THE AUTOMOTOR
AND
HORSELESS VEHICLE JOURNAL

A RECORD AND REVIEW OF APPLIED AUTOMATIC LOCOMOTION.

Circulates amongst Makers and Users of Motor Cars, Cycles, etc., in the United Kingdom, the Colonies and the Continent.

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CONTENTS.

THE AUTOMOBILE CLUB EXHIBITION.

WE deal in detail in another part of our issue with the recent Exhibition at the Agricultural Hall. Of the general impression produced by the Show there can hardly be two opinions. The progress displayed is remarkable. In particular, it produces the impression to probably a greater degree than any exhibition which has as yet been held, that the automobile industry in this country has become, not only a serious, but a great industry. Possibly nothing shows this more than the attitude of the general public in the hall—the manner in which they recognised that the automobile had long ceased to be an appliance calculated to excite either wonder or amusement, and that the object of the Exhibition was to enable them, as well as the exhibitors, to conduct legitimate and sensible business. As regards the cars shown from time to time in operation in the arena, the most noticeable feature was the general reduction of noise, both as produced by the engines actuating the cars and by the gearing; while more noticeable still was the complete absence of even the faintest odour. It is therefore with nothing short of astonishment that we encountered a statement in an otherwise unexceptionable and even sympathetic leading article in this week's *Lancet* that "the hall was well-nigh intolerable from the nauseating smell of escaped and partially burnt petrol." This statement is so remote from actual fact that we do not see how it can be even included within the elastic bounds of what is usually euphemistically described as exaggeration. Steam cars, both of the Serpollet and American Locomobile types, were more in evidence and more generally appreciated by the public than has been the case in our experience before. A significant feature of the Exhibition was afforded by the relatively large number of subsidiary manufactures which have grown up and into a position to supply the requirements of automobile manufacturers, in a manner and on a scale which we only meet with in the case of successful and firmly established industries.

THE ELECTRICAL PRESS AND AUTOMOBILISM.

IN general we rather avoid dealing with adverse criticisms in the technical Press, but an article of considerable length which appeared in a recent number of the *Electrical Engineer* has caused us, we think advisedly, to make a departure on this occasion, at any rate, from what we regard as a salutary rule. We have replied to the article in question in the leading article in our present issue, and we refer our readers to that article as regards the merit of the controversy. We would point out in a general way, however, that the attitude taken up by the *Electrical Engineer* on this question is only too characteristic of the general attitude of the electrical Press to that department of the automobile industry to which we would have expected them to afford assistance and co-operation.

THE MAYBACH CASE.

IF any pronouncement of Mr. Justice Kekewich could have excited surprise, surprise would probably have been excited by his recent decision in the Maybach case. It was, to say the least, not generally anticipated. There can be no question that it will have a considerable, not to say serious, effect upon the automobile industry. Both the conduct of the case and the production of evidence on the part of the defendant were in many ways remarkable. Unfortunately we received the report of the case too recently before going to press to be able to deal with it in as exhaustive a manner as the importance of the subject and the nature of the action demand. We propose, therefore, to postpone what we have to say on the subject till our next issue, when we hope to deal with the subject exhaustively. It will be sufficient to remind our readers now that the Maybach patent is for the use of the float-feed carburettor, a device which is, as they are of course well aware, employed in a very large number of petrol motors.

PATENT LAW.

THE first of a series of articles on Patent Law from the inventor's point of view is published in the present number. We have occasionally dealt with special aspects of the law of patents. The present article, which is intended to be the first of a series, deals, as will do those which follow it, with Patent Law, not so much from the purely technical or legal point of view, as from the standpoint of the inventor who is thinking of applying for a patent, and who wishes to know in what way he ought to proceed so as to procure the best legal protection for his property that he can obtain. The articles will be partly written with a view of enabling inventors who are not in a position to spend much money on obtaining the necessary protection, to form an opinion as to how far they can be their own patent agents, and partly also to provide those who are in a position to spend some money in protecting the products of their inventive faculties with some data for forming a conclusion as to what is the best kind of professional assistance that they can engage. The motor car industry is an expanding one, and a very large number of people more or less directly connected with it are constantly devising new and useful improvements. Therefore, we venture to think that our readers are certain to have among their ranks a considerable number of persons to whom these articles may prove of interest and, we trust, of use.

THE WAR OFFICE AND AUTOMOBILISM.

WE publish elsewhere, *in extenso*, an invitation for tenders for heavy lurries for military purposes, which has been issued by the War Office. The specification shows that the type of automobile required is of the heavy traction type, as a self-propelled vehicle is required equal itself to carrying a load of 3 tons, and of pulling another vehicle or trailer behind it with a load of 2 tons, the combination being capable of ascending an incline of 1 in 8 and making its way satisfactorily over rough roads. We are glad to be able to announce this fact as an indication that the War Office is at length recognising the possibilities of automobilism as applied to military purposes. A similarly encouraging sign is provided by the fact that the War Office has appointed six representatives from its department to be present at the tests about to be made in connection with the Liverpool Heavy Trials. The Office is likewise, we understand, according favourable consideration to the suggestion of the Automobile Club to place a number of automobiles and drivers at its disposal to enable it to form an opinion as to the suitability of the lighter classes of self-propelled vehicles for use in connection with military operations.

NEW ELECTRIC LAMPS.

A NEW type of electric lamp is due, we understand, to the scientific genius of Dr. Auer von Welsbach, who has already gained fame and considerable fortune by his incandescent gaslight. Dr. Welsbach has discovered that the metal osmium is a more refractory material than carbon, of which to form the filaments of incandescent electric lamps, and he has succeeded in constructing a lamp composed of a filament of osmium. The light-efficiency of this lamp is said to be remarkable, being somewhat higher than the Nernst electrolytic filament, while it does not require any complicated devices to cause it to light up, but it can be switched on and off like an ordinary incandescent lamp. It is, perhaps, at present a question how far the new lamp can be made a commercial article, but assuming that it ultimately may be so manufactured it is not without interest to automobilists. A peculiarity of the new filament is both that it cannot be constructed for high voltages and that it is most efficient when made for low voltages, say between 10 and 50. Now really efficient electric lamps, consuming less than half the energy of existing lamps and capable of being lighted by a small number of cells, and turned on and off without trouble, would be a real boon to the automobilist. While dealing with this subject of the recent improvements of electric lighting, we cannot refrain from mentioning the newly-invented arc lamp, in which the carbons of the ordinary arc lamp are replaced by a material of similar composition to that which is used for making the Nernst filaments. Such a lamp is, of course, not self-starting. Like the Nernst lamp, it requires to be heated up, but when so started it gives the extraordinary light-efficiency of 0·24 watt per candle-power. If this lamp is ever manufactured on a commercial scale, it should render electric lighting, with current even at ordinary prices, considerably less costly than lighting by means of the Welsbach burner, even where gas is cheapest.

THE EDISON ACCUMULATOR.

IN our present issue we give a short article dealing with the new Edison accumulator. Our information, to be perfectly frank, is based upon Edison's British specification, no other data being at present apparently available, all the references to it which have already appeared in the Press being palpably indebted to the same source of inspiration. To the description of the battery we have ventured to append some critical remarks, as we see reason to doubt whether the system advocated by Mr. Edison is likely to give rise to the great saving of weight to which we understand he lays claim. Whether this be ultimately realised or not, however, Edison's invention is an attempt to produce an accumulator on what are, at any rate, partially new chemical lines. In this respect his invention differs from the majority of other new batteries, in which generally the sole claim to novelty is based upon some variations in the construction of the grid or method of manufacturing the paste for lead accumulators. Edison's accumulator has, therefore, our fullest sympathy, as we have become slowly and reluctantly convinced that only upon some lines involving chemical reactions, which do not occur in the ordinary lead accumulator, is any great improvement in the weight capacity of secondary batteries likely to be discovered. Shortly described, Edison's battery may be said to be our old friend, the copper-zinc combination, with the copper positive improved so as to be insoluble in caustic alkali, and the zinc replaced by finely-divided cadmium. The negative, therefore, is not, as in the zinc-copper combination, a soluble electrode. At the same time, news comes from Stockholm that Herr Jungner, whose work on the development of accumulators on new lines we referred to in THE AUTOMOTOR JOURNAL for December last, p. 143, has been experimenting on somewhat similar lines. He also employs finely-divided cadmium as a negative, but is said to prepare it in a different way from Edison, while peroxide of silver is employed as a depolariser on the positive. This may make a light and, quite possibly, highly efficient battery, but it looks as if its price must of necessity be prodigious.

TRANSMISSION GEARING.

THE views of a manufacturer on the general question of transmission gearing cannot but be interesting to our readers, and when these are expressed by the designer of such a

vehicle as the Wolseley, this will be particularly the case. Mr. Herbert Austin's paper, which we give in full in the present issue, contains a very fair comparison and criticism of such well-known systems as those of Panhard, Benz, De Diétrich, Renault, De Dion, and Wolseley. The treatment of each of these forms of gearing is very systematic, and it well brings out the relative merits of each. The drawings are also very useful, if only for reference, as they give an excellent and immediate impression of each of the leading types of transmission gear which are now mostly used.

THE AUTOMOBILE CLUB'S EXHIBITION.

THE best and most complete Automobile Exhibition which has ever been held in this country was opened on May 4th, at the Agricultural Hall, Islington, N. During the whole week the attendance was considerably greater than at any previous and similar show, and it was evident that the general public are now taking a keen interest in self-propelled vehicles, both from the point of view of business and pleasure. It is probably not too much to say that this is the first exhibition at which the number of those directly connected with the industry has not exceeded that of the possible purchasers present; in fact, nothing has shown the change of popular feeling more forcibly than has this exhibition. Fortunately also the number of exhibitors and the quality of their exhibits were admirably calculated to impress the public favourably, and the change in the general tone of the visitors must have been evident to all those qualified to judge of it. The noticeable amateurishness and indifference which in too many instances has characterised some of the earlier shows, and which has been far from calculated to allay the often laughing spirit affected by many of the visitors, were totally absent in this case; a keen attention to business on the part of the exhibitors and a serious interest in the machinery on the part of the general public were to be found in their place.

Concerning the exhibits, improvement in design, improvement in workmanship, and improvement in appearance were their characteristic features. Although the proportion of English machines was considerably greater than hitherto, there were not only a large number of Continental vehicles to be seen, but American manufacturers were also well represented. In the oil-driven cars, more powerful motors or lighter construction of the complete vehicle, simplified or more efficient transmission gearing, better cooling systems, and provisions for rendering the power and speed of the motors more flexible, predominated; the adoption of motors running at very high speeds and developing some 6 or 8-h.p. has evidently become very general, and, although this practice is open to some criticism, it is probably a phase which will assist in the further development of the internal combustion engine, and which will, by enabling manufacturers to reduce the cost of their vehicles, render automobiles more popular at the present time. Steam cars, both of the lighter American form (which does not seem to have appealed to English makers) and of the medium-sized and more substantial Serpollet pattern, attracted a great deal of attention. Considerable disappointment was shown at the comparative absence of those heaviest types for which builders in this country are so favourably known; but the near approach of the trials of these vehicles at Liverpool is doubtless responsible for this one weak spot in the exhibition. Electric carriages in great variety were to be seen, and all the better-known English and foreign makers made a good show with machines of neater and lighter appearance than formerly.

In the matter of detail it was obvious that much experience has been gained and profited by recently, with the result that the manufacturers of such special parts as wheels, chains, frames, axles, bearings, pumps, or bodies, now understand the demands of the industry, and are able to supply articles which are suited in design, in material, and in workmanship for their intended purposes. The exhibition has not only shown that a great industry is now fairly under weigh in this country from a mechanical point of view, but also leads to the belief that it will have done much to disabuse the public mind of the idea that the automobile is an unreliable plaything.

The number of exhibitors was about 150, which is in itself a great increase over those of last year. The centre of the large hall was again reserved for the trial of vehicles, but only a few of these were allowed to enter at one time, and no regular competitions of any kind were held. The exhibits completely filled the space available both around the arena, in the minor hall, and in the entrance arcade; some few stalls were also placed in the gallery.

