was just seventeen miles per hour, and this with two passengers and luggage. I have frequently made about fifty miles non-stop runs. The car is shod with plain 750 × 80 Dunlops, the average mileage of each cover, including re-treading, being 8,000. Having no speedometer, I am unable to state total mileage, but my book shows 14,000 miles, mostly local driving, with an occasional short tour. J. M. PHILPOT.

OFFICIAL CONSIDERATION.

[16259.]—In regard to the article in your issue of October 15th, page 529, headed "Official Consideration," while not wishing to decry the Chief Constable's kindly notice, I would point out that it is not by any means new. The courteous County Clerk of Morayshire has issued similar reminders for some years, and I still renew with that county. S.T., LATE S.O.

Correspondence.

MOTORING CONDITIONS IN SOUTH AFRICA.

[16260.]—The accompanying photographs may be of interest to you, representing snapshots taken on a trip from Port Elizabeth to the Zuurberg, Middleton, Somerset East, Pearston Cradock, Rosmead, and Middelburg, the distance covered being just under 600 miles. Owing, however, to an accident caused through a damaged piston, whereby the engine got jammed, and in consequence of which the crankshaft broke, the trip was brought to an untimely end, with the result that the car had to be drawn by a span of six oxen to the nearest railway station, Bethesda Road, sixteen miles distant. The accident happened on the top of the Hoogte Pass, between Cradock and Graaff Reinet.

We were travelling on a 20 h.p. four-cylinder Ford touring car, and it was surprising, considering the condition of the roads generally and the river beds we had to go through, that the car was able to stand the test to which it was put. In the distance covered we rose to an altitude of 4,095ft.

We found that petrol was obtainable at all the places we visited, although to make sure we had arranged for a supply to be sent us from Port Elizabeth at various points. Referring, however, to correspondence which I have seen in *The Autocar*, a petrol car in South Africa is certainly preferable to a steam car, owing to the scarcity of water on the road. What, in my opinion, is wanted for this country is a high power and lightweight petrol car with large wheels and a high clearance, say twelve inches, and with as large a radiator as is possible on account of the steep gradients, especially in the Cape Colony, where before one reaches the Orange Free State an altitude of 4,884ft. is attained.

I may mention that the party consisted of three, and for a time four, including a chauffeur, together with luggage weighing about 200 lbs.

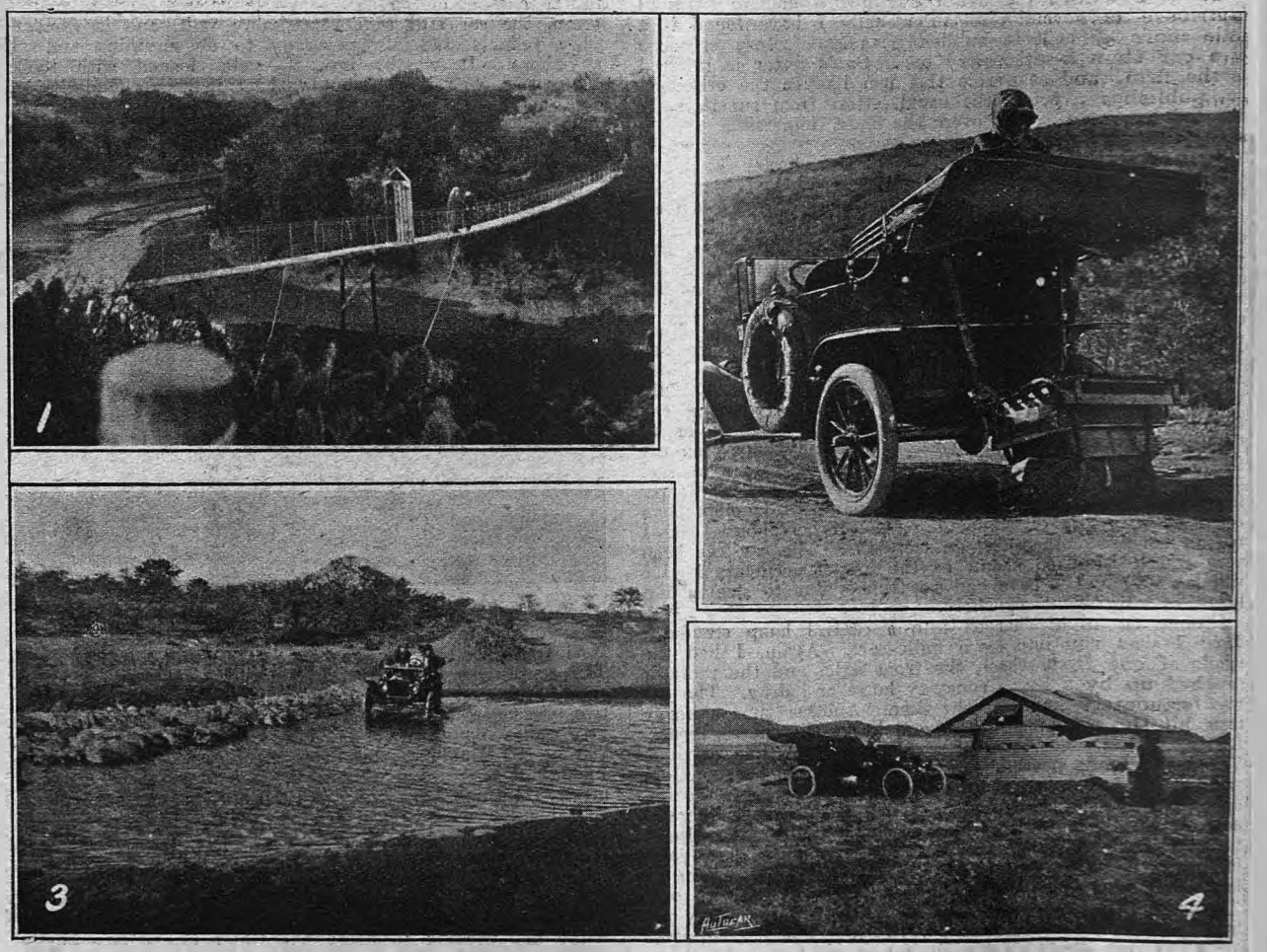
The trip was in every way highly interesting and instructive, and it is, I believe, the first instance where a Ford car has been taken for any distance on South African roads. I bought the car in December last, and since then I have covered approximately 9,000 miles without any serious mishap except the one above referred to, and on that occasion I feel I expected too much of it.

In conclusion, I can only say that I am extremely pleased with the Ford car, and it certainly does all the makers claim for it, but I cannot help feeling that there are certain parts which could be improved to advantage, namely, a larger and stronger radiator and an increase of, say, one-sixteenth of an inch in the crankshaft and back axle. The slinging of the car, three-point suspension, as applied to Fords, is exceedingly good. PAUL RIES.

SPARE PARTS AND STANDARDISATION.

[16261.]—I constantly see eulogies in your pages on the standardisation of parts on which the American firms particularly pride themselves, saying "Merely send a wire with the number of the part required, and you will get it during the day," etc.

I should now like to give my experience. Over two months ago the big end of one of my connecting rods was carried away, and the connecting rod burst through the crank case smashing it up. Since then throughout the whole summer the car has been lying idle in the garage, while both the firm in charge and myself have been bombarding the makers with queries as to when the crank case will arrive. Now, to add insult to injury, they are sending in the bill with a request for "payment in the course of a post"; while, as far as I can make out, there is as much chance of having the car ready now as there was two months ago. I think this is sufficient to show that there are two sides to the question, and all I can say is that your correspondent [1427] has been much more fortunate than R.N.



MOTORING IN SOUTH AFRICA.1. Suspension Bridge across the Great Fish River at Middleton, between Zuurberg and Somerset East. 2. A bad bump resulted in the upsetting of the luggage carrier, between Zuurberg and Somerset East. 3. Crossing a stream between Somerset East and Pearston. 4. A reminiscence of the war. A blockhouse between Middelburg and Rosmead.

THE AMERICAN "THROW-OUTS."

[16262.]—With reference to the various statements which have been appearing in the press recently in regard to the American motor cars which are being dumped into this country, I personally do not think that there need be any great cause for alarm. Those who remember what happened in connection with the cycle trade will also remember that history repeats itself, and the attempt made by American bicycle makers years ago to dump their over-productions into this country met with the fate it deserved.

There is a word of warning, however, to the public which would not be out of place. Certain American firms have established businesses over here, and have been selling their cars in a legitimate way, catering for English requirements, stocking spare parts, and generally running their businesses on English lines—regarding these firms I have nothing to say, and my remarks do not apply to them. What the buying public has to fear are the "throw-outs" of the American factories, cars which are useless for American trade, and which are brought into this country solely with the idea of getting rid of them at any cost. The makers having no reputation to lose over here have no special regard in seeing that the cars are well made. There is no necessity on their part to care whether they break up or fall to pieces in the first week of ownership, they need not bother about stocking any spare parts which a user may require; in fact, every penny they obtain from the public is clear gain, as the machines are unsaleable in their own or any other country under ordinary marketable conditions. It is in respect of these cars that the public need to fight shy.

From a purely practical point of view I cannot believe that the public will buy, even at a breaking-up price, the "jingle traps" which seem to be the staple productions of so many American factories. The English user and buyer of motor cars has always asked for something substantial—of good design, and capable of running well, and I do not think we have to go beyond our European factories to obtain all these qualities in a car—certainly America is the last place to look for them.

The matter is very much in the hands of the motor trade, and I cannot believe that it will allow the public to be gulled into buying cheap and unknown American cars and "throw-outs" from American factories. It is easy to be penny wise and pound foolish in connection with the purchase of a motor car, and there are other points for the careful buyer to consider than merely that of the first cost. Cars which will not sell in the American or Canadian markets surely cannot be successfully foisted upon the British buyer.

CHARLES JARROTT.

[We note that Mr. Jarrott is, and very properly so, careful to exempt from all reference the well-known American firms who have had established agencies in this country for many years past, and who have conducted their respective businesses on lines appealing to the British public. These firms stand to suffer equally with our home people from the threatened flood of Transatlantic outcasts, which are to be dumped upon our unprotected shores from behind a 45% barricade.—ED.]

POPPET AND SLEEVE VALVES.

[16263.]—As one keenly interested, from an experimental point of view, in this discussion, I would like you to give this letter space.

Certain advantages are to be gained by adopting sliding mechanism, and at present these sleeve valves seem to form the nearest approach to the ideal valve gear for petrol motors. I would like to point out how unfair Mr. Edge's challenge is to the Knight engine. He wants it to try and gain during the next three months (the worst three in the whole year) similar certificates to those gained by his car in much more favourable weather. If he has so much confidence in his car, why does he not offer to match a 1911 model against a 1911 Knight engined car? That would be something like a fair trial.

As Mr. Lanchester points out, it is only the engine that is under discussion, and what is better than a prolonged bench test? I doubt if any poppet valve could stand for the same length of time as Mr. Knight's engine did. In every big motor race that has taken place some cars have always been put out of the running by their valves breaking.

The Vauxhall Co.'s letter is more to the point, but they give away their case when they state that the Knight engine is quieter in running. Although engine silence may only be a trifle in their opinion, yet it is not so with everybody.

Sleeve valve engines are only in their infancy, and I know Mr. Knight says that the dual sleeve design is the only one by which satisfactory port openings and silent running are obtained, but it is quite possible to design a single sleeve valve engine without any additional mechanism, such as small pistons or non-return valves, and still have the same large port openings, etc., using the same positive eccentric movement as on the Knight. I believe if manufacturers would approach the problem with an open mind and without prejudice, they would get with a single sleeve valve as good if not better results than those obtained by the dual sleeve type.

Cars are not yet perfect, and never will be so long as manufacturers insist on ignoring new departures.

JAMES MARTIN.

[16264.]—In your issue of Oct. 29th, I read with the greatest interest the comments that you made under the heading "Poppet Valves and Slide Valves: Editorial Summary of their Respective Advantages and Drawbacks," and generally I think the public will find them to be a most valuable guidance.

Even beyond the important considerations that you discussed in the two distinct types of engine, it seems to me that careful design in every detail of the chassis and, above all, the most excellent workmanship should be carefully sought for by an intending purchaser of a motor car.

In my own case I have found that it will not do to assume that, because manufacturers of one of the types have settled down to very much the same principles of construction, there is little to choose between their products.

In the spring of 1908 I purchased a six-cylinder Rolls-Royce landaulet (bodywork by Messrs. H. J. Mulliner), and I have used it since then fairly continuously both in London and the country, including three summer seasons' work in the country. It has now been run for upwards of 40,000 miles, and over some of the most hilly roads in the United Kingdom, and is still in as good a working condition as when I first used it, and I have found it to be all that Messrs. Rolls-Royce have claimed for it.

During the period stated it has been overhauled once—last spring, at their works at Derby—and the small renewals and adjustments (including the overhaul and cleaning) since I purchased it have not amounted to more than £55. I should further mention that I have always been treated with the greatest courtesy by this firm.

This summer I purchased a smaller four-cylinder landaulet from another well known firm, which at once developed some serious defects throughout, including the engine. After running the car for about 3,000 miles I decided to have the defects remedied if possible, and I am afraid this will prove to be a costly matter, as this firm declined to make any renewals, and I have had to get the car reinstated by more willing and courteous people.

It therefore appears that one buys experience as well as a motor at one and the same time, and if you will be so good as to insert this letter I shall be able to make a present of my experience to others.

H. E. WALTERS.

[16264A.]—As an engineer with some experience in steam, gas, oil, and petrol engines, I would like to say a few words on the sleeve and poppet valve question.

First, in steam engine practice it is well-known that the positive driven slide valve is very much quieter than the tappet and spring operated drop valve, which if silence is required has to be fitted with dash pots or their equivalents, but the drop valve engine has advantages which make it worth going to the trouble of fitting such, among which advantages are better steam tightness, quick opening and closing, and less effort to operate them, and what holds good for steam ought to hold good for hot air, the working fluid of a petrol engine.

Re noise from the exhaust. One of Mr. Knight's points was that the Knight engine had a softer beat than a poppet valve, as proved by a guessing competition on listening to the open exhaust of different cars. Now I consider that a soft beat on an open exhaust, if it prove anything, proves a low terminal pressure rather than any quality of the valve or its mechanism, and this terminal pressure may be due to the engine running throttled or it may be due to valve leakage.

Now, sir, to settle the question I would like to see a series of indicator diagrams taken off a Knight engine at different powers and speeds, and a series taken off a poppet valve engine under the same conditions, both if possible to be of the same bore and stroke, and the same volume of combustion space.

Correspondence.

Instruments can now be obtained to indicate high speed engines, and if such a set of diagrams can be produced it will go a long way to satisfy engineers as to which is the "top dog."

The diagrams in each case to be taken off the best engines of both types procurable, as I take it the "ramshackle engine" which Mr. F. W. Lanchester speaks of is not in this discussion.

Mr. Lanchester, from his position with his own company, and also with the Daimler Company, ought to be able to do this for us.

It would also go a long way to prove the value of the one point which he makes for the Knight engine against the poppet valve, and which he thinks is sufficient justification for its existence—that is, in his own words, "the obtaining of large valve and port areas in conjunction with a compact form of combustion space."

We all agree that this is desirable, but many of us remain in doubt about the Knight method being the best way of doing it, and will remain in doubt till more evidence is forthcoming.

J. JOHNSTON.

[16264B.]—Since writing the article on the valve question which appeared in your issue of the 5th November, I have been thinking over the statement of Mr. Knight's that no car has nearly approached the performance of the two Daimler sleeve valve engines in their 2,000 mile track performance when they travelled at an average speed, approximating to forty-two miles an hour at a consumption of 34.94 and 33.37 ton-miles per gallon.

I wonder whether your readers will remember the race for the Tourist Trophy in 1905. This was run on a circular course in the Isle of Man, which was far from flat, and included four ascents of the mountain road of Snaefell. This performance, therefore, was made on a course which was incomparably more severe than the flat concrete track at Brooklands, but for all that the 20 h.p. Rolls-Royce, on this occasion, made, at an average speed of 39.4 miles an hour, a fuel consumption of 25.3 miles to the gallon, or 31.2 ton-miles per gallon.

Your readers will easily arrive at a conclusion as to which is the more meritorious af these records.

CLAUDE JOHNSON.

[16264C.]—I have just read your summing-up of the controversy as to the merits of the slide valve engine. I have hitherto taken an interest in your paper, and I think the line you have elected to take regrettable, as it will be thought so one-sided and unfair that you are liable to be credited with running down the slide valve simply to get popularity with the many makers of other engines, preferring popularity with the many to impartial fairness to the *one* English maker of the slide valve engine. People will not believe you can be so ignorant. Of the many ways, it is infinitely superior to the poppet valve engine, *much* more powerful, more simple, less trouble, and infinitely preferable, as anyone with *any* experience of the two can tell, and it is known you have had sufficient experience of the slide valve engine to *know* better than to take the palpably unfair line you have elected to take, much to the disgust of many of your readers.

G. HAMILTON.

[The above effusion is interesting, as showing the disposition of a few people to impute bad motives to those who happen to express opinions with which they do not agree.—ED.]

THE HEWITT PISTON VALVE ENGINE.

[16264D.]—We were interested to read the instructive letter [16212], in which Mr. Phillips takes some exception to the statement that the piston valves of the Hewitt engine are self-driven. It would seem that Mr. Phillips does not quite follow the claim. The valves are self-driven because of the power given out on the exhaust valve piston during the working stroke. While, of course, the pressure comes from the cylinder head, it should be noted that at the completion of the induction stroke the inlet valve trunk is filled with mixture, which is forced into the cylinder head on the compression stroke, a larger volume being thus enclosed than with any other valve system. The crank-shaft half time wheel, instead of driving the valve-shaft as usual, merely keeps it in time, and takes up the excess of power from the valve-shaft. Thus the valve-shaft is self-driven.

The increased power of the Hewitt engine is due to the fact of the unusually rapid expansion, as ably analysed by Mr. Phillips. But not alone does the exhaust valve piston descend with the main piston during the working stroke, but at the time of firing the exhaust piston is already moving out rapidly, and travels at its maximum speed (that is the centre half of travel), the whole working stroke of the main piston. The fact that at the time of firing the main piston is almost stationary makes this action of the exhaust piston most valuable. The advantage of this is particularly noticeable at low speeds by the exceptional way in which the Hewitt engine retains its strong pulling. Increase of power as well as economy is also contributed to by the expansive working afforded by the exhaust valve piston being in at the commencement of compression, while being out at the end of the firing stroke, the expansive properties of the gases being utilised to the extent of the difference in area thus produced.

DAVY ENGINEERING, LTD.

THE AUTOCARS OF 1911.

[16264E.]—Now your valuable "Autocars of 1911" is published no doubt hundreds of intending purchasers will be studying it carefully.

I suppose a 4in. Knight-engined car will be a very sought after model, and looking through this type of car I find the following comparison of prices:

Country of origin.	Bore and stroke.	Chassis price.
England (25 Daimler)	.. 101 × 130 ...	£535
France (25 Panhard)	.. 100 × 140 ...	£580
Germany (40 Mercédès)	... 100 × 130 ...	£750
Belgium (26 Minerva)	... 102 × 125 ...	£530

I dare say some of us, all other considerations of efficiency being equal, find pocket liable to triumph over patriotic feelings, but here I find patriotic feelings satisfied, pocket satisfied, and the knowledge that in going for the British car I am getting a well tried machine. As to general appearance and finish, what can beat the British article in question? I have no connection with the motor trade except that of a satisfied owner of British cars.