The following is a description of some of the exhibits which came under our notice, and which appeared to represent not only the novelties of the show, but also the general constructional tendencies of the day:—

The Motor Manufacturing Company (Limited), of Coventry, showed a fine assortment of their different-sized vehicles, fitted with bodies of various kinds, including the inevitable "tonneau" pattern, which is just now so fashionable. This Company's latest production is a voiturette, known as the "Miniature Panhard," two of which were shown. These vehicles are well described by their name, as they follow the general lines of the well-known Panhard cars. A 5½-h.p. single-cylinder, water-jacketed motor of the De Dion type, which runs at a high speed, is fixed beneath the bonnet in the front of the frame. It is fitted with the device for regulating the degree to which the inlet valve opens which we described and illustrated recently.* Three speeds forward and one backward gear are obtained in the usual manner by toothed gearing enclosed in a gear case; the gear wheels, however, remain continually in mesh, and are alternatively brought in action by a feather which slides on the shaft. A radiator is placed in front of the vehicle, the water tank is at the back of the frame, and the petrol tank is fixed behind the dashboard. These popular little vehicles run very quietly, and are well finished in every respect; bodies to accommodate four passengers are usually fitted, and in some forms the rear seat is readily detachable when the space occupied by it is required for luggage. About eight other carriages fitted with motors of from 6-h.p. to 12-h.p. were also shown, inclined wheel steering and side gear levers being universally adopted on all. An interesting show of motors and a Werner motor bicycle completed this exhibit. The former were of the following sizes and descriptions:— 2¾-h.p. air-cooled De Dion type, weighing 65½ lbs., the piston being 79 mm. diameter, and having a stroke of 80 mm., normal speed 1,600 revs. per minute; a similar motor fitted with a water-cooled cylinder head, and thus rendering it free from the inconveniences of overheating; 5½-h.p. water-cooled De Dion type, weighing 124 lbs., the piston 100 mm. in diameter, with a stroke of 110 mm., normal speed 1,450 revs. per minute; 6-h.p. and 9-h.p. double-cylinder vertical motors of the Panhard type, and 12, 16, and 24-h.p. motor of the same type, with four cylinders.

The Langley Motor Company, of Luton, showed the "Pick" voiturette, which we have previously described (Vol. V, p. 125), and which is fitted with a 3½-h.p. water-cooled motor, with two forward speed gears, and with Compin spring seats. The Compin seat is constructed of flat steel plates which are placed parallel with each other across the framework of the seat, and which are free at one end to slide on steel pins. The arrangement affords a comfortable and very flexible cushion.

De Dion Bouton (Limited) exhibited several of their well-known voiturettes (*see* Vol. IV, p. 382), which do not call for any lengthy description here, although we may mention that one of them was fitted with a detachable glass screen in front. The chief novelty consisted of a launch motor of identically the same form as that employed upon the voiturettes, and with which was coupled, on an aluminium bed plate, an adapted change-speed and reversing gear of the makers' usual type.

The Dunlop Pneumatic Tyre Company (Limited) had a complete range of tyres on view, from those suitable for motor tricycles up to large tyres for heavy cars. The larger sizes have hitherto been made abroad, but the Company have now manufactured these themselves, and will be able to make delivery of matured tyres in July next. Samples of wheels for automobiles, both of the artillery and of other types, together with tyre repair outfits and other accessories, completed an interesting display.

United Motor Industries (Limited) showed a French voiturette of a type similar to many others in the exhibition, and in which a 4½-h.p. De Dion motor in front drives a "live" rear axle through a change-speed gear and bevel gearing. A large variety of accessories both small and large, as also a complete frame with transmission and steering gear, were on view. Here also was a new two-speed and clutch gear which has been introduced by MM. Dupont, Hanriot, Frères et Cie., of Paris, for motor cycles, and which is represented in Fig. 1. This gear is connected to the motor shaft in lieu of the ordinary pinion, whose place relatively to the large spur wheel driven by it is taken by the pinion seen in the drawing. A clutch, normally held in driving contact by a spring, and a band brake can be operated by the rider and the effects obtained are that the motor can be entirely disconnected from the driving pinion, the pinion can be caused to revolve at the same speed as the crank-shaft (and the whole gearing) or the pinion may be made

* Vol. V, p. 174, January last.

to run at a lower speed than the motor. This appeared to be a particularly compact and reliable mechanism, and is constructed upon the same principle as several other gears which were to be seen in the exhibition. Its central shaft, which is coupled direct to the motor,

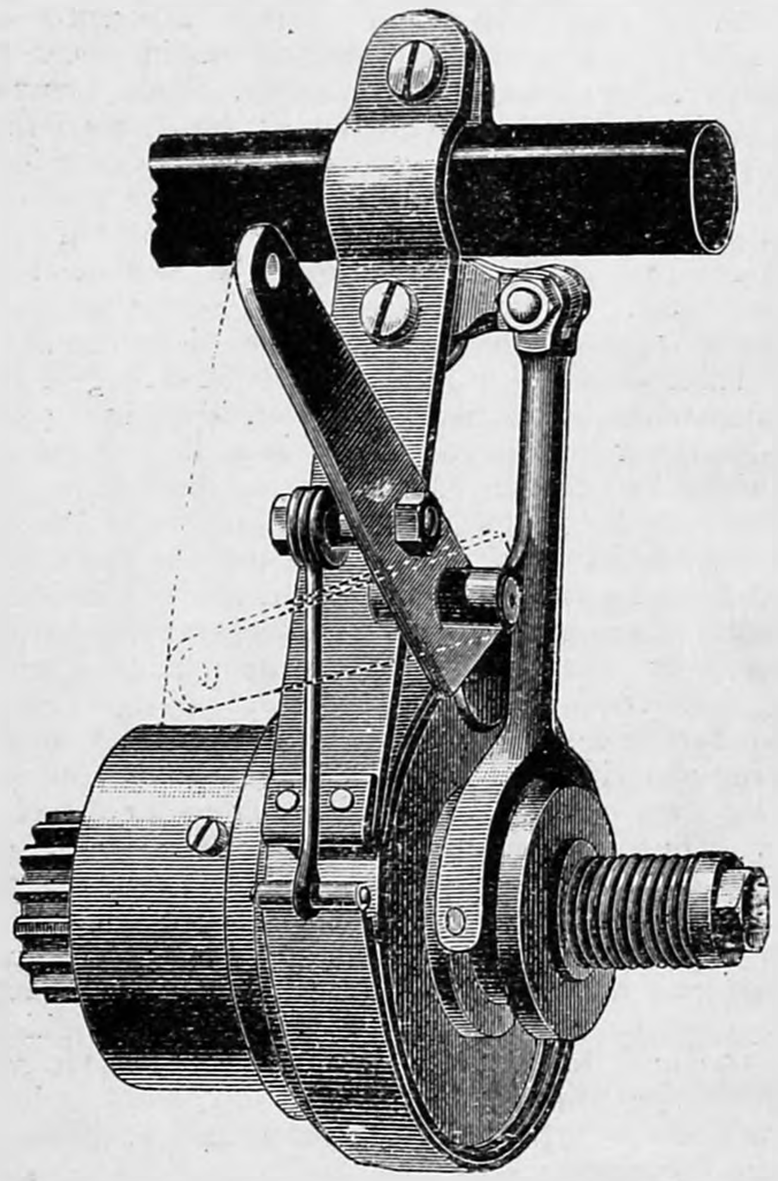


FIG. 1.—The Dupont Two-Speed and Clutch Gear for Motor Cycles.

carries a spur wheel which is keyed to it inside the containing case. The shaft projects as seen in the drawing, and the cone of the clutch rides on a feather upon it. The driving pinion which lies between the gear case and the motor is carried by a sleeve which runs freely upon the central shaft, and which also has a spur wheel fixed to it inside the case. Planet wheels, whose bearings are formed by the case itself, mesh with the unequal sized spur wheels above mentioned, and the case itself is free to revolve about the shaft except when it is held by the band brake. If the clutch is engaged the whole gear revolves as one piece, and there is no power lost in uselessly revolving any idle wheels.

FIG. 2.—The Wolseley Water Pump.

When the clutch is thrown out the motor runs freely, but the brake drum revolves in the opposite direction, and if the drum is then held the driving pinion is caused to run at a lower speed, and the power is transmitted to it as in the back-centre of an ordinary lathe.

The Motor Power Company (Limited).—Two Napier cars and two Gladiator voiturettes were shown by this Company, who also intended to have one of the large 50-h.p. racing Napiers on view, but this we did not see there. The 9-h.p. Napier is fitted with a double-cylinder vertical motor, which is entirely enclosed in a dustproof case. A larger car of the same make has a four-cylinder engine, which develops 24-b.h.p., and is fitted with an aluminium body. Artillery wheels with oak spokes and steel bosses are provided with Clipper-Michelin tyres on both cars, and two separate sets of band brakes are fitted; one set is worked by a hand lever and the other by a foot pedal, the drum of the latter being water cooled, to avoid all risk of overheating, and both serving to hold the car in either direction of travel. The larger Gladiator vehicle is not unlike the Miniature Panhard above described; it is fitted with a 6½-h.p. water-cooled Aster motor, with artillery pattern wheels and with 3-inch and 2½-inch tyres to rear and front wheels respectively. The smaller Gladiator has already been dealt with in a previous issue (Vol. V, p. 13); it has a 3½-h.p. Aster motor in front, a chain-driven counter-shaft across the centre of the underframe, a high speed clutch gear and a low speed epicyclic gear upon the counter-shaft, and the differential gear upon the rear axle is driven by a second chain from the counter-shaft. Cycle wheels of equal size are all provided with 3-inch pneumatic tyres.

The Wolseley Tool and Motor Car Company (Limited), of Birmingham, showed one of each of their standard cars, one being fitted with a double-cylinder horizontal motor of 10-b.h.p. at 750 revs. per minute, and the other having a single-cylinder motor of half this power. They also exhibited one of their complete 5-h.p. motors on a testing stand, as also samples of aluminium and bronze castings, of forgings and stampings, and of the Wolseley calliper gauges. The excellence of the workmanship throughout was most marked, and the recent improvements which have been introduced, both in the motors and the transmission gearing, deserve special mention. All four wheels are of the same size (34-inch, with 3½-inch tyres, on the large car, and 30-inch on the smaller car) and are of the artillery type; the hubs are provided with double ball bearings. Special brakes, which hold the car equally well backwards as forwards, are fitted. The cooling system for the cylinder jackets is arranged so that natural circulation will take place in the event of any failure of the water pump. The larger carriage has four forward speeds and one reverse, &c.; the smaller car has one less forward speed.

The chief features of the Wolseley motors are that the cylinder ends, C (Fig. 4), can be removed in one separately jacketed piece (Fig 5), which contains vertical inlet, D, and exhaust, E, valves, together with a horizontally placed ignition plug, F; that ground joints are used in order to avoid any packing, and that all the bearings are exceptionally long and well lubricated. The contact breakers, A (Figs. 3 and 4), which are mounted upon the end of the cam-shafts of both the 5-h.p. and the 10-h.p. motors, are particularly neat. They are contained in an aluminium box, which rides freely about the revolving contact piece on the shaft, and can be rocked about the shaft in order to vary the time of ignition. The lead-in wires pass through fibre plugs, A_1, which are fitted with caps rendering them water-tight, and holding the wires firmly in place. The circulating pumps, B, are driven by gearing from the cam-shaft at a quarter the