LIEUT., R.N.

INSURANCE OF MOTOR CARS.

[16264F.]—I insured my car in February last and understood that I was covered against accidental damage of all kinds, and against all risks excepting mechanical breakdown.

Whilst in garage recently my car was damaged by stable sewage dropping upon it owing to a stopped pipe leading from stables on a higher level, injuring the paintwork, plating, and upholstery of the car. The insurance company deny liability, stating that the accident was not the result of collision or impact, which are the terms used in the policy. They also inform me that they have recently employed a new form of policy, and which was used in my case.

It would be of interest to me, and probably to motorists generally, to hear the experience of other insurers with regard to claims in respect of damage other than as a result of collision.

GABRIEL.

TYRE EXPERIENCES.

[16264G.]—Referring to the letter of W. Wright [No. 16224] I have often noticed the absence of essential particulars and conditions when your correspondents write of immunity from punctures, and of the good qualities of the tyres they use.

Will W. Wright kindly say over what sort of roads he has motored the 14,000 miles, also what the weight of his car is? Does he use his motor daily, and drive at night?

I think if your correspondent had to use the roads about here (South Wilts), which are made of flints, he would have failed to do more than a third of the mileage without wearing out his tyres altogether, to say nothing of a few punctures.

AM 1403.

FITTING DETACHABLE RIMS.

[16264H.]—May I advise those who contemplate ordering Michelin detachable rims with their French cars to have the wheels altered in London and not in France. I ordered a Sizarire-Naudin with these rims last month, and although the car has been ready for delivery for three weeks the Michelin people are still delaying the wheels. My experience with the Michelin people in London was much more happy, as they fitted their rims to a Renault of mine between Monday and Saturday of the same week.

91 R 4.

CAR BODY NOISES.

[16265.]—In the editorial of your issue of September 17th you comment upon one of the worst troubles a coachbuilder has to contend with, and our experience is in accord with your statement, "that the problem bristles with difficulties."

It is quite unanimously agreed that practically all body noises are caused by "whip" and angular contortions of the chassis frame, due to the road wheels and springs accommodating themselves to the inequalities of the road surface.

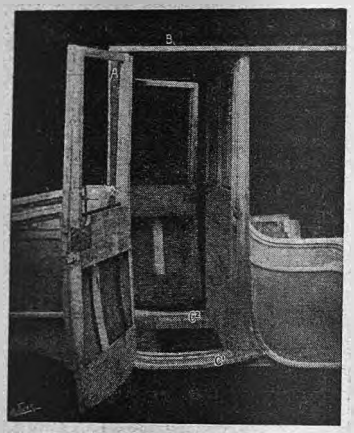


Fig. 1.

The coachbuilder cannot hope for any help from the chassis manufacturer, as it is readily acknowledged that a body rides much sweeter on a flexible chassis; it therefore behoves the carriage-builder to seek to solve the problem alone.

If the coachbuilder could dictate to his client, he would affirm that a body must be built with a full or brougham door, and with as few adjustable windows as possible; reference to fig. 1 will show what is meant by a full or brougham door. It will be seen that this illustrates a single landaulet in which the head opens behind the hinge pillar only, the hinge pillar A being one solid upright, joining the cant-rail B at the top; the cant-rail and the fixed portion of the roof, together with the runners C^1 and C^2, forming a positive tie between the front and rear portions of the body.

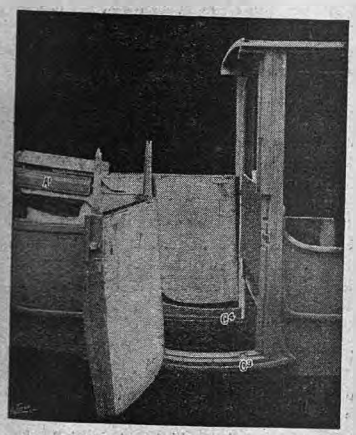


Fig. 2.

This form of construction in a well-built body should not contract noises due to "whip" or angular contortions of the chassis for some considerable period; of course, the doors of a body, even of this construction, will rattle when the striking plates of the locks become worn by constant opening and shutting.

The life of a striking plate can be considerably lengthened by augmenting their grip by means of independent "dove-tails," preferably of the two-way variety; that is, in which the dove-tail is tapered both to prevent the rise and fall of the door and also end-play.

Fig. 2 shows a single landaulet body, with a half-door, and in which the head opens from the front door pillar. The top part of the hinge pillar A^1 folds back with the head.

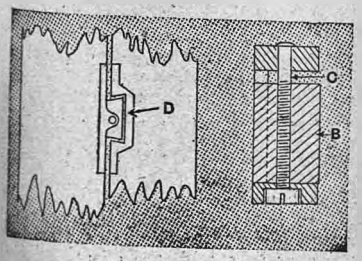


Fig. 3.

This body illustrates the conditions which prevail in all completely open bodies, and all bodies which are a combination of an all open body and semi or all closed bodies. It will be here seen that the only connections between the front and rear portions of the body are the runners C^3 and C^4.

Even a layman will readily see that as the frame of the chassis "whips" the door pillars are bound to open and close at the top and generate a hammering of the door frame upon the pillars.

This action can be prevented for a time by fitting two-way dove-tails which will grip the door frame and the door pillar together as if they were a single unit. These dove-tails will gradually wear with the opening and closing of the door, causing at first a slight click, which eventually develops into a distracting metallic hammering.

To obviate this ear-splitting nuisance, we designed and have fitted for some time the adjustable "dove-tails" and adjustable "striking plates," as shown by figs. 3 and 4 respectively. These will also be seen fitted to the bodies illustrated in figs. 1 and 2.

When the doors show the slightest disposition to rattle, the chauffeur gives the screw C in the dove-tail (fig. 3) a quarter or half turn. This carries the male member B forward until it engages firmly the female member D. The chauffeur then gives the screw C of the striking plate (fig. 4) a turn, carrying forward the striking plate B sufficiently to allow the bolt of the lock to engage with a "spring" that can be instantly recognised by closing the door with a smart slam. The doors are then good for many thousand miles further running, when the same operation can be repeated.

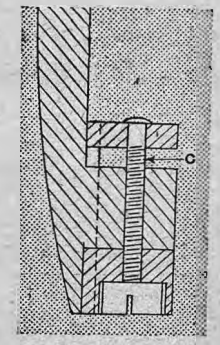


Fig. 4.

We have found that the above method of dealing with the door trouble (which we consider our worst enemy) has been quite satisfactory.

The next trouble in point of magnitude is undoubtedly "window noise." In attacking this problem, we set out with the theory that if a window be fitted well in the first place, and an automatic device fitted to reduce wear these noises would be minimised, if not eliminated altogether.

Until we set ourselves the task of designing such a fitting, we always fitted to the framing of the body a "silencer," in which the tightening of a thumbscrew brought pressure to bear upon the frame of the window and a corresponding reaction on the framing of the body.

This system acted exceedingly well if our clients were careful enough to screw up the "silencers" each time the windows were closed, but as there were six of these silencers to be operated in a limousine, or limousine landaulet body, we found that the client omitted to adopt this precaution, either through forgetfulness, or because he considered the operation too much "fag" each time the windows were raised or lowered. Naturally, the window fillets, or the body framing, or both, soon showed signs of wear through vibration, and an annoying rattle was set up.

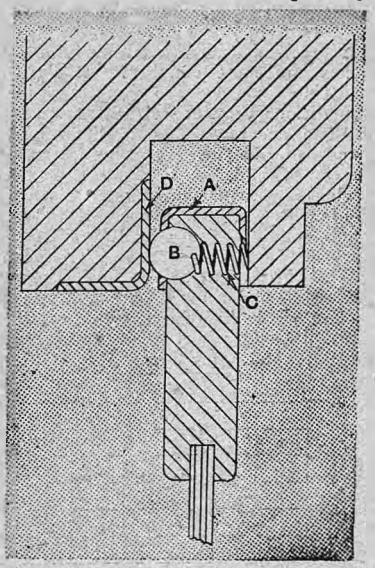


Fig. 5.

The device we designed to surmount this trouble is shown by fig. 5. The general arrangement shows its action very clearly. It will be seen that the channel section carrier A contains a ball B, which is pressed partially through a hole in the former by means of a coil spring, the ball rolling round on the striking plate D, and wedging the glass frame tightly between the striking plate and the framing of the body. This action is automatic, and no greater power is needed to raise the glass frame (owing to the rolling of the ball) than in an ordinary frame without a silencer. Incidentally, the carrier A overlaps the window at each side, and thus protects the polish of the frame.

Of course, there are many minor noises, such as rattling of the arm-holder fittings, folding seats, handles, speaking tubes, clips, etc., but these are avoided by good design and fitting.

Wind screens are also a source of trouble, especially on covered bodies, as the only connections between the canopy and the dashboard are two (invariably) flexible stanchions.

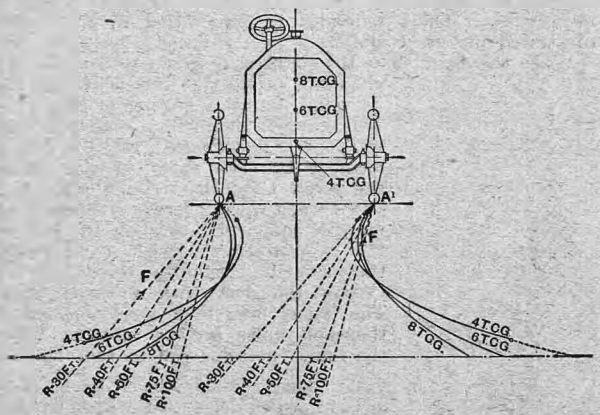
If other coachbuilders would give their methods of treating noises, they would do each other and their clients a real service.

J. ROTHSCHILD ET FILS, LTD.

Correspondence.

WIRE WHEEL STRAINS.

[16266.]—Everyone knows that the strains on the wheel of a motor car are far greater from the outside than from the inside quite independent of those violent shocks produced by side slip. These latter, of course, always come from the outside, so that whether ordinary running con-



ditions are considered or the exceptional condition of side slip, a wheel ought to be made far stronger from the outside than from the inside.

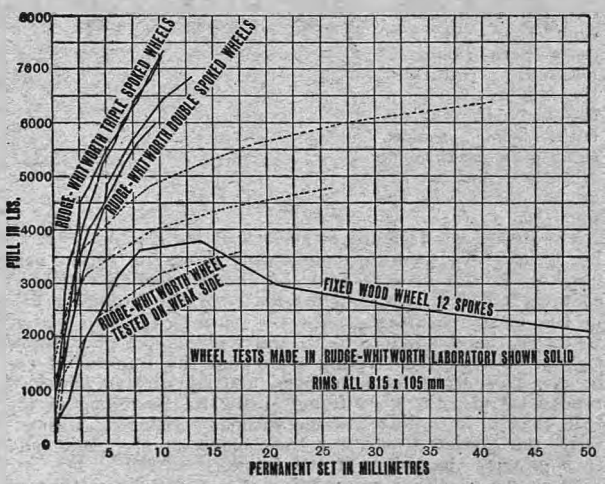
These facts and their recognition are as old as the motor car itself, but we were the first to design a wire wheel to meet these conditions departing from the symmetrical form, so that we might gain all the possible strength we could against shocks from the outside, and to do this we sacrifice a good deal of the strength from the inside where it is not wanted.

An article of mine appeared some years ago in *The Autocar* setting this out at some length.

I reproduce a diagram from this article, which makes it quite clear that the strains under the conditions in which they are most equal are nearly twice as much from the outside as they are from the inside, while under other conditions they are eight times as much.

The accuracy of our conclusions was never questioned, and we did not even think that they had any particular novelty, and we thought that everybody knew that our wheels were designed purposely with a weak and a strong side. Recently, however, we find that there have been made and submitted to potential customers tests between a steel wheel of very ingenious construction and one of our Rudge-Whitworth detachable wheels, purporting to show that our wheel is far weaker than the steel wheel.

As we had, by a friendly arrangement with the makers, tested their wheel against ours, we were surprised at the result, and, comparing the figures given with those that

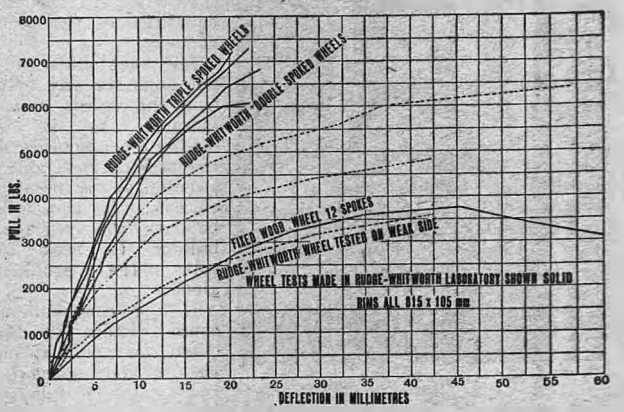


we had arrived at, we found that they corresponded approximately to the results of one of our wheels tested on its weak side.

In the two diagrams herewith we give plotted out in dotted lines the results of the tests of the two steel wheels and the Rudge-Whitworth wheel tested the wrong way up. We also give the results in solid lines of two double-spoked Rudge-Whitworth wheels and two triple-spoked Rudge-Whitworth wheels, and also, for the sake of comparison, a test of a fixed wood wheel.

The points on the curves each record a different load, and between each of the points the load is reduced to zero. This accounts for the curious form of the wood wheel curves.

To make the comparison clearer, if one takes the worst of the Rudge-Whitworth wheels and compares it with the



best of the steel wheels at 6,000 lbs., it deflects 22.5 mm., as against the steel wheel 37 mm., while the permanent sets are as follow:

Rudge-Whitworth wheel ..... 10 mm.
Steel wheel ..... 27 mm.

It will be seen that the Rudge-Whitworth wheel on its strong side is at least as much superior to the steel wheel as the steel wheel is superior to the Rudge-Whitworth wheel in the direction that does not matter.

RUDGE-WHITWORTH, LTD.
JOHN V. PUGH.

A JACK.

[16267.]—A certain jack was mentioned in a recent issue of *The Autocar* as a French notion. The idea was provisionally protected by myself on the 3rd February, 1905 (No. 2193), the specification being drawn by a leading firm of patent agents. As I could get no one to take it up I allowed the patent to lapse, but I am none the less satisfied that at least for light cars the contrivance would be useful, saving time, energy, and weight.

FRANCIS NUNN.

HOTELS.

[16268.]—I sympathise with "Kent" (16227) in his troubles, for most of us have suffered in the same way. My plan is now to travel with a C.T.C. handbook, and use its hotel system, and this makes for comfort and economy. Personally, I do not want to make a show when touring, and those who do can use the R.A.C. hotels and pay the charges based on the supposition that all motorists are multi-millionaires. A good tip is never go to an hotel that possesses a garage. Put briefly, my suggestion is that motorists who wish to study economy should join the C.T.C.

W. B. GOODWIN.

CONDITIONS OF SALE.

[16269.]—Now that Show time is again here and many people are actually ordering or purchasing a new car it behoves them to be very wary lest they not only get a car but a liability they probably little dream of.

The following is an excerpt from a recently issued price list for 1911 which speaks volumes, and, maybe, hides a deal more:

"The motor goods referred to above are sold on the condition that they are not to be exhibited, either directly or indirectly, at any exhibition held in the United Kingdom of Great Britain or Ireland, without the written authority of the seller, and that in case of any breach of this provision by the client to whom the chassis is sold, the client is liable to pay the sum of £250 to us for every such breach, such sum being the agreed damages which we should sustain. Any sum due in respect of such damages may be assigned by us to anyone."

A buyer allowing the seller to have control of his car after it is bought and paid for is asking very loudly for

TROUBLE.

Testing a Motor Car.

From Rough Material to Finished Article.

THE majority of motorists have very little idea as to the methods by which a modern motor car is tested before being handed over to the purchaser. The general conception seems to be that the whole process consists merely in sending the chassis, with a light bucket seat in position, for a run of fifty to one hundred miles in charge of a tester, and that the sole aim of the latter is to race the vehicle along the public highways as fast as possible in an attempt to shake it to pieces, incidentally scaring other users of the highway by reckless driving.

That such is far from being the case was clearly demonstrated to the writer—if such a demonstration were necessary—when, quite recently, an opportunity was afforded by a well-known firm of manufacturers for him to study the whole process of testing from the time when the rough materials enter the works until the complete car is ready for delivery. An account of the methods employed by the firm referred to may be of interest and enlightenment to those who are not acquainted with the subject, and the following paragraphs will be devoted to a general outline of the various processes which, taken altogether, may be said to constitute the testing of a car.

At the outset, we must deal with the

Rough Materials.

By "rough materials" is meant such parts, for instance, as cylinder castings, rough forgings, stampings, and steel of various grades in lengths. All these are examined by an inspector immediately they enter the works (and before they are accepted by that section of the stores department which is devoted to rough materials), and the work of this inspector is to submit the details to various tests. As examples, he is provided with gauges which enable him to ascertain if a cylinder casting is in accordance with specification as regards water spaces, thickness of walls and jackets. He must closely examine every forging for flaws, and, although such when existent more often show themselves later on in the machining, the inspector will occasionally find suspicious markings, with regard to which a written report must be made to the proper quarter before he is relieved of responsibility. If the inspector's superior thinks fit, a suspicious forging is "thrown out," but if there is a possibility that the apparent defect is merely a surface mark, and not really a flaw, it is passed on to the stores, though in its subsequent progress through the machine shop especial care is taken in the process of turning or machining to note whether the defect is or is not merely "skin deep."

As regards steel in lengths or bar, and also forgings for axles and other main parts, a sample section is taken from each batch received from the steel makers and submitted to various tests by the laboratory department or sent to an independent testing institution, who make a report as to tensile strength, elongation, etc., and if on these points the various grades of steel do not reach to within a very small percentage of the specification the whole batch is rejected and returned to the steel makers.

Finished Parts.

When such parts as crankshafts, gearshafts, cylinders, etc., have been through the various operations of machining they are passed on to the gaugers, who not only gauge and check the dimensions of the finished article, but also closely examine each part for flaws or defects which may have developed or shown up in the machining. When a detail has been passed by these men they must stamp each part with a die bearing their initials, and woe betide them if a defect is subsequently noticed which should have been seen and reported by them!

Before cylinders are passed into the finished part stores they are taken in hand by the fitters to have the "core holes" plugged—holes left in the process of casting for withdrawing the "core" necessary for forming the water jacket, etc.—the studs, valve guides, etc., fitted, and the valves fitted and ground in. The cylinders are then passed to a special inspector, whose duty it is to submit the water jackets and combustion head to a test by hydraulic pressure.

The water jackets are submitted to 15 lbs. pressure, but the interior of the cylinders receive from 500 to 600 lbs. pressure per square inch, and for this purpose they are bolted down to a special steel base, through which the pressure enters, with a joint of rubber composition to prevent any leakage occurring at the lower extremity of the cylinder.

The two halves of the aluminium crank chambers are bolted together, all exits plugged, and then these are also submitted to hydraulic pressure, though but 3 or 4 lbs. in this case. The idea of this is to ensure as far as possible that "porous" castings are not issued to cause subsequent annoyance by oil leaking and dripping.

Radiators, too, when complete, are submitted to 10 lbs. pressure.

Road springs receive attention from this same inspector, and are submitted to a pressure, in a special form of press, representing a very considerable overload as compared with the weight which will ultimately, in actual use, be placed upon them by chassis, body, passengers, etc.