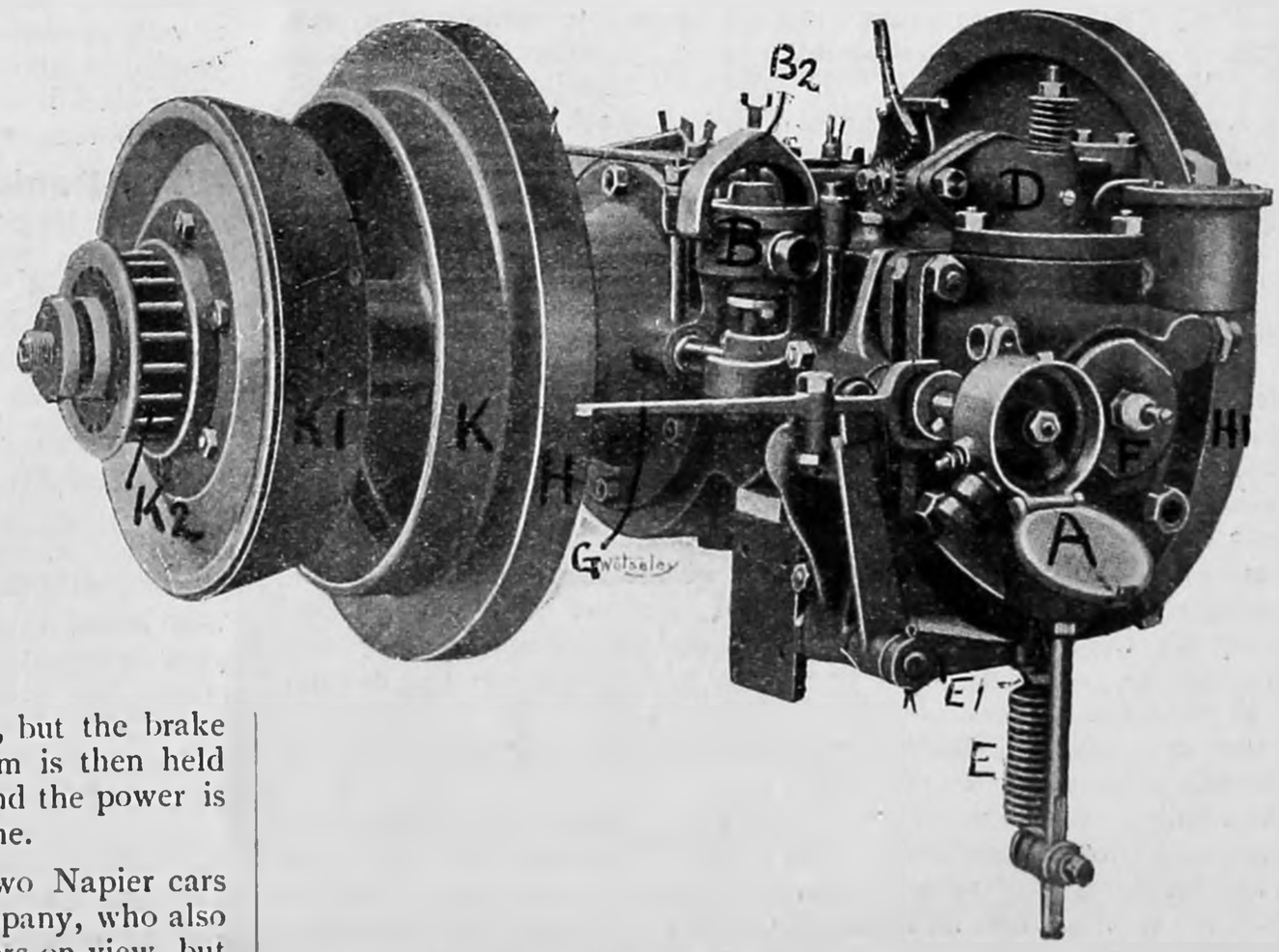


FIG. 3.—The Wolseley 5-h.p. Motor.

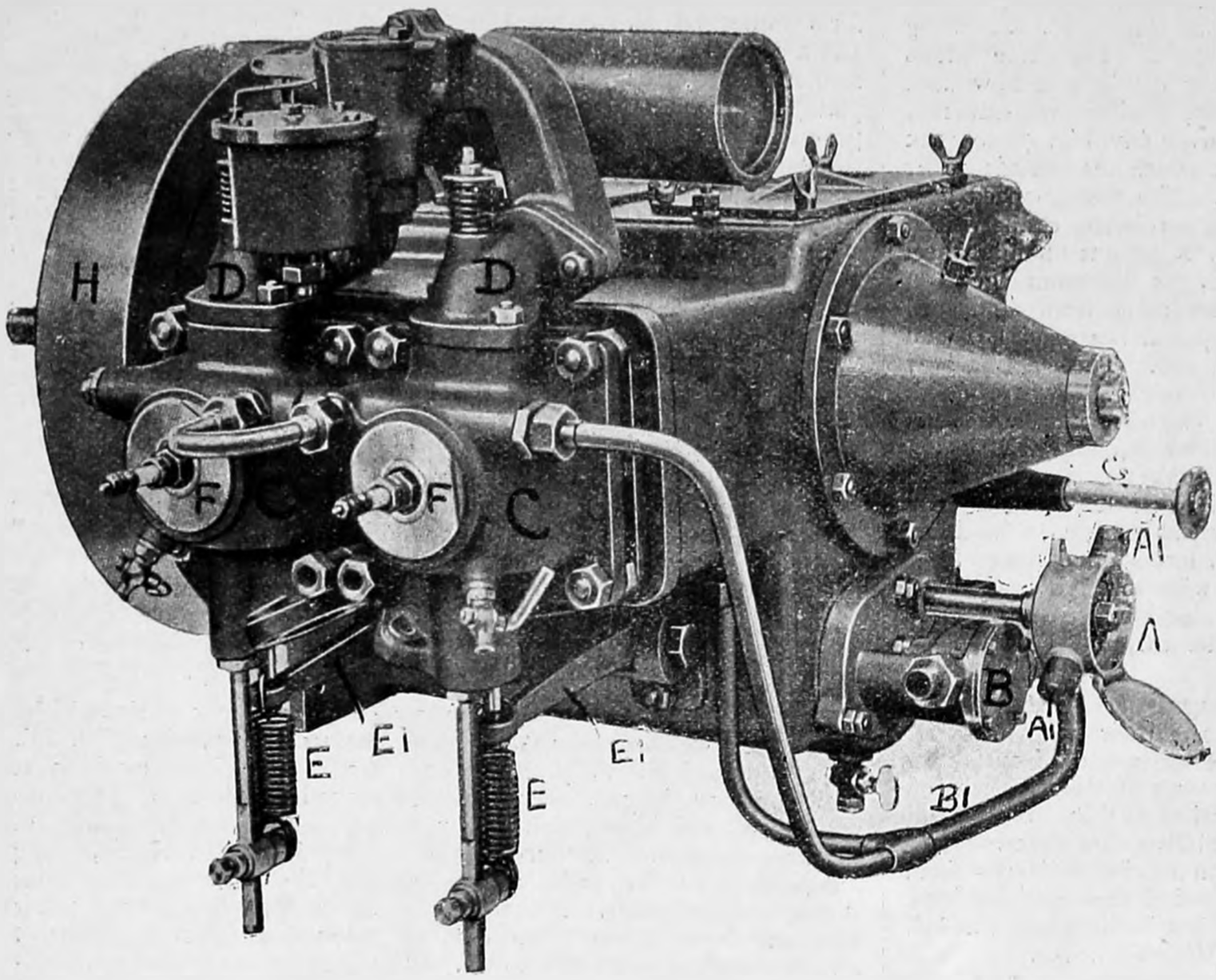


FIG. 4.—The Wolseley 10-h.p. Motor.

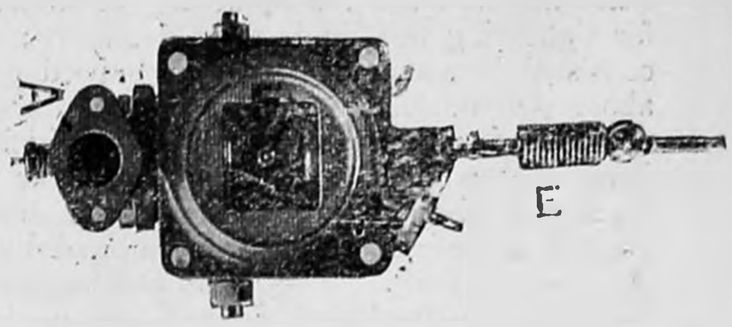


FIG. 5.—Cylinder Head of Wolseley Motor.

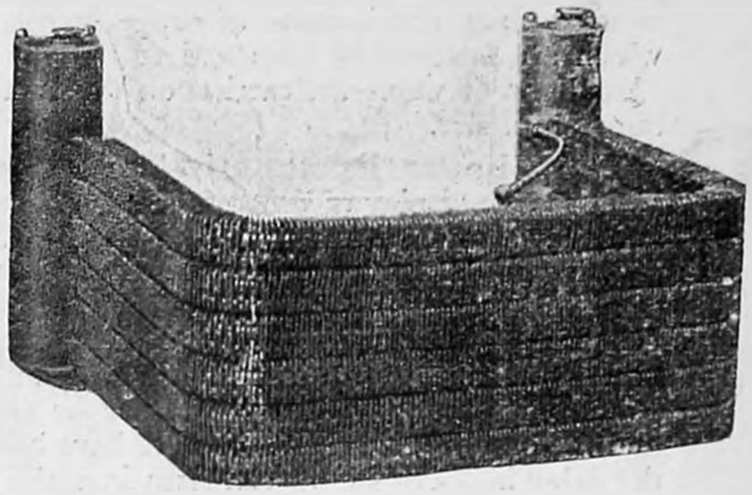
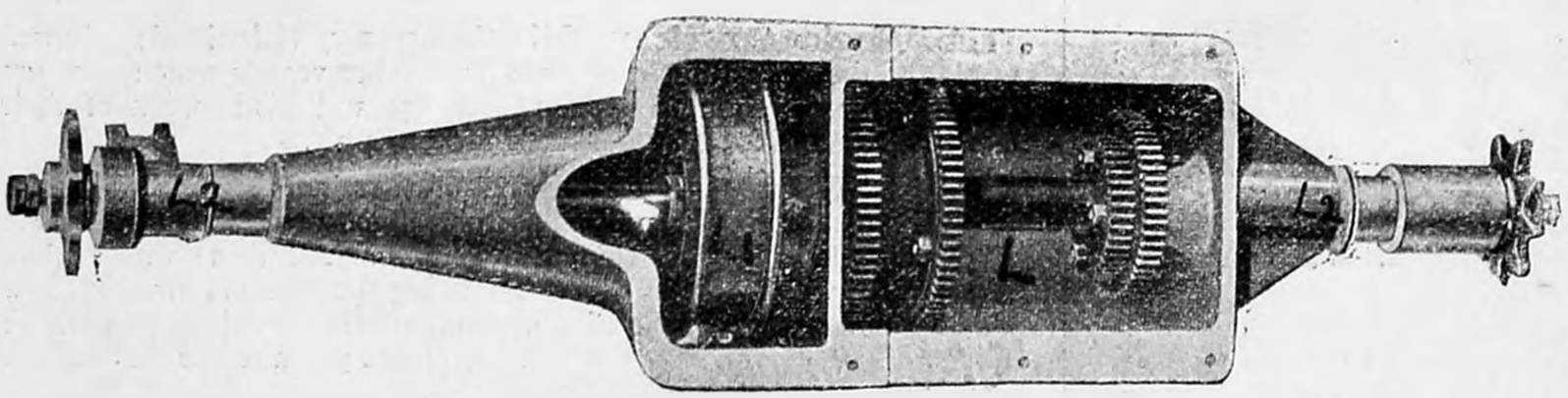


FIG. 6.—The Wolseley Radiator.

speed of the motor; they are of the Roots blower type, in which sliding blades, P_1 (Fig. 2), in an eccentric block, P, follow the inner face of the pump cylinder. The moving parts are readily accessible, and are found to work without giving any trouble. A device for giving half compression at starting is fitted to both types of motor. It consists of a sliding piece upon the cam-shaft, carrying a projection which can be made to lie upon the surface of the exhaust cam, and to raise the exhaust valve during the first part of the compression stroke at starting; it is worked by the lever, G, in Fig. 3, and by the sliding rod, G, in Fig. 4.