The pressure or weight to which they are subjected is applied and taken off a number of times, and particular note is made as to whether any loss of camber, or shape, is sustained. It is expected, and allowed for in the design, that springs will lose something in the amount of camber during each of the first two or three applications of weight, but after that they should regain the same shape every time the pressure is removed. If such be not the case, that is, if a spring continue to lose a little camber on every occasion, it is rejected.

Assembled Parts.

GEAR BOXES.—Although perhaps it is somewhat of a misnomer to apply the expression "testing" to the process of "running in" the gears, a few words on the subject may not be altogether out of place here.

The gearshafts with pinions attached are fitted into the gear box in which they will eventually run, and the whole is bolted down to a framework. The engine end of the primary shaft is coupled directly to an electric motor, and in place of the usual brake drum one of special construction and water-cooled is fitted. The pinions are then meshed, one gear at a time, and power transmitted through them by the electric motor, the necessary resistance being obtained by a brake on the water-cooled drum. This brake is applied and regulated by a screw-adjusted lever, so that the pressure can be regulated to a nicety. At first the gears are run "light" and at a low speed, but gradually the speed of the motor is increased and the brake

tightened until the speed of the former and the power being used corresponds to those of the engine of the car for which the particular set of gears is intended.

As a general rule the gears are "run in" with oil as a lubricant, but if any pair develop noise above the average, they are ground with an admixture of soft soap and fine emery; the bearings are, of course, well protected when emery is used, special shields being fitted to prevent it from working into the gun metal bushes, ball bearings, etc., the whole gear box and its contents being afterwards taken apart and thoroughly cleaned.

If, however, any unevenness—a "knock," for instance—is noticeable, practically no benefit is obtained by grinding with emery, and in nineteen cases out of twenty the offending pinion or bevel wheel is "scrapped," *i.e.*, thrown out. At the same time, it is a very rare occurrence for any unevenness to be apparent, but when such does exist the fault is usually to be found in the large "crown" bevel, and due to warping in the case-hardening process, or to a small or irregularly cut tooth.

At the works, which the present writer inspected, and to which this description particularly applies, each set of gears is "run in" for twelve hours under load.

Testing Engines.

In comparison with the process of "running in" the gears in the gear box, the testing of engines is a far more serious business.

When each engine is finished by the engine erecting shop, it is passed on to the test room, and when it arrives there it is supposed to be absolutely complete in all details; adjustment only of a few parts should be required before it can be run.

The timing of the valves is set by a "charge hand" of the engine erecting shop in accordance with minute instructions which are issued regarding this point on each type of engine. These instructions are in accordance with what experience has proved to give the best results. The same applies with regard to the setting of the clearance allowed between the heads of the tappets and the valve stems.

On arrival in the test room the engine is bolted down to a cast-iron "bed" or frame, preparatory to being coupled up to an electric generator or dynamo which supplies the "load." Water supply for cooling purposes is obtained from a large tank on the wall near by; the petrol tank is also fixed on wall brackets, and is fitted with a gauge glass, graded in pints, in order that the petrol consumption can be readily seen.

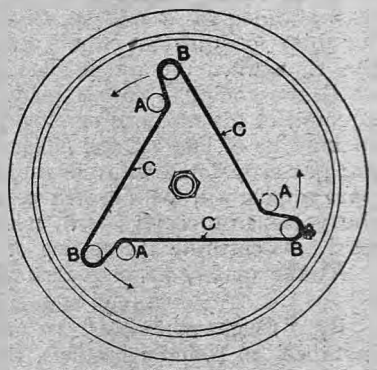
The form of coupling through which and by means of which the engine drives the dynamo, when everything is ready for a "load test," varies, of course, in different works, but the type which the writer saw in use is sufficiently interesting to warrant description.

In the first place, a specially made cast-iron cone, which corresponds as regards diameter with the male portion of the clutch eventually to be used, is pressed into the cone of the flywheel, being guided into position and registered by the spigot of the crankshaft in the same way that the clutch will be. It is not intended, however, to use this cast-iron cone as a friction clutch in the ordinary sense, for it is secured firmly in position, and forms a positive drive by a large washer and a nut screwed on to the threaded end of the spigot, for this latter protrudes beyond the boss on the cone when the latter is "pushed home."

Screwed into this cone and projecting about 4in. towards the dynamo are three studs of 1in. diameter, equidistant in the circumference of the cone.

The other half of the coupling, that on the dynamo shaft, is a flat disc of similar diameter to the cone, and this also is fitted with three studs projecting towards the engine. But these studs on the disc are placed closer to one another and nearer the centre than those on the cone, so that, although when the engine is bolted down to its "bed" the two sets of studs overlap one another, they do not "foul" or touch, if the engine is turned. Thus the engine can be run "light" even whilst in position for immediately coupling up. When this latter is necessary, all that is done is to interlace a flat leather belt, about 2½in. wide, between the two sets of studs, the ends of the belt being joined together by screw fasteners (see sketch).

From the sketch it will be seen that with the belt in position it is impossible for the studs (B B B) on the engine to revolve without turning those (A A A) on the dynamo, the power being transmitted through the leather belt.



A, studs on disc of dynamo (driven)
B, studs on cone secured in flywheel (driving)
C, leather belt

Of course, it would be a simple matter to couple the engine-shaft directly to the dynamo by means of flat discs secured on each and bolted together, and, it may be remarked, this is done in some works, but, as will be readily appreciated, the belt coupling described has the merit of being very flexible, a perfectly universal joint, and, moreover, positively isolates the engine and leaves no opening for end thrust to occur if the engine should be a shade too near or too far away from the generator. So much for the coupling.

When the engine is in position with cone attached but without the belt in position, the tester takes it in hand. His first duty is to verify the correctness or otherwise of the setting of the valves and to fill in his report sheet accordingly. Then he removes the lower portion of the carburetter and with a small reamer enlarges the bore of the jet until it is standard size; any deviation from standard is rigidly avoided until it has been positively proved that by no other means can full power be obtained.

The next process is to set the float on its spindle, so that the level of the petrol in the float chamber is correct in relation to the height of the jet. The ignition then receives attention, for the timing of this is adjusted by the tester. He is allowed a little latitude in this respect, and may use his judgment as to the best setting, although there is a limit to the variation from standard even in this.

The reason for allowing a certain amount of latitude in the setting of the ignition, the writer was informed, is that each engine, almost, has its own little peculiarities—although apparently all are made exactly similar—and one of these peculiarities is in regard to the amount of "advance" which can be beneficially given: and so the timing is set accordingly.

The switchboard of the dynamo is so arranged that the latter—which is connected with the power circuit of the works—can be run either as a motor or as a generator. That is to say, it can be made to work as

an electric motor to turn the petrol engine or as a generator of current when driven by the engine.

This feature is of practical advantage, for, after the coupling belt has been fixed in position, the valve caps removed, a liberal supply of oil injected inside the cylinders, the crank chamber filled—when all this has been done, the switch on the switchboard is put in and the dynamo started as a motor to turn the engine. The latter is not run under its own power for some little while, but is turned by the dynamo for an hour or so, in order that the rubbing surfaces on pistons and cylinders, bearings, etc., may have a good chance to get a somewhat polished surface or "skin" upon them before being subjected to the strain of working under power. The advisability of this precaution is apparent when it is remembered that in a new engine the amount of clearance between the pistons and cylinders is very slight, varying from two to six-thousandths of an inch only, and the probability is that if a "load" were put on at once some damage would ensue, by one or more of the pistons seizing, or at least scoring the cylinder walls badly.

When the engine has been turned thus for a predetermined period, the belt of the coupling is removed and the engine is run under its own power, but without load, for two hours. Then it is coupled up to the dynamo again, and the serious part of the test is commenced. The work which it is given to do—the "load"—can be adjusted and varied to a nicety by resistances in the field circuit of the dynamo, and the lever for cutting out these resistances is in a position close to the tester's hand. Some eighteen or twenty "points" are available, and the load is applied one point at a time.

For the benefit of the uninitiated it may be here mentioned that the power developed by an engine coupled thus to a dynamo is ascertained by the amount of current generated by the latter, and this is shown by the readings of the ammeter and voltmeter on the switchboard. Ampères and volts multiplied together represent a given number of watts, and 746 watts represent 1 h.p. There are, however, certain electrical losses which are regulated by the efficiency of the dynamo, and in calculating the actual b.h.p. of an engine under test a certain percentage is added to allow for these losses.

Imagine we are watching an engine under test and are keenly interested in its behaviour. It is one of a type such as the writer saw "put through its paces" which must develop at least 33 h.p. at 1,000 r.p.m. before it can be passed, and, not only so, it must also run for two hours without stopping and develop that power the whole time.

Well, our engine has started under load; it is gradually notched up—the resistances are cut out—until it begins to "pull." The throttle is fixed wide open, and a steady speed of 1,000 r.p.m. is maintained. The tester glances at the ammeter and voltmeter. "Humph, 135 and 120—that's fair." Then he adjusts the automatic air supply, regulates the character of the supply—gives more cold or hot air—adjusts the ignition and every few minutes pours more oil into the crank chamber until the exhaust (which is led into the open air) is pouring out dense smoke. After half an hour's running the power has gone up considerably, volts varying between 120 and 128, ampères going up gradually 145, 150, 160. "Now she's doing better—32 h.p. allowing for electrical losses," says the tester.

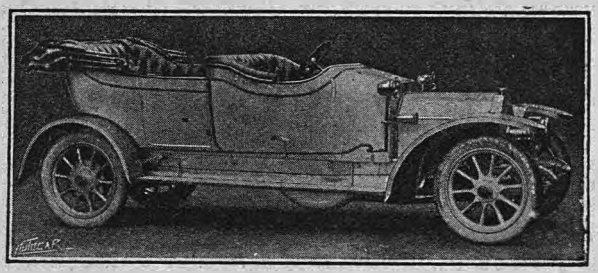
But 32 is not enough; 33 is the minimum, and 36 is expected from most engines.

Another half hour's running, and the power is up to 34. The tester makes an adjustment, then it is 35. A little running, "Good; 36 h.p. in two hours' running."

But it is not always thus. Occasionally great difficulty will be experienced in getting up to the minimum of 33, and hours—sometimes days even—will be spent removing cylinders and examining pistons for signs of seizing, removing valves, and examining stems for signs of wearing through being too tight a fit in the guides, testing the compression, the strength of valve springs, adjusting the timing of ignition, and many other points.

If every other means fail to make the engine develop the full power, an alteration in the size of the jet is made, but only as a last extremity. If this has the desired effect a most careful note is made and kept in the records of the exact size which is eventually used. The variation from standard will not be a great deal, for 1-20 mm. (about 1-500in.) will sometimes make a great difference in the power.

(To be continued.)



***A NEW LANCIA CAR.** It will be noticed that both the brake and gear change levers are enclosed, the only fittings on the outside bodywork being the brackets for the spare wheel.*

Motorists' Difficulties.

Lack of Training and Consideration in the Ruralist. By J. Fairfax Blakeborough.

"IT is those who come from the town, and have little knowledge of the country, rural idiosyncrasies, and peculiarities, who are guilty of much of the damage to estates and property, and who unwittingly cause much annoyance to the agriculturist. It is the town sportsman and sportswoman—possibly very keen and very good fellows and women—who out of sheer innocence and ignorance raise the ire of the master of hounds and the farmer. They do the wrong thing at the wrong time, or the right thing at the wrong time, and thus are anathematised." So said a very prominent sporting peer to the writer a few days ago. There is a certain amount of charity in his very true remarks which one would like to see extended to the motorist. He has become used to the railings and exaggerated statements regarding his conduct as a motorist, and they become somewhat tiresome and nauseous by oft repetition. It must always be remembered that motorists broadly come under two headings—the townsman and the ruralist. Chauffeurs, as a rule, are drawn from the towns. Those who have come from the country have not been found invariably successful. They are nervous in busy town thoroughfares, to which they have never been.

and rarely become, quite accustomed; whilst they are apt to go to an extreme, and be too considerate of every horse and its driver in charge of a load of turnips, or the fellow asleep at the bottom of an empty cart allowing his funereal horse to plod its weary homeward way at its own pace and whither it will in the road, whilst he either endeavours to procure forty winks or soliloquises on fat sheep and abnormal trunips. I am a ruralist myself, and I hold no brief for the motorist, but there undoubtedly are these important questions relative to the latter: (1) Lack of knowledge, (2) exaggeration of facts, and (3) the inconsideration of the country folk themselves. All these are to be remembered when discussing the enormities of the motor car and those who use them.

What do I mean by the lack of knowledge of townsfolk? Let me deal with a few points to instance it. The townsman is driving his car on a country road, and sees a horse in front. Now, the manner in which that horse is harnessed, ridden, driven or led, conveys nothing to his mind, whereas the country gentleman would know by the bridle, by the lunging rein, by the very position in which the horse carried its head (whilst yet his car was a considerable distance away), whether or not it was incumbent upon him to pull up. Supposing the squire had diagnosed the case incorrectly for once, he would know what the horse would be most likely to do from his own experience and intuitive knowledge, and would act accordingly. Not so the townsman, who has been amongst machinery all his life, or connected with business. Unless he sees a horse suddenly dancing heavenwards, aiming for the hedge, or completely turn its course, all horses are more or less alike to him. "Then he ought to learn the difference," I hear some anti-motorist say. That is no argument, but it *would* be argument to say, "It is too late in the day for puerile raillery; and, as motors have come to stay, and cause thousands of pounds to circulate, would it not be as well for the village youths who are entrusted with horses to have something of the same apprenticeship to the management of their equine charges as the chauffeur is compelled to have?" It is a well-known fact that horses have a great sympathy with their riders. If the latter become nervous, they impart their nervousness to the animal under them, and it commences to dance or "shy." Again, as soon as some grooms—they may be very good *grooms*, but they are very bad horsemen—see a car, a motor cycle, or, indeed, anything on the road which they imagine may cause the horse they are riding or driving to take fright, they at once commence to "jag" at its mouth, or take tight hold of its head. The horse might have had no more qualms of the car, steam-roller, or motor cycle, than a thirsty navvy has of a pint of beer but he resents the pulling at his mouth. He therefore receives a punch in his ribs, a smack down his shoulders, or both—one with the groom's heel, the other with his stick—and just as he is showing more resentment the car comes along. Thus he gets to hate the very sight of cars, and to await their coming when they are yet afar off with trepidation, knowing that there is this jagging at his mouth, punching of his ribs, and so on, in store for him.

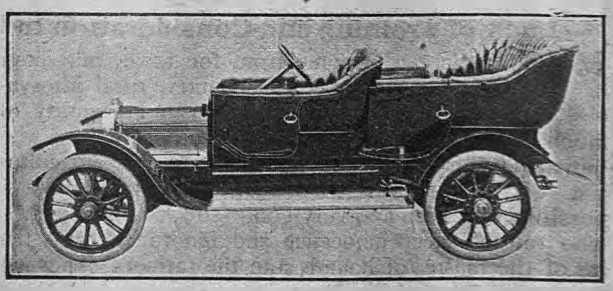
This explains much of the dislike of many horses to motor cars. Is the motorist to blame? No! but he is blamed nevertheless. It appears that he must be trained to drive and trained to stand being maligned; the unskilful handler of the equine reins needs no training, and is sympathised with. It is a strangely conservative world, my masters! It was a long time realising that railways would not ruin the country, and set every field of corn and every haystack on fire; whilst Mother Shipton, who prophesied carriages would run without horses, has been laughed right down the ages till her prophecy was an accomplished fact. Then, when it *was* an accomplished fact, it was at once received *in extremis*, and urged that in a year or two no horses would be required in England, and everyone and everything would be driven off the road.

The following is a digression, but possibly an interesting one. I read in an American paper this month that they consider there are many thousands to be made out of England if they begin to breed weight-carrying hunters, as the demand is greater than the supply in the old country. In another part of the same Yankee sporting paper are some verses bearing somewhat on the same subject, from which I select the following lines:

Though the automobile whizzes over the scene
That once was so perfect and still,
Leaving dust in its wake and the scent of benzine
As it disappears over the hill;
Though its zips and its jolts give alarm to the colts
Let us not for a moment forget
That in spite of man's need for excitement and speed
There is room for the old horse yet.

What has been said about the road applies equally to hunting. The town motorist often runs out to see a meet of hounds with most innocent intentions. The M.F.H. expects him to be *au fait* with the minutiæ of the science of the sport, which it has possibly taken the M.F.H. himself over a quarter of a century to learn. He is often either rude to the group of motorists in his annoyance, or else curses them behind their backs. Neither of these means is going to teach them very much. If the town motor party offend, as they undoubtedly sometimes do in their enthusiasm and excitement, it is with no preconceived intention of spoiling sport, as some would really have us imagine. The *raison d'être* is exactly the same as that which causes the town sportsman and sportswoman to gallop over seeds and wheat, to leave gates open—thus causing stock to get mixed—and so on. They are guilty of damage without knowing it. The motorist merely endangers the sport without knowing it, and possibly bespatters with mud the ebony boots, mahogany tops, and lily white breeches of the road hunters.

Enough has been said, however, to show that there are two sides to every question, and that before condemning the motorist or motor, these questions should be asked: (1) Am I in ignorance condemning him for something done in ignorance? (2) Is there not "contributory ignorance" on the part of the other party, who, unlike the chauffeur, has possibly had no training in driving a vehicle along the highway?



A 12 h.p. Talbot with a standard round body fitted with high side doors.

Some Queries and Replies.

Readers seeking the experience of users of specified cars, parts, or accessories are invited to insert their queries in these columns, and their fellow readers are invited to reply.

Querists are asked to enclose a stamped addressed envelope, so that replies may be made direct if the subject is not considered of sufficient general interest to publish.

Letters should be addressed to the Editor "The Autocar," Coventry, and replies to queries should bear the number of the query to which they refer.

Editorial advice is at all times willingly given to our readers.

REPLIES.

No. 1521.—Carburetter for 12 h.p. Humber.

I found my 1910 12 h.p. Humber did barely sixteen miles per gallon. I fitted extra inlet valve (Bowden's) to induction pipe below the V, and now do over twenty-three. Have kept careful record.—C.C.M.

No. 1531.—9-11 h.p. Delahaye.

I have had one of these cars for over a year, fitted with a landaulet body, and have been extremely satisfied with it. The chassis carries a landaulet body well, so it will easily take a light torpedo body. The engine is very quiet, and pulls extraordinarily well for its size (62 mm. by 100 mm.), and, considering this, is fast and climbs well. I have had four Delahaye cars, ranging from 9-11 h.p. up to 25-35 h.p., and know no car which has better material put into it or which lasts as well as the Delahaye. At high speed the back axle of the 9-11 "sings" a little, otherwise the car is very quiet. It does (with a landaulet body) over thirty miles per gallon of petrol in a fairly hilly country (S. Berks and N. Hants.) —G.A.

In the spring of this year I decided to sell my motor cycle and go in for a small car. Being a person of strictly moderate means, I required maximum efficiency combined with the minimum cost of upkeep, and eventually selected a 9-11 h.p. Delahaye, as I found I was unable to get the flexibility and rapid acceleration I had been accustomed to on less than four cylinders, and am pleased to say I have had no cause to regret my choice. During the past six months I have travelled about 3,000 miles without an engine or tyre stop, and (with the exception of having the valves ground in once) no expense beyond garage, petrol, and lubricants. I have a Victoria body, built locally, with an emergency seat for two behind, and find it travels better with four up than two, so "Enquirer" need have no doubts as to fitting a light four-seater. The ease of control, quiet running, reliability, and finish of the whole car has been continually admired, and have also given me the greatest pleasure and satisfaction. The car will take ordinary hills at fifteen miles per hour on second speed; consumption works out usually at twenty-seven and on a straight run over thirty-one miles to the gallon.—SYDENHAM.