Since our previous descriptions of the Wolseley car (Vol. IV, pp. 384 and 452) the belt between the motor and the transmission



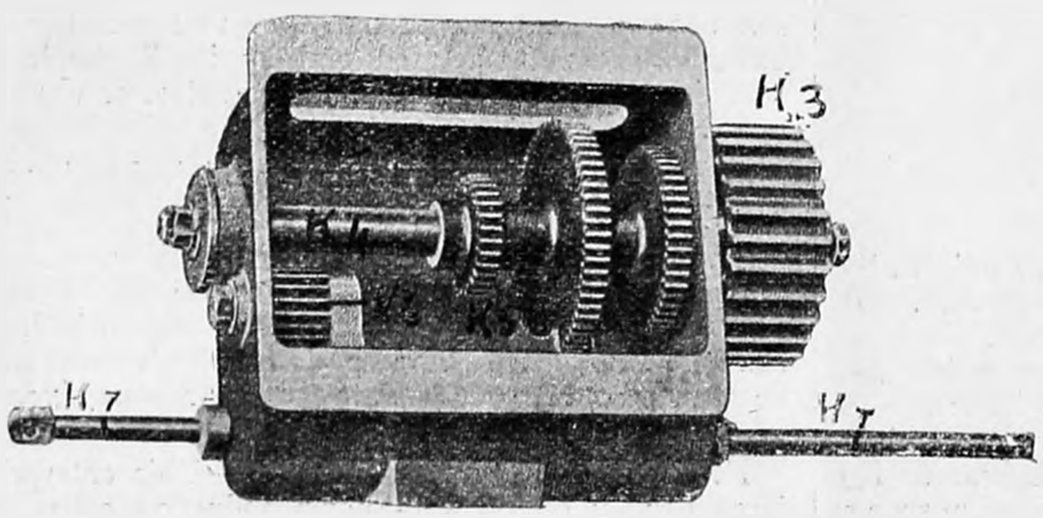
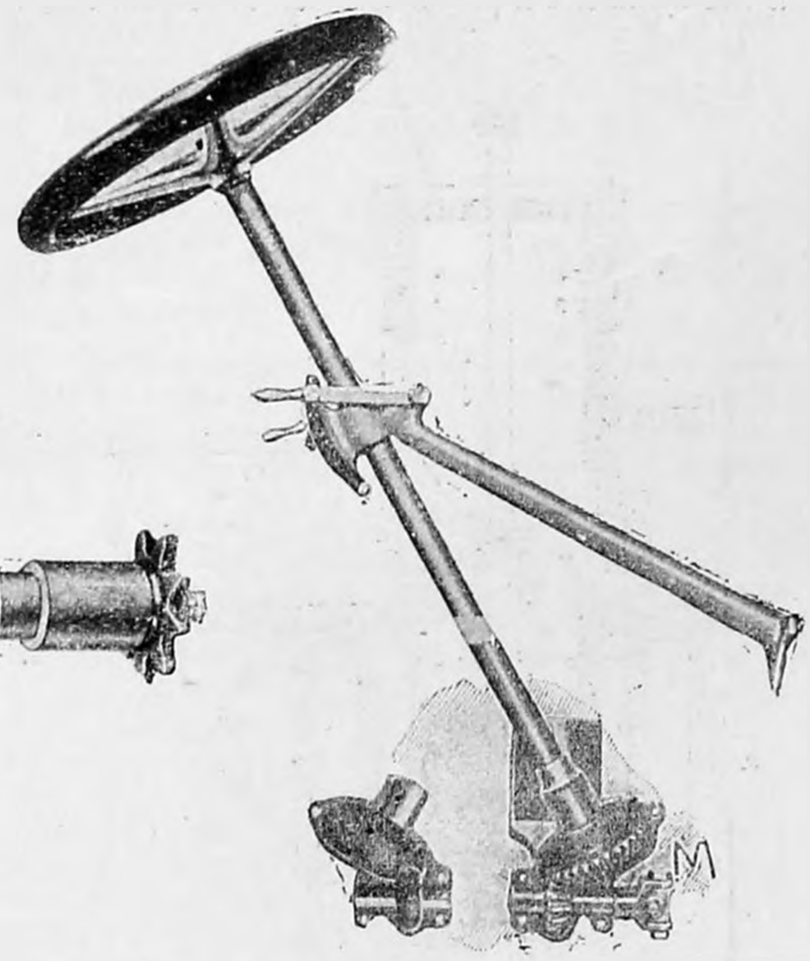


FIG. 7.—The Wolseley Change-Speed Gear.



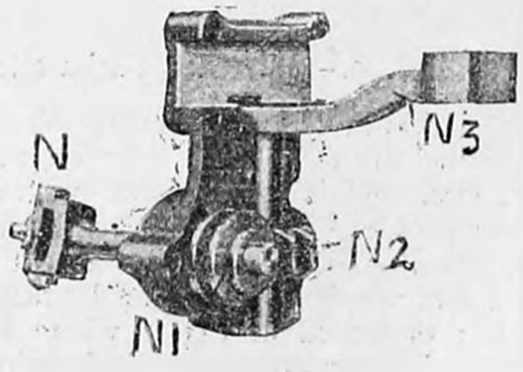


FIG. 8.—The Wolseley Steering Gear.

gear has been replaced by a Renolds chain, which is brought into operation by a well-designed and large friction clutch, K, K_1, fitting into one of the fly-wheels, H, on the motor shaft. The same means that was employed for tightening or loosening the belt is now used for tightening this chain when necessary; this, it will be remembered, consisted in arranging the change-speed gearing (*see* Fig. 7) to rock about the transverse counter-shaft, L, from which the outside roller chains lead to the rear wheels of the vehicle. The change-speed gear itself is seen in Fig. 7, here K_3 is the motor-driven chain wheel, K_5 are the sliding gear wheels on the shaft, K_4, K_6 is an idle wheel used for giving the reverse motion, and L_1 is the differential gear on the counter-shaft. The gears and shafts are made from mild steel forgings, hardened and ground true, and special bearings, L_2, with two rows of ball bearings, are fitted at each end. The steering gear has already been described by us. It is seen in Fig. 8, where M is a universal joint (on the bevel geared portion), which is connected with a second universal joint, N, actuating the worm, N_1, and wheel, N_2, portion, N_3, on the front axle. The band brake on the differential gear shaft is water-cooled, and the internal block brakes which act upon large rims on the rear wheels are powerful enough to hold the car on any hill. The radiator seen in Fig. 6 forms three sides of the motor bonnet, and is made of copper pipes, with soldered brass gills, which are fastened at each end to upright aluminium vessels. Only 1¼ gallons of water are carried on the smaller car, and 1½ gallons on the 10-h.p. size.

The Clipper Pneumatic Tyre Company (Limited) made an attractive display of different sized sections of their excellent tyres, and they also showed a variety of useful accessories and of outfits for effecting speedy repairs when necessary. The tyres of Messrs. Michelin, of France, which are of the same type and variety as those sold by this Company, are so well known to all automobilists that description is needless. Since the Company first began to receive deliveries from France of these tyres the demand has far exceeded their anticipations, and the only trouble they appear to have had has been caused through the delay in obtaining special sizes from the Michelin works.

The Star Motor Company, of Wolverhampton, not only showed a 3½-h.p. and a 4½-h.p. car of their Benz type but an entirely new form of vehicle, similar in general respects to the Darracq type, was just completed by them in time for the exhibition. This car is fitted with a two-cylinder 6-h.p. water-cooled motor in front, with a change-speed

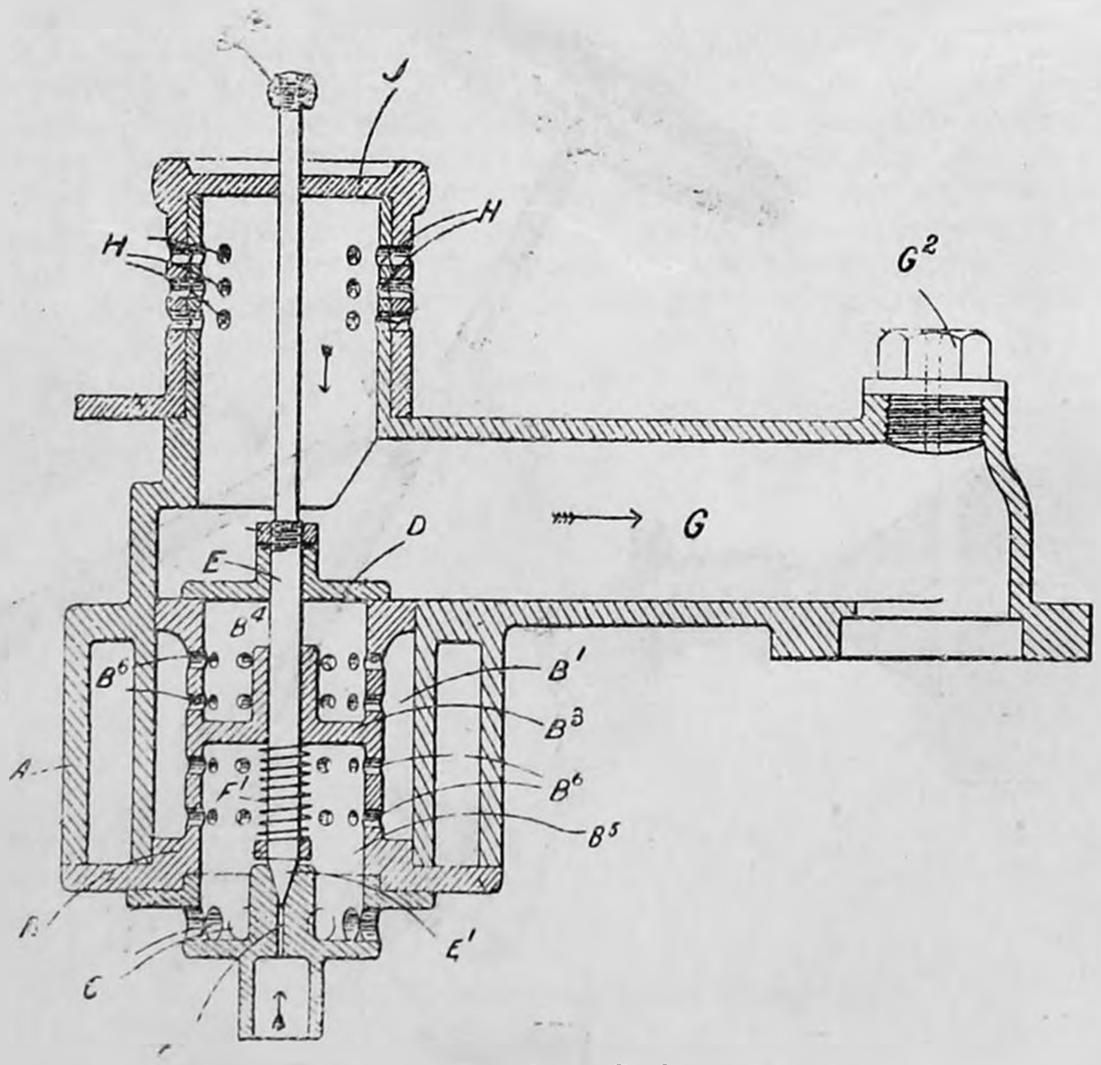


FIG. 9.—The Star Carburettor.

gear giving three forward and one reverse speeds, and with a universally jointed shaft driving the differential gear on the live rear axle. It weighs about 11 cwt., and is well finished with a "tonneau" body to accommodate four people. One of the greatest attractions on this stall was the new carburettor, one of which was cut through its centre to show its construction, which is being used by this Company on all their motors. This is represented in Fig. 9, where B is a perforated (B_6) internal cylinder enclosed in an exhaust jacketed chamber, A, in such a way that an annular space, P_1, is formed between them. The cylinder, B, is divided into two parts by a partition, B_3, which also forms a support for a sliding rod, E. At the lower end of the cylinder, B, air holes, C, and a central passage, C_1, for the petrol feed, are provided. The sliding rod, E, passes through the centre of the carburettor and carries a valve plate, D, a needle valve, E_1, and a spring, F_1 (for holding it in its lower position). The passage, G, leads to the inlet valve of the motor and through it air is drawn from beneath the carburettor, through the holes, C, the lower chamber, B_5, the annular space, B_1, and the upper chamber, B_4. The air lifts the valve plate, D, and the needle valve, E_1, thus allowing petrol to flow from the passage, C_1, into the chamber, B_5, where it is taken up by the inrushing air. An auxiliary air supply enters the adjustable holes, H, in the regulating cap, J, at the top of the apparatus, and it joins the carburetted air in the passage, G. A plug, G_2, is screwed into the casting opposite the inlet valve; it is pierced by a small hole, which can be left open or closed, and it serves for giving ready access to the valve. The head of the projecting rod, E, is fitted with a cap to allow of its being lifted or of the needle valve being ground in when desired.

The National Motor Carriage Syndicate (Limited).—We have so fully dealt with the "Joel" electric motors, the "Rosenthal" accumulators, and the other special features of the vehicles buil by this Company that we must refer our readers to these previous descriptions for full information (Vol. V, pp. 31 to 35 and 270). Two complete vehicles, an incomplete coupé of light appearance, and samples of the Company's specialities constituted an interesting display.