No. 1534.—10-12 h.p. Swift.

I do not know what sort of body "Chassis" is proposing to build on his 10-12 h.p. Swift, but the following points may interest him. Mine is a two-seater of standard type, 1909. I find the running much improved, especially on a bumpy road when I am carrying luggage behind, showing that it is advisable to have weight on the back axle. The gear lever is, to my mind, rather too far from the seat. It is advisable to make the dash quite rigid before fitting a glass wind screen. I have a great opinion of the 10-12 h.p. Swift.—E.M.M.

No. 1536.—Dry Batteries.

"M.D." will get good results with dry cells of Messrs. Siemens Bros.' make—the "Hellesen" cell, No. 2 size, four of which will be required for motor car work. It is difficult to understand what "M.D." means when he states: "I bought two of a well-known make—one showed only two volts and the other was exhausted in a couple of days." Is it two cells or two batteries of four cells each that is intended? If cells are meant, two are not sufficient, while there is not a single dry cell on the market which will give two volts on test: dry cells ought to be tested with an ampère-meter, not a volt meter. The electro-motive-force of the above mentioned type, No. 2 cells, is 1.47 volts, and the internal resistance 0.25 ohm, so that four of these cells coupled up in series will give just over four volts, which is necessary for ignition purposes. The smaller sizes of these cells are not to be recommended for motor car work on account of the much increased internal resistance—0.65 ohm. Dry cells do not give the output of a good accumulator, and have to be used intermittently; they should be carried in a place where there is no possibility of moisture finding ingress, and in coupling up the screw terminals on top of each cell ought to be just a shade more than thumb tight lest vibration should loosen them; they should also be smeared with vaseline. Vibration does not affect dry cells, and there is no bother with spilling of the electrolyte as in accumulators, nor are they liable to short circuit. A very important point to observe is to get them fresh from the maker, not the retailer; they should be specially ordered, for in keeping they gradually become useless owing to an increase in their internal resistance. Nine months is about the average life for motor car work.—PAGE.

No. 1535.—Crossley Cars.

I have had one of the new 20 h.p. Crossleys since the 4th of August last, and beg to offer the following answers to your correspondent's questions: (1.) Materials. I recommend your correspondent to do as I did, if he has time, and visit Messrs. Crossley's works at Gorton, Manchester. I was received—by appointment—with the greatest courtesy, and venture to think that he would be more then satisfied. (2 and 3.) Durability and repairs. I have only had my car a short time, so I am afraid I cannot help him much here, though the car has done 2,600 odd miles and shows absolutely no sign of wear. We have, however, also a 40 h.p. Crossley here, new in January, 1908, which has only been taken down once—and that to have the pistons scraped and steering taken up. This car belongs to my

Some Queries and Replies (*Continued*).

father. (4.) Tyres. I have on the car Michelin tyres, 875 by 105, non-skid on back, square tread in front. In spite of some of the worst roads in Dorsetshire and Devonshire, their life appears only to have just begun. (6.) Petrol. I have done over 2,600 miles, and have bought 130 gallons of spirit. My tank is more than half full now, so it is averaging over twenty miles to the gallon. (7.) Noise. The car is more silent now than when new. When running on the flat at its best pace—about 25 to 30 m.p.h.—the most noisy part of the car is the speedometer. (8.) Front wheel brakes. These require very careful adjusting, but once adjusted are, I consider, ideal. No noise is heard or jarring felt. I understand that an improved pattern brake is being fitted to the 1911 pattern. (9.) Though I am no mechanic by education or training, I employ no chauffeur, and run the car entirely myself, with the exception of washing. The engine is, in my opinion, simplicity itself. Everything is encased. (10.) Cooling. The engine warms up a bit on such hills as Devonshire can produce when at its best, but is this a disadvantage? (11.) The car is a marvellous performer on hills. I am in no way connected with the motor trade.—A.G.S.

No. 1502.—Armstrong-Whitworth.

I have an 18-22 h.p. Armstrong-Whitworth. I have found it most satisfactory. I run about eighteen miles to the gallon. I have now run 3,000 miles, and have never had a tyre off, and they are still in good running condition. The Armstrong-Whitworths are good hill-climbers, and quiet. I can thoroughly recommend them.—B.

No. 1516.—Tyres and Rims.

I had a good deal of trouble with some 815 × 105 tyres which were fitted to 810 × 100 rims on my 15-20 h.p. Darracq, and the tyre makers were very certain that the flanges had undue strain on them on this account. I also had great difficulty in taking the tyres off; but I have now fitted the correct size, and I certainly cannot see that the larger tyres gave any more comfort, or were in any way at all preferable—very much the reverse.—H.B.C.

No. 1496.—Lancia Cars.

I have had a 20 h.p. Lancia, heavy landaulet body, six months on hire work. The car has done 15,000 miles, and has never given me a moment's trouble, and is running as well and as quietly as the day it was delivered. I got 7,000 miles on one front tyre, and over 6,000 on the other; 5,000 miles on back cover. Petrol consumption averages twenty miles to the gallon.—GEORGE FIELD.

No. 1509.—12-14 h.p. Charron.

"R.C." will find the following alteration to the existing and primitive carburetter very effective. Add a Gillett-Lehmann controller to float chamber, bore a ⅛in. hole or thereabouts in side of air box and solder on a shoulder. On this shoulder fit a rubber pipe, which is run to dashboard, and controlled by any sort of tap that does not too much reduce its effective area. Set the controller with hole under milled nut a shade less than half open. Turn the cone about a quarter of a revolution to get richness for starting and slow running (directions are given with the controller). At high speeds use the hand-controlled air pipe freely, and less so at lower speeds. I find this gives greater power and also very slow idle running. Easy starting with throttle shut except for permanent hole in it. Quick pick up and slow down, and consumption about 22 m.p.g. from England to Scotland. I have just fitted a Zenith, which works better, of course, but think "R.C." will be quite satisfied with the other. The spring air valves should be opened as far as possible without bringing them into action when the car is running slow and idle. Owing to abnormal smallness of choke-tube, keep petrol level nearly ¼in. below top of jet; fit a cut-out owing to smallness of exhaust pipe.—H.C.J.

No. 1514.—16 h.p. 1910 Humber.

I purchased a 16 h.p. Humber car in February of this year, and after running it 6,400 miles am of opinion that it is thoroughly reliable, efficient, and well-constructed, the only incidents which have occurred to me being a damaged ball-race in a back wheel hub, caused, I think, by a locking ring having been insufficiently secured when the hub was removed for greasing, and a crack in one of the small brackets to which the back springs are attached, a new one being supplied free by the company. I have driven it over all kinds of roads in the North and South of Scotland, and found it fast, both on the level and on hills, well sprung, and not heavy on tyres. I might mention specially the excellence of the Humber detachable wheels. As to petrol consumption, tested recently over 170 miles the quantity used was ten gallons.—A.J.A.

No. 1519.—Turner-Miesse Steam Car.

I have had one of these cars, a 20 h.p., since May, 1909, and have driven it about 4,000 miles. The burner is not silent, but is not noticeable when the car is running. It does not choke if kept reasonably clean, and is easy to clean. It does not smell or smoke, unless very dirty, except when drain cock is open, while generator is being warmed up before starting. The air pump cannot supply excess of fuel to burner, as there is a spring relief valve in the pressure system. With the air locking valve closed the car may stand for hours without the air pressure falling appreciably. The engine cannot be stopped while the car is running. The vaporiser gives no trouble, but the generator will cool down if the car be over-driven, and the car will slow down and show a lot of steam behind. The car runs very sweetly at any speed up to about 25 m.p.h., and hardly loses any way on average gradients. "Spurting" cools the generator, and the car will have to be stopped for four or five minutes till it warms up again. The water regulating lever and the selector lever are all the hands have to attend to besides steering, once the car is under way. The selector does not need to be touched except on a very steep hill. The water pump is quite silent. The oil tank carries a supply for six hours from the time of lighting up. I have never been able to travel more than forty-two miles on one tank full of water.—W.J.S.H.

Some Queries and Replies *(Continued).*

QUERIES.

No. 1550.—Sioco Cylinders.

IS it a fact that the Sioco firm no longer charge their tyre cylinders? If so, is there any other firm who will do this? There must be many motorists with these expensive outfits, and if unable to get them charged they are useless.—H.E.B.

No. 1551.—Change Speed Lever.

CAN any reader tell me how to prevent the change-speed lever on my 15 h.p. Austin (1909) jumping out when travelling on third speed? I have a four-speed gear box, and it only does this when going about 15 m.p.h. or over on third.—WOOLWICH.

No. 1552.—Noise and Loss of Power.

I HAVE a 12 14 De Dion (1908) fitted with a Trier and Martin carburetter, and though I get good running on the road, I cannot manage to get quiet running at starting without a great sacrifice of power. I have tried putting smaller jets in the first hole and shutting off air, but this means so much loss of power that the car cannot climb our very steep and frequent hills. With larger jets and more air one can start the car on any incline up to 1 in 6, but at rest the racing is very bad and most damaging to the engine. I thought there might be a leakage in the induction pipe, but there is none, and after many experiments I ask if any of your readers can give me advice. —NOVICE.

No. 1553.—Heating Motor House.

I SHOULD like to have the experience of any of your readers who have made use of Norton's patent fuel garage stove. Is it absolutely safe? Does it give out the heat required to keep out frost when the outside temperature is, say, 20° F.? Are there any objectionable fumes? How long does it last when once changed before recharging is necessary? What does the cost of working amount to? I should like to have details from any of your readers with regard to Clark's Motex heating apparatus. Is this satisfactory and economical? The motor house I wish to heat is of wood, made of 1in. boarding outside and cleaded inside with ⅜in. matchboarding, and has a cubical extent of 2,000ft.—AJ 53.