Carl Oppermann not only showed two of the electric vehicles with which we have previously made our readers familiar (Vol. IV, p. 179, and Vol. V, p. 272), but also a neat little machine of the "runabout" type. The last mentioned is built to carry two passengers, and is intended to run about 25 miles on one charge of the accumulators. The underframe is very light and elastic, being independent of the body, and connecting the front and rear axles through swivel joints. A motor of 1-h.p. is suspended about the rear axle, and drives a worm wheel on the differential gear by means of a triple threaded reversible worm. The gearing is enclosed in an oil-tight casing fitted with an easily removable inspection cover. Both the rear axle and the front wheels are provided with roller bearings, and, as the transmission losses between motor and wheels is put at 86 per cent., the current consumption is likely to be extremely small. The battery consists of 30 "Flambeau" cells, which are always connected in series. These batteries are of the Faure type, in which leaden grids, varying in thickness (over a horizontal section) from ⅛ inch to ¼ inch, are coated with a specially prepared paste, which is claimed to become harder instead of softer when in use. The battery weighs 5 cwt. The controller allows the speed and the direction to be varied, the former by means of a resistance, and the latter by changing over the armature leads of the series wound motor in the usual way. The gear ratio of the worm and worm wheel is 22½ to 1. The weight of the complete car is 8 cwt. The design and workmanship alike have resulted in the production of an exceedingly taking little machine.

The Anglo-American Oil Company (Limited) showed samples of the specially sealed cans and other vessels which they are using for the safe and convenient storage and distribution of their widely-known and invaluable Pratt's Motor Spirit.

Messrs. Brampton Brothers, of Birmingham, made an even more imposing display than usual of their much appreciated block and roller chains for all types of motor vehicles. All those who require chains, chain wheels, or cutters (for making the wheels), already know that they can be sure of obtaining a sound article from these progressive makers. The careful study which has been given to the demands of an automobile is evidenced in this exhibit.

The Meyra Electric Company (Limited), of 78, York Road, N., showed a large assortment of their excellent dry cells. These batteries are manufactured entirely in England, and have already established a good reputation for that class of work for which they are made.

J. Van Toll, Shepherd's Bush, exhibited an improved New Orleans 3½-h.p. voiturette and one of the popular light American steam cars.

The Sports Motor Car Company showed an 8-h.p. voiturette of the Renault type of design, in addition to many of their little Mayfair cars. The latter form of vehicle, of which a similar American example was also to be seen, is fitted with a double-cylinder, water-cooled motor, has four forward speeds and one reverse, and carries four persons.

F. C. Blake, of Hammersmith.—This enterprising maker had a large display of his well-known induction coils, ignition plugs, and other accessories. Amongst the novelties we noticed particularly his

new carburettor and his improved ignition plug. The former is seen in section in Fig. 10, where it will be noticed that a flexible diaphragm, E, partitions off the lower portion of the apparatus. The diaphragm carries a central nozzle, D, which fits down upon a ball, F. A set screw, H, allows the position of the ball, F, to be adjusted, and the

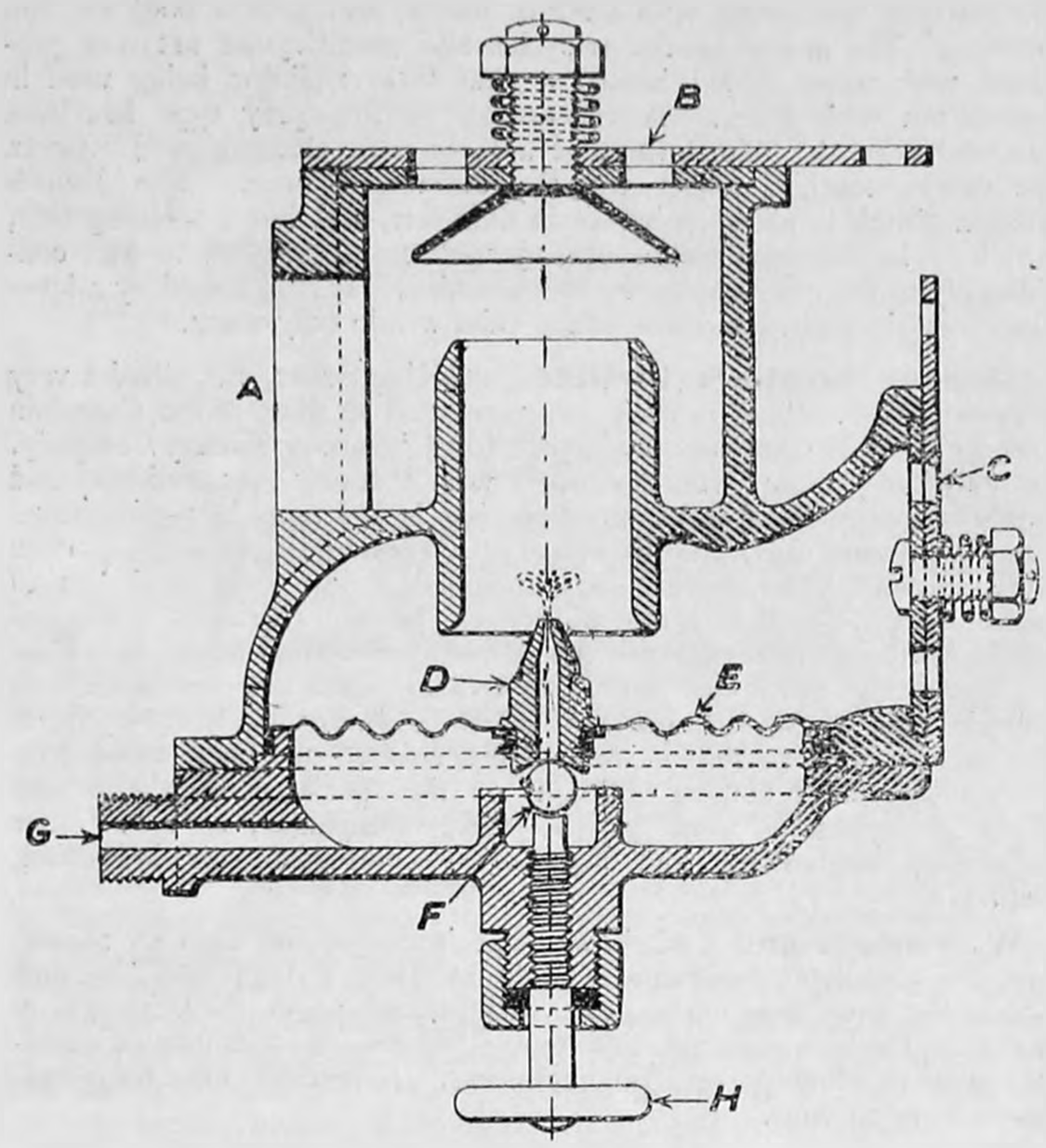


FIG. 10.—The Blake Carburettor.

ball itself forms a valve which normally prevents the petrol, supplied through the pipe, G, from issuing out of the nozzle, D. Two adjustable air inlets, B and C, lead into the apparatus, the one (B) providing auxiliary air to the motor through the passage, A, and the other admitting air to be carburetted by passing round the nozzle, D, and through a vertical and cylindrical portion of the casting. A shield prevents the petrol from escaping through the air inlet, B, and it also serves to mix the fresh air with the carburetted charge. The inside of the carburettor is left rough, in order to afford a large retaining surface for the liquid petrol. When the piston is making its suction stroke, the partial vacuum formed in the carburettor causes the diaphragm, E, to rise and permits some of the petrol to escape through the nozzle, D. The entering air then mixes with it and carries it into the working cylinder. At the end of the suction stroke the diaphragm returns to its normal position, and in so doing it pumps a jet of petrol through the nozzle. This second discharge forms an evaporating film over the walls of the carburettor and is ready to be taken up by the air during the next suction stroke. Mr. Blake's latest ignition plug is seen in section in Fig. 11; its chief features are the methods employed for fixing the porcelain plug, E, in the steel body, F, and for holding the central conductor in place inside the porcelain. For the former purpose the china plug, E, is conical, and is only glazed over its smaller half. Four circular grooves are cut in it, and these correspond with similar grooves in the body, F, into which it fits closely. A special fire-proof cement is used to hold the china in place, and as the cement fills the grooves in each of the two parts, a very firm fixing is obtained. The central conductor passes freely through the centre of the porcelain and is provided with a conical head, H, which is ground to fit the porcelain, like a gas-tight valve. Its outer end passes through a washer, D, and is held in place by a spiral spring, C, which presses against the lower milled nut, B. For attaching the necessary conducting wire to the screwed portion, A, a second nut, B (which tends also to lock the lower nut), is used. This arrangement enables the central rod of the plug to expand and contract without causing any leakage between it and the porcelain. An "earthed" platinum point, G, is fitted in the usual way.

Mr. Blake also showed one of his well-made 4-h.p. double-cylinder motors (*see* Vol. IV, p. 508), in which the two exhaust cams are placed side by side at one end of the crank chamber. He was able to give some particulars of a new 8-h.p. car which was to have formed the chief attraction of his exhibit, but which was not quite ready in time. From the description given to us we gathered that this new vehicle possesses many novel and interesting features, amongst which the change-speed and the transmission gear are possibly the most important. For the moment we shall only say that it is fitted with a

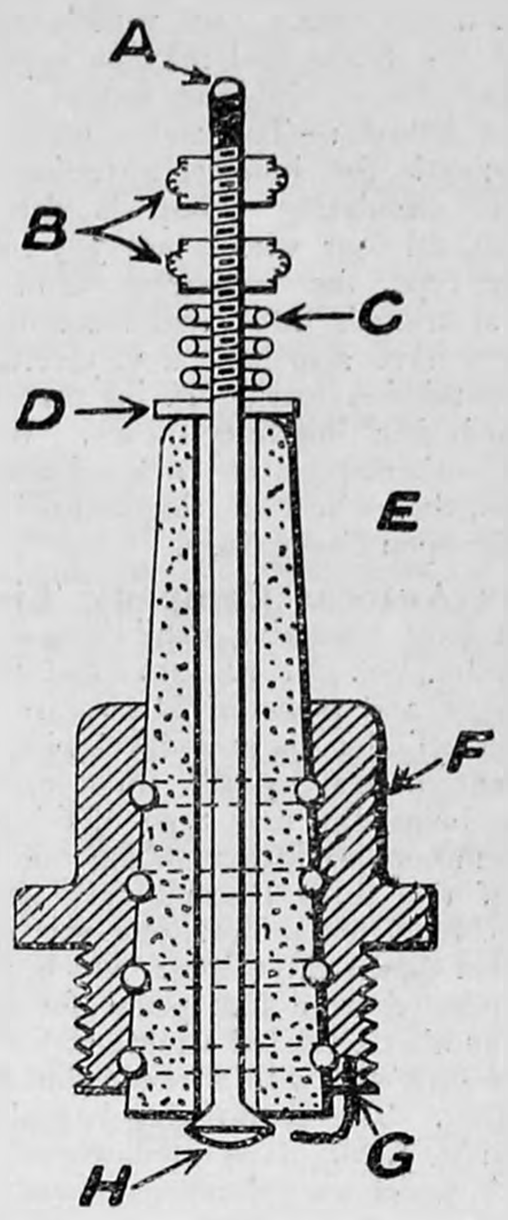


FIG. 11.—The Blake Ignition Plug.

four-cylinder engine, which is cooled by a system of natural circulation, that the electric ignition commutator is of improved form and is distinct from the motor itself, and that the gear has been designed to eliminate friction so far as possible, and to give all changes of speed with a single hand lever.

Henry Waterson (Aston) showed some ignition plugs in which mica insulation replaces both the porcelain and the packing, used for holding it in the body of the plug. A large display of accessories of all kinds were to be seen on this stand.

The Progress Cycle Company (Limited) made a good show with their 4½-h.p. voiturettes, which were described in connection with a previous exhibition (Vol. V, p. 123). Improvements are still being made by this Company in their vehicles, and we hope to deal with them fully at a future date.

Messrs. Marshall and Co., of Manchester, made an imposing display with several of their well built cars. In addition to examples of their already known Benz type of vehicle, two particularly interesting machines were shown. The first of these is fitted with an 8-h.p. horizontal motor, of the single-cylinder pattern, and although in general respects it resembles the belt-driven system employed in their previous cars, it has several novel features. Wheel steering with an inclined pillar has been adopted, and the whole of the controlling hand levers, with their connecting links and rods, have been replaced by a Bowden wire system which very greatly simplifies the machine. All the Bowden wires are brought together up the steering pillar, and one handle serves for operating the four wires which bring the three forward and the reversing speeds into play. Other improvements in this vehicle consist in the use of 3-inch driving belts and 1½-inch side chains, in attaching the rear springs to the underframe in such a way that they can slide in guides when it is desired to tighten the driving chains only, in the use of swivelled roller bearings, and in the arrangements which are made for giving immediate access to the inlet and exhaust valves. The second novel carriage was of an entirely different form, and was designed by Mr. J. J. Mann to meet the present demand for light and high-powered cars, having toothed-wheel change-speed gearing. A double-cylinder 8½-h.p. water-cooled motor of the Buchet vertical type (*see* Vol. V, p. 247), in which the exhaust valves are placed vertically in the centre of the cylinder head, is fixed low down beneath a bonnet in front. The crank-shaft lies at right angles to the front axle and

contains a friction clutch inside the fly-wheel. This clutch is forced inwards against the action of a spring when it is desired to disconnect the motor from the gear. The change-speed gear, which is of the Panhard type and which gives three forward and one reverse speeds, is coupled to the clutch on the front end and is at its other side connected by a universally jointed shaft to bevel wheels driving the differential gear on a live axle. This vehicle created a very favourable impression at the Show and may be expected to become one of the popular machines of the near future. Other points in its construction are as follows:—The water tank is fixed above the engine and underneath the bonnet, a radiator is placed in front of the frame, the circulating pump is driven by gear wheels from the crank-shaft, all four wheels are 31½ inches in diameter, and are of the artillery type, the framework is of strong channel iron, irreversible wheel steering is fitted, and election ignition is employed. These manufacturers have also built a voiturette fitted with a 4-h.p. motor and with transmission gearing, giving three speeds and a reverse, but this was not finished in time to be shown. We understand that the various speeds are obtained by an enclosed arrangement of clutches and epicyclic trains, that wheel steering is used, and that the body is suspended separately upon Cee springs.

The Roadway Autocar Company (Limited), 44, Berners Street, W., had a most attractive exhibition of the Mors (Vol. IV, p. 342), the Renault (Vol. V, p. 120), and the Bardon makes of carriage. The larger and powerful Mors cars in particular, which are fitted with four-cylinder engines developing 10 or 16-h.p., were examined with great interest by all. Four cars built by this maker were on view, two being the new type of 6-h.p., with double (and opposite) cylinder motors, and there being one of each of the latest big machines. Of the three Renault cars shown, which are all driven with 4½-h.p. De Dion motors, one was specially noticeable in consequence of an exhaust-valve lifter which was fitted to it, and which could be operated by a foot pedal for quietening or slowing down the motor ; another attracted attention, both for a similar reason and because it was provided with a removable top and front screen, for use in bad weather. The Bardon car has already been illustrated in our columns (Vol V, p. 8). It is fitted with a single-cylinder 5-h.p. horizontal engine, in which the cylinder is placed across the frame, and is provided with two pistons. The combustion chamber is formed between the pistons, and there are two separate crank-shafts, each having two fly-wheels. Three forward and one reverse speeds are obtained by toothed gearing, and the power is transmitted to the rear wheels by outside chains. A variety of accessories enhanced the interest of a capital display of Continental vehicles.

The Locomobile Company.—As might be expected, this Company's exhibit was one of the best in the Exhibition, and was well attended by the public during the whole week. In addition to a large variety of their well-known cars, they showed separately a sample engine, fuel feed regulator, burner, and a boiler which had been cut through vertically. Our readers have already been given full details of these machines (Vol. IV, pp. 389 and 454, and Vol. V, p. 119), and it is further almost superfluous to say that this Company have secured a long lead in the production of the type of light steam vehicles which they have done so much to popularise. The recent order which they have received for the supply of one of their cars for the use of the Metropolitan Fire Brigade is an excellent advertisement for the Company. Several of these vehicles are fitted with condensers of the Clarkson type in front.

Ernest Hutton and Co. (Limited), of Northallerton, showed two of their Simplex voiturettes, the one with seating accommodation for two and the other for three persons. In these vehicles the power is transmitted by a belt from a 5-h.p. M.M.C. motor to a counter-shaft, between which and the differential gear on the rear axle toothed gearing provides the necessary changes of speed.

Brown Brothers (Limited) not only exhibited the numerous accessories which they supply, but they showed a Locomobile and a light petrol car of the Darracq type, driven by a 6-h.p. Aster motor.

New Orleans Motor Company (Limited), Twickenham.—This Company show for the first time the new type of carriage to which we have referred in a recent issue and which has given such satisfactory results lately. It is a well-built, strong, and economical machine which is fitted with a double-cylinder water-cooled motor in front. The Panhard type of gearing is connected to the motor by a special form of clutch, and the bevel gearing which transmits the power from the universally jointed shaft to the different gear on the rear axle is capable of withstanding all the shocks to which it is liable to be subjected. The Company are likely to do a considerable business with this machine as well as with their well-known belt-driven type (Vol. IV, p. 394), of which three were also exhibited.

J. W. and T. Connolly exhibited a collection of wheels fitted with their successful "Ideal" solid rubber tyres. These, together with the Grant roller bearing axles, received a good deal of attention from the visitors.

Dennis Brothers, of Guildford, made a very good show with their motor cycles of various kinds, with a light four-seated car of the Darracq type, fitted with a 6-h.p. motor, and with a body for four persons. The motors on the tricycles and quadricycles are now provided with water-cooled heads, a neat little radiator being used in connection with them. A carburettor of the spray type has been substituted for the older form, and a large cone clutch is used between the driven toothed wheel and the differential gear. The Dennis friction clutch is about 7 inches in diameter, and has a working face, which is leather-lined, of about 1½ inches. It appears to add considerably to the convenience of the machine. It is operated by a lever placed on the right-hand side of the rider within easy reach.

Shippey Brothers (Limited), 13, King Street, E.C., had a very imposing exhibit, both in their own name and in those of the Canadian Electric Vehicle Company, and the "Ideal" Storage Battery Company. In addition to many vehicles fitted with "Ideal" accumulators and Still's patent motors and controllers (*see* Vol. V, pp. 261–263), three American steam cars of the Milwaukee Automobile Company's pattern were shown. The electric cars included a van to carry ¼ ton of useful load, as well as some half-dozen private carriages. We are dealing with the steam cars of the Milwaukee system in our next issue in connection with our series of articles upon the automobile in America, the second instalment of which is unfortunately crowded out this month. Those shown were nicely finished and were fitted with different styles of bodies. Samples of the special accumulators and electrical apparatus sold by the three companies, as also other apparatus, appliances, and accessories, completed this interesting display.

W. Vincent and Co. showed specimens of the Cyclops motors and the complete underframes made by Daniel Augé and Co., and which we have previously dealt with in our pages (Vol. V, pp. 6 and 7). The governors on these motors regulate the quantity of explosive mixture which passes to the cylinders. A vertical and a horizontal motor were on view.

The Swift Motor Company exhibited two of their new 5½-h.p. voiturettes, which were quite a pleasant surprise to many of the visitors. One of these machines was shown complete, with a body to seat three persons, and the other had its framework and machinery entirely exposed to view. There is a strong resemblance between these entirely English-built cars and the French Gladiator vehicle. The underframe is composed of two tubes which are connected together above the rear axle, and which carry its bearings ; they are also joined together in front by cross-ties, and are suspended at this end by double elliptical springs resting upon the front axle. These tubes are 1¾ inches in diameter, and the metal is of No. 8 gauge. A 5½-h.p. motor of the M.M.C. make is secured by special projections to the front part of the underframe ; its shaft lies parallel with the axles, and it is provided with an outside fly-wheel, a chain wheel, and an end bearing (on the frame) on its left-hand side. The power is transmitted from the motor to a counter-shaft, which is placed across the underframe a little forward of its centre, by a Brampton roller chain, and a jockey pulley is provided for adjusting the degree of tightness of this chain. The counter-shaft carries a friction clutch and two epicyclic trains of gearing, which are arranged in such a manner that when the clutch is engaged the whole counter-shaft and gearing revolve as one solid piece, but that when the clutch is thrown out the application of one of two band brakes, which hold the epicyclic gear drums, causes either the low gear or the reversing gear to come into play. A second roller chain connects the counter-shaft with the differential gear on the rear axle, and the starting handle fits on the end of the counter-shaft. The differential gear is of the spur and pinion wheel type and the outside chain wheel is so equipped that a safety clutch can be brought into contact with its teeth, and the car thus be prevented from running backwards, by operating a small lever on the steering pillar. Provision is made for taking up any slack in the rear chain, the side tubes of the underframe and all the brake rods which actuate the three brakes being adjustable. The circulating pump is mounted upon the underframe above the crank-shaft and is driven by a separate chain from that shaft. The inlet valve throttle device is connected by a Bowden wire with a regulator on the steering pillar. A radiator is placed in front of the car and the tanks are fixed to the dashboard. The steering gear is of the inclined wheel form, and the parts which connect the pillar with the two front wheels are extremely strong and are to a large extent in duplicate. A lever at the right hand side of the car serves either to throw the clutch in and out of

gear or in a further position to apply the brake on the differential gear case. A special form of hub which is used for the rear wheels is shown in section in Fig. 12. The hub, A, is fixed to the shaft, B, by the split conical sleeve, C, and the nut, D; the sleeve can be withdrawn by screwing up the nut, E. The body is mounted upon springs between it

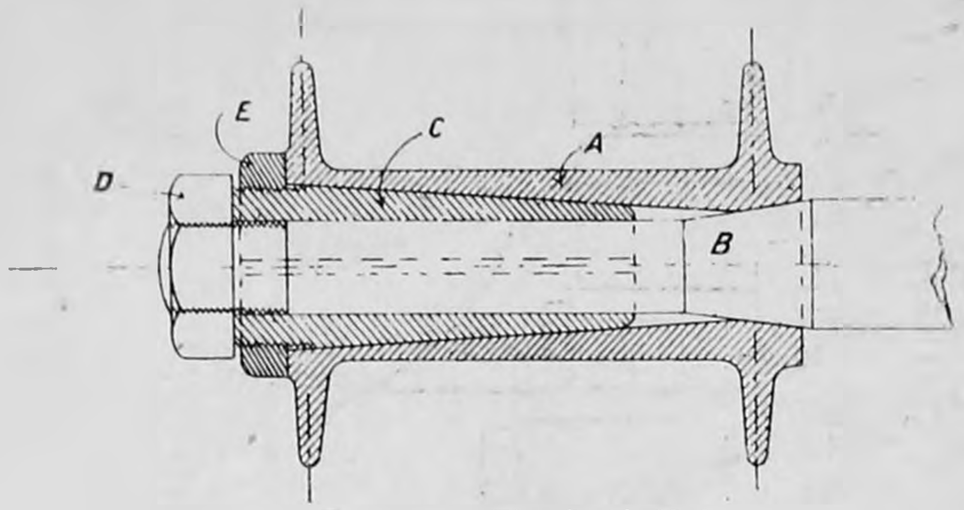


FIG. 12.—The Swift Hubs.

and the underframe at the back and on brackets which are pivoted on the frame in front. In design and finish this is one of the most pleasing voiturettes now on the market.

The Metropolitan Motor Manufacturing Company (Limited) showed one of the new two seated cars and one of the four-seated geared vehicles made by them. We recently gave a full description of the former, together with detailed drawings (Vol. V, pp. 259, 320). In the latter the two belts are still retained, but they both pass over pulleys on the same side (under) of the counter-shaft, and the tightening and slackening mechanism is only used as a flexible clutch between the motor and the gearing.

The Creese electric ignition gear and self-starter were shown fitted to a Daimler car. The former of these consists of a contact-breaking device, which is fitted on the half-speed shaft of the motor, and which is entirely enclosed in a dust-proof case; it is so arranged that the time of ignition can be varied by rocking the case about the shaft. The self-starter enables the motor to be set in motion without using the starting handle, so long as an explosive charge has been retained in the working cylinders. An indicator shows the driver which cylinder should be fired in order to start the motor forwards, and suitable keys are provided for producing a spark across the ignition plug in either cylinder. It is found in practice that a double-cylinder petrol-engine can be started in this way some considerable time after it has been allowed to stop.

The Daimler Motor Company (Limited) thoroughly succeeded in retaining their reputation for making an excellent exhibit, and, as usual, their display was one of the very best. Two 18-h.p. carriages—one of which was lent by Mr. J. D. Siddeley, and was fitted with fine specimens of his Company's Clipper tyres—formed the greatest attraction on this stand. They are driven by four-cylinder motors, which are provided with both tube and electric ignition, so that either system can be used alone or both employed at the same time. Roller bearings with ball thrusts are fitted to the cars throughout. A double-acting water-cooled band brake on the counter-shaft is operated by foot, and a hand lever actuates a pair of special compensating brakes on both rear wheels. Two 6½-h.p. cars of latest type, one of 9-h.p. (double cylinder), a 4½-h.p. Kimberley car (Vol. V, pp. 218, 219), and a 6-h.p. launch motor were also shown. Good workmanship and finish characterised every exhibit.