No 1554.—"Chattering" in Clutch of Metallurgique.

WILL any reader who has suffered from, and cured, a noisy Métallurgique clutch kindly let me know how I can stop mine from "chattering."? The clutch apparently develops periods of chattering at certain engine speeds. I have taken down and thoroughly overhauled the clutch, but cannot find there is any need of adjustment. I have tested the car on a private road, and find that the speeds at which the clutch chatters most are 10 m.p.h. and 25-30 m.p.h. Between 10 and 25 m.p.h. it is quiet enough. Directly the throttle is opened at 25 m.p.h. it continues to rattle abominably. There is, however, never a sign of slipping. Universal joints are in thorough order, and have no play. Should the clutch be run dry, or with a slight amount of kerosene given occasionally? The clutch is considerably less noisy when the car is laden with four people and there is a good weight to be propelled.—TROUBLED.

No. 1555.—Rocking of Front Wheels.

I WILL be glad if any reader of *The Autocar* can give me information on the following: My car, about four years old, has recently developed a very unpleasant roll, or rocking of the front wheels, usually when entering a town, or when the pace is checked even on the open road. There does not seem to be much backlash in the steering, and none of the steering rods or connections are unduly loose. When the car is almost stopped and then sent on again it usually stops the rocking for the time being. A remedy was suggested to me, and that was to have the front axle bent up slightly in the middle so as to give the wheels a cast out at the top. Would this be effective, or can a simpler cure be found? —R. B. A. WALLACE.

Queries and Replies.

Four-cylinder Rover.

I SHOULD like to compare notes with any of your readers who possess this type of car. Mine gives no trouble provided the ignition (accumulator and four trembler coils) is well looked after. The petrol consumption varies from twenty to twenty-five miles per gallon, according to number of passengers and hills to be climbed. I once did twenty-nine miles per gallon on a circular run of about thirty miles with one up, keeping on top the whole way. Can any of your readers better this consumption with standard Rover carburetter? The car goes much better if the contact breaker be run in vaseline or oil, but it has to be cleaned out and fresh oil put in every fifty miles, or misfiring commences. Advice on this point would be welcome. Occasionally one hears a peculiar thumping noise in the engine, which is especially noticeable when the car is not in good trim. This is quite distinguishable from a knock; what would it be due to? Engine gives full power when throttle is only half open. In view of this would a smaller jet improve matters, or more air be beneficial?—A.F.S.

A proof of the above was sent to the Rover Company, Ltd., who reply as follows:

The consumption for this engine, especially as the car is geared fairly low, is about normal. Oil should be used in the contact maker, and a hole is provided for this in the lid. If grease or vaseline be used, it does not lubricate the pin on which the roll revolves, so that it makes the firing sluggish. The thumping is due either to misfiring from the above cause, or carbon deposit on top of piston or cylinder. Full power when throttle is only half open is most likely due to throttle being out of adjustment, as the jet in the carburetter cannot alter in size, and if it is kept as sent out by the makers, is usually right. As the car has been in use for so many years, we should think that the throttle is likely to be the cause of the trouble. It is no good supplying more air, as the inlets of the carburetter allow as much air to go through as the valves will take.—THE ROVER COMPANY, LIMITED.

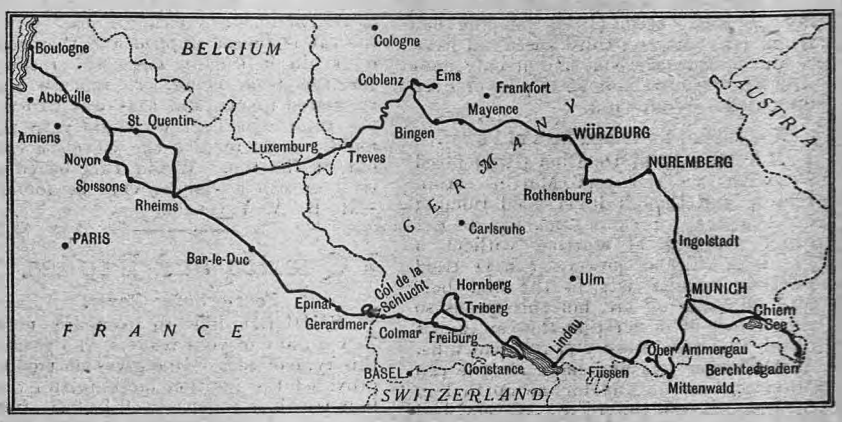
Week-end and Touring Notes.

A Motor Tour in France and Germany. By "X."

(Concluded from last week.)

Section IV.

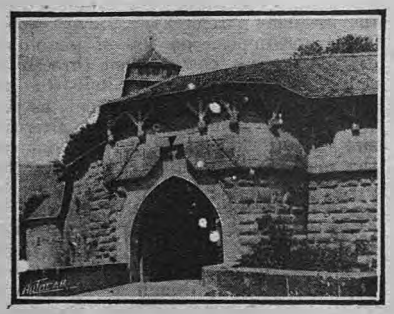
The drive to Rothenburg was a pleasant surprise, as, instead of a repetition of the Munich to Nuremberg journey that we had expected, it was a good, even road through enormous forests.



The first view of Rothenburg is obtained when reaching the summit of a hill; one sees an extensive plain stretching out in front, and in the middle of it, a small, quaintly-roofed and completely walled-in town, with lofty turrets and towers studding the walls all round. Only one factory chimney can be seen, a very different sight from the first view of Nuremberg, which looks exactly like what it is—a large manufacturing city.

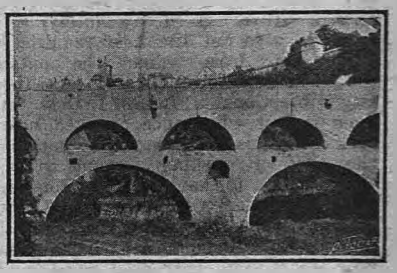
On the side of Rothenburg from which we approached it there is a sudden dip in the plain, at the bottom of which flows the River Tauber. Just half-way down on the side of this hill is the Hotel Wildbad—a modern and well equipped hotel. We stayed there for a few days, and found it most comfortable, the only drawback being that at least one hundred and seventy-eight steps or else long winding paths have to be traversed in order to reach the town above. A peculiarity about the hotel is that, owing to its being built on the side of the hill, each floor is on the ground level although there are five storeys!

Rothenburg, first known as a town in 942 A.D., is about the most perfect mediæval town I have ever come across; the only new thing in it seems to be the electric light works owning the one tall chimney; everything else takes the mind back to the middle ages. The walls and towers are absolutely perfect examples of mediæval architecture, and some of the gateways are magnificent.



Rothenburg o/d Tauber. Spital Tor.

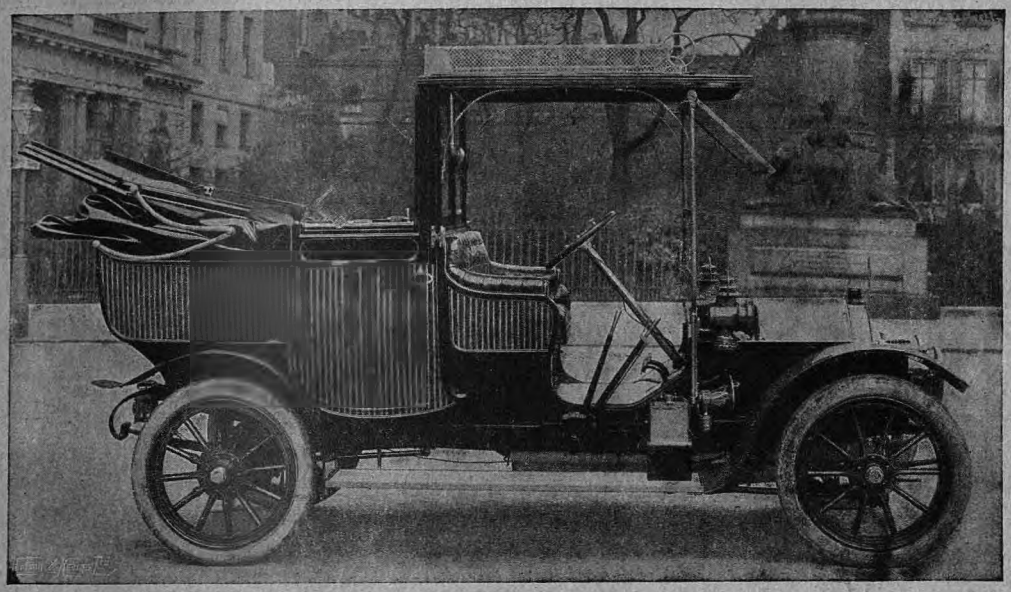
Although not nearly so well known, Rothenburg is, in my opinion, infinitely superior to Nurnberg from the tourist's point of view, as there is not that terribly incongruous mixture of old and new that is to be found so plentifully in the latter town.



The thirteenth century double bridge at Rothenburg o/d Tauber.

After many warm days pleasantly spent in wandering round the old town, we said *au revoir* to Rothenburg and made for Mayence and the Rhine. We lost our way several times, passed through many walled-in towns, but not many as picturesque as Rothenburg, and experienced a terrific thunderstorm and a deluge of hail in the heart of the lonely Spessart Forest—one of the largest forest districts in Germany and far away from civilisation of any kind. It continued for miles—nothing but the roar of the thunder and the clatter of the hailstones on the roof of the car as we tore on through the intense blackness of the woods only illuminated occasionally, to a startling brilliancy, by the vivid flashes of lightning.

Finally, leaving the forest and also the thunderstorm behind us, we ran along roads which reminded one of France, through Darmstadt and on over the Rhine into Mayence.



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