Messrs. Lewis and Lewis, of Townmead Road, Fulham, showed two sizes of their Diana voiturette (Fig. 13). These are driven by motors of the Benz type, but with improvements; the crank chamber is closed in, and the crank pin is lubricated from a sight-feed lubricator by means of a hollow ring outside the crank and an oil hole through the centre of the crank pin. A half-compression cam is provided for facilitating starting, and a radiator is fitted to the car. The usual belt and chain gear, with an epicyclic third gear, are used, but a patented arrangement for shifting both belts by a single handle is employed. The counter-shaft runs in swinging brackets, and can be drawn forward by tension screws to tighten the belts and chain. Double-acting band brakes are fitted to the driving wheels and are worked by hand or by foot. One of these cars with a 3½-h.p. motor and one with an available 6-h.p. were shown. The coach work is strong and handsome, and is upholstered in leather.

The Automobile Manufacturing Company (Limited) had one of the finest shows in the exhibition of the various Continental vehicles stocked by them. These include Panhards (Vol. V, pp. 11, 12), Serpollet steam cars (Vol. IV, pp. 212, 341; Vol. V, pp. 56, 57), Darracqs (Vol. IV, pp. 106, 107; Vol. V, p. 124), Mors voiturettes (Vol. IV, p. 342), Delahaye light cars, and those of Delin. Accessories of every description were also exhibited by them.

Messrs. Roots and Venables showed two of their well-known kerosene motor cars. These were fitted with a single-cylinder motor of 3½-h.p., and had a well-finished body to seat two persons.

C. F. Milnes and Co. (Limited), of Balderton Street, W., showed two strong underframes, fitted with "C.P.D." motors and Simms-Bosch ignition, suited for heavy lurries. The transmission gearing and tooth-wheel change gear were fixed in place, and the whole construction of this machine is very substantial. As this Company will be represented at the Heavy Vehicle Trials at Liverpool next month we shall defer any fuller description of their cars until then.

Rubery and Co., of Darlaston, showed a light steel channel frame for a voiturette, complete with a framework of light steel angles for the body. The panels of the latter were filled in with woven corrugated flat brass wire. For lightness and excellence of workmanship this is one of the best pieces of work in the exhibition. These well-known makers of this class of parts also exhibited other samples of their various specialities.

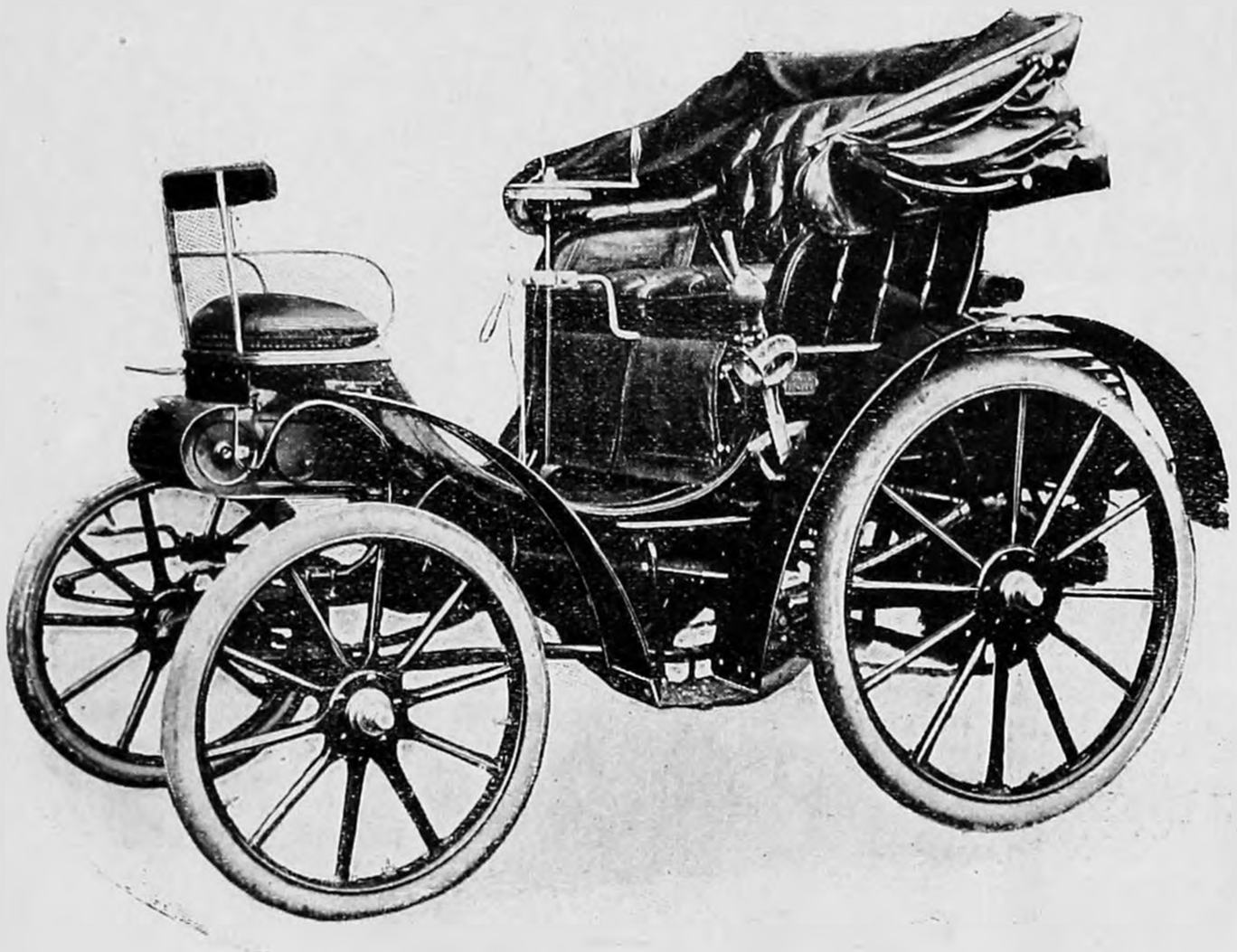
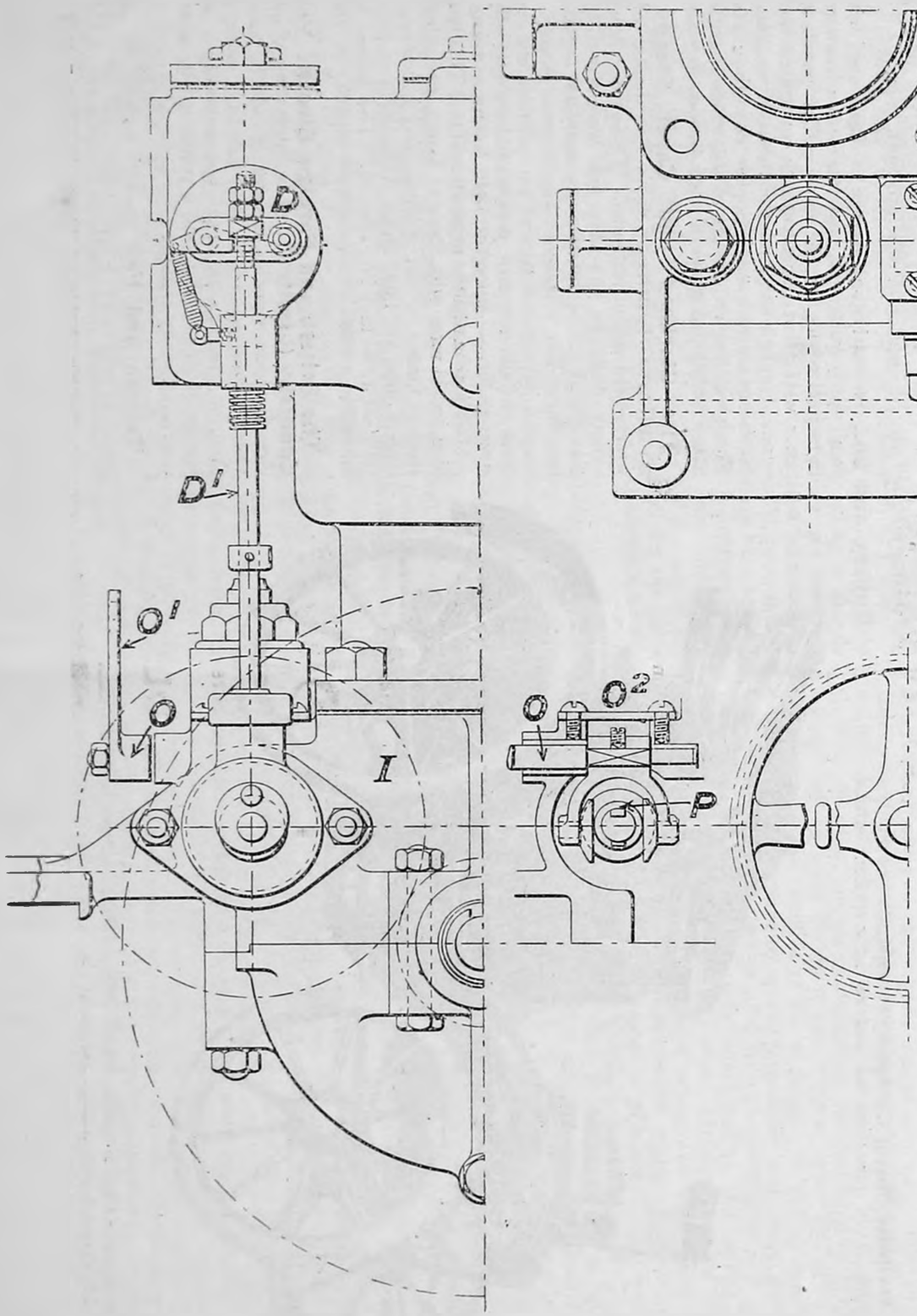


FIG. 13.—The Lewis and Lewis "Diana" Voiturette.

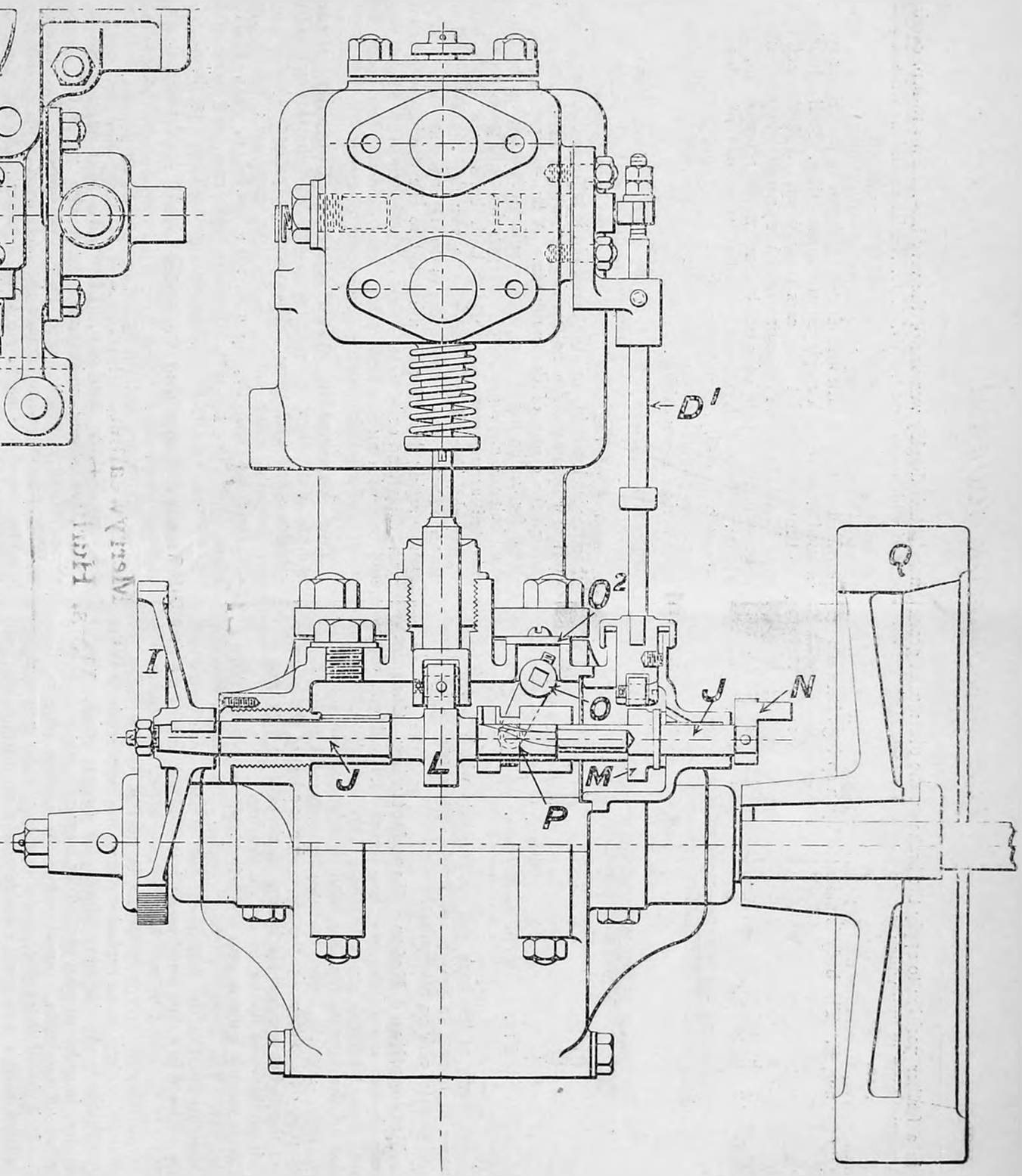
The Clarkson and Capel Steam Car Syndicate (Limited) had a fine display of their widely-used patent radiators. These were shown in a variety of shapes and sizes, and were also to be seen throughout the exhibition on many of the vehicles present. The Clarkson liquid fuel burners were another important feature of this exhibit, and amongst these the smallest size, which has been specially constructed for use upon the light American steam cars, probably attracted the most attention. This burner is identical in form with those of larger size which are already known to our readers, and is certain to be largely used on light steam vehicles, if it proves as satisfactory as may be expected. The largest burner on this stand was of a maximum capacity of 200-h.p.

The British and Foreign Electric Vehicle Company (Limited) had an interesting display of electric motor vehicles, several of which have previously been shown. The Lee-Coll accumulator (Vol. V, pp. 74–75, 112) was naturally a special feature of this exhibit, and it continued to arouse the interest of many visitors.

Turgan and Foy showed samples of each of their 4½-h.p. and 6-h.p. Filtz type of voiturette,



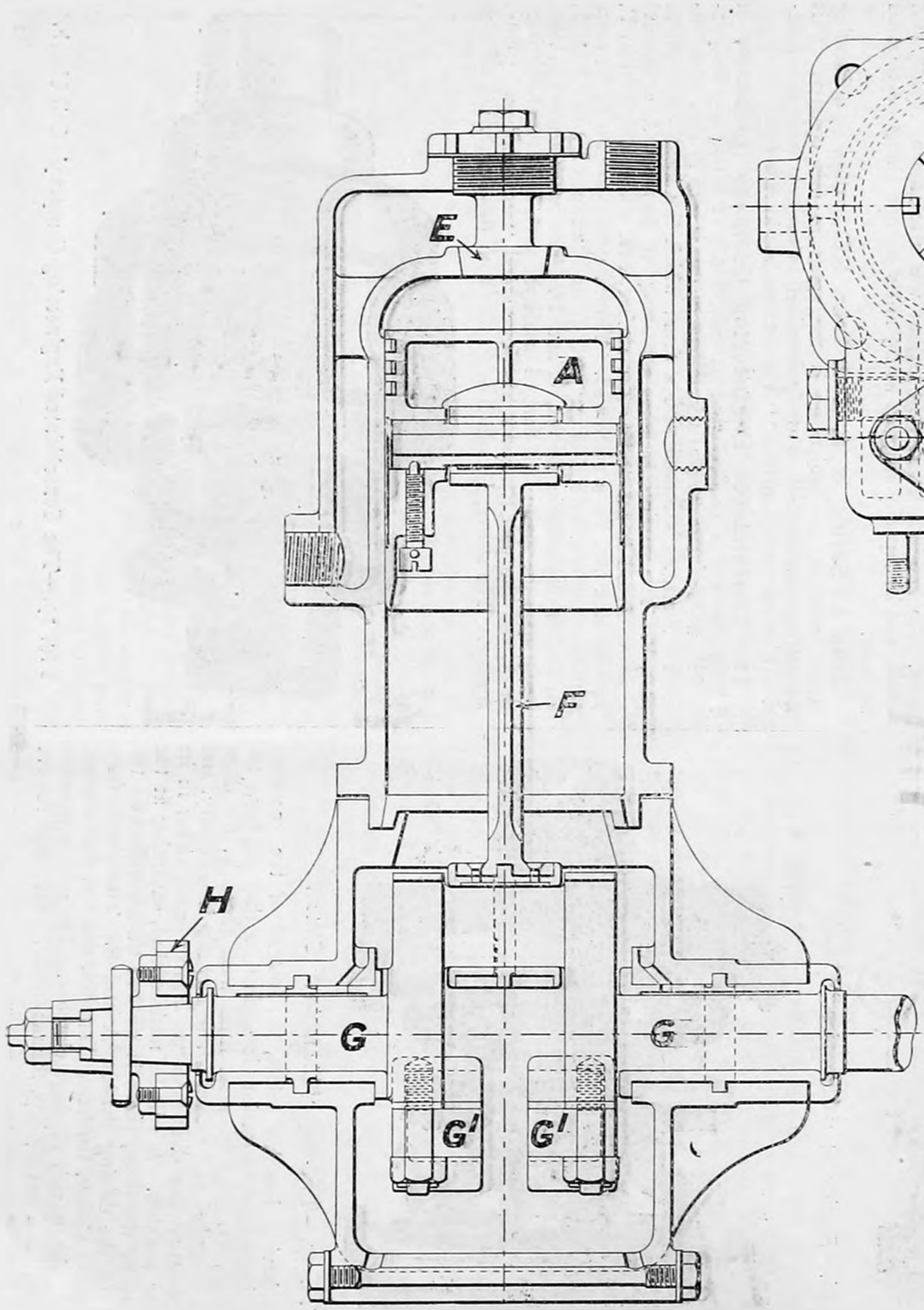
Part Side Elevation Showing Ignition Plug.



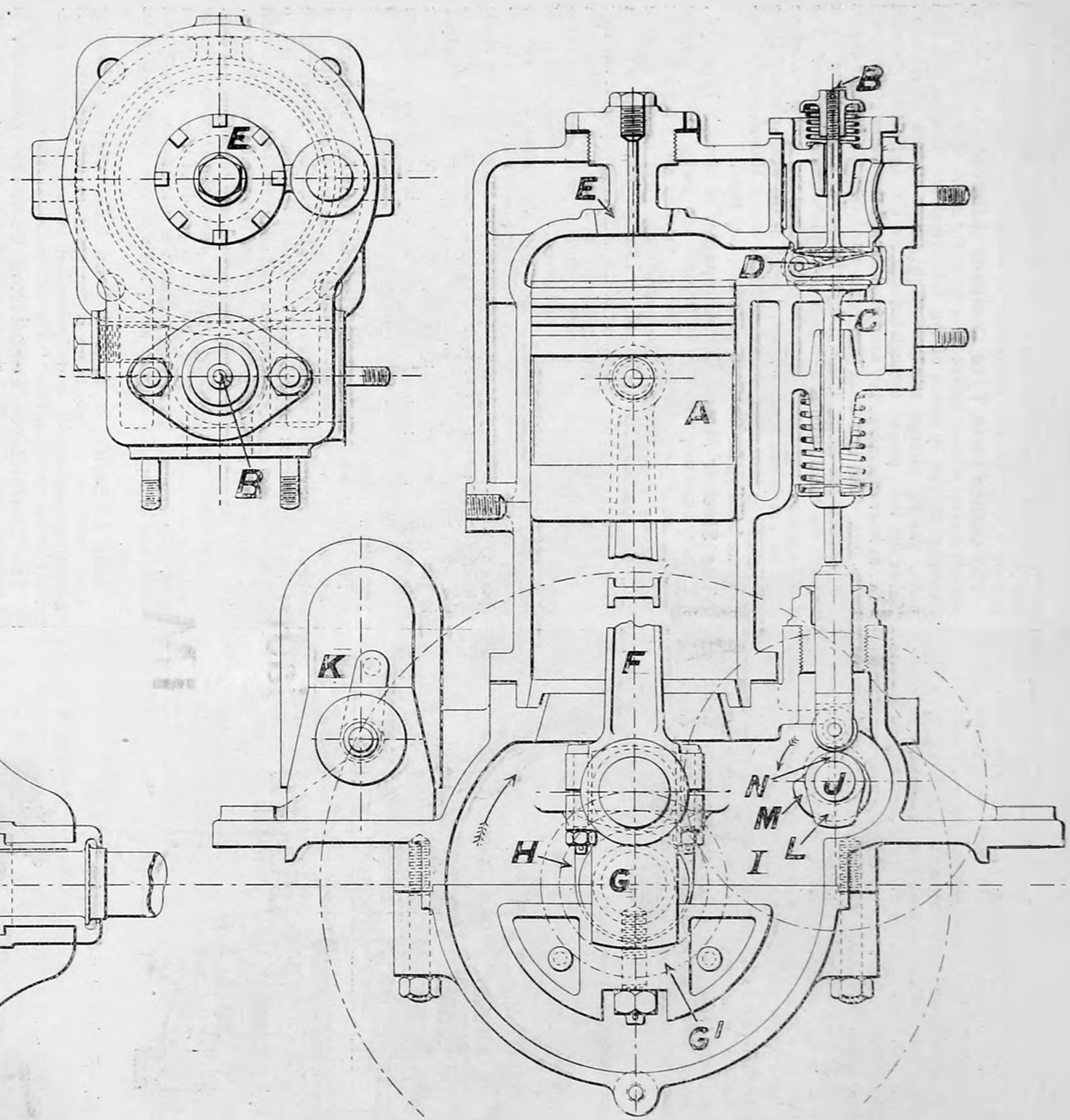
Side Elevation and Section through Cam Shaft.

FIG. 14.—THE SIMMS 7-H.P. MOTOR.

Plan of Cylinder Head.



Longitudinal Section through Cylinder and Crank Shaft.



Cross Section through Cylinder and Valves.

FIG. 15.—THE SIMMS 7-H.P. MOTOR.

A, Piston; B, Inlet Valve; C, Exhaust Valve; D, Low Tension Igniter; D^1, Rod working same; E, Inspection Plug, in head of cylinder; F, Connecting Rod; G, Crank Shaft, with special lubrication of bearings; G^1, Counter Weights to balance connecting rod and piston; H, Pinion on motor shaft; I, Spur Wheel on cam shaft; J, Cam Shaft passing through crank chamber; K, Magneto Generator, operated by pin, N, on cam shaft; L, Exhaust Cam; M, Plug actuating igniter; N, Crank Pin working magneto through connecting rods (not shown); O, Rocking Shafts regulating time of ignition; O^1, Handle for operating same; O^2, Inspection Cover; P, Fork for sliding cam, M, and crank pin, N; Q, Fly-wheel.

described by us in connection with the Paris Exhibition last year (Vol. V, p. 14). Their touring steam omnibus (Vol. V, p. 267) which made the journey in Algiers a short time ago was also on view, together with a couple of their well-known small steam boilers (Vol. V, p. 247).

The Simms Manufacturing Company (Limited) had a fine display of their high-speed motors, both of the air-cooled and water-cooled type. These were all fitted with the Simms-Bosch electric ignition, and igniters of this type, as also their new rotary type of magneto, were shown separately also. We are enabled to give several detailed drawings (Figs. 14 and 15, *see* pp. 374, 375) of this Company's well-designed 7-h.p. motor, and as it has recently been described by us (Vol. V, p. 317) we now need only refer our readers to them and to the key to the parts which are lettered similarly on each drawing.

Durham, Churchill, and Co. showed a great variety of Champion friction clutches, many of which were specially designed for automobile work. A section (Fig. 16) of one of the larger type, in which an eccentric action serves to hold the clutch faces, F and G, out of engagement, shows the general construction adopted. Fig. 17 is a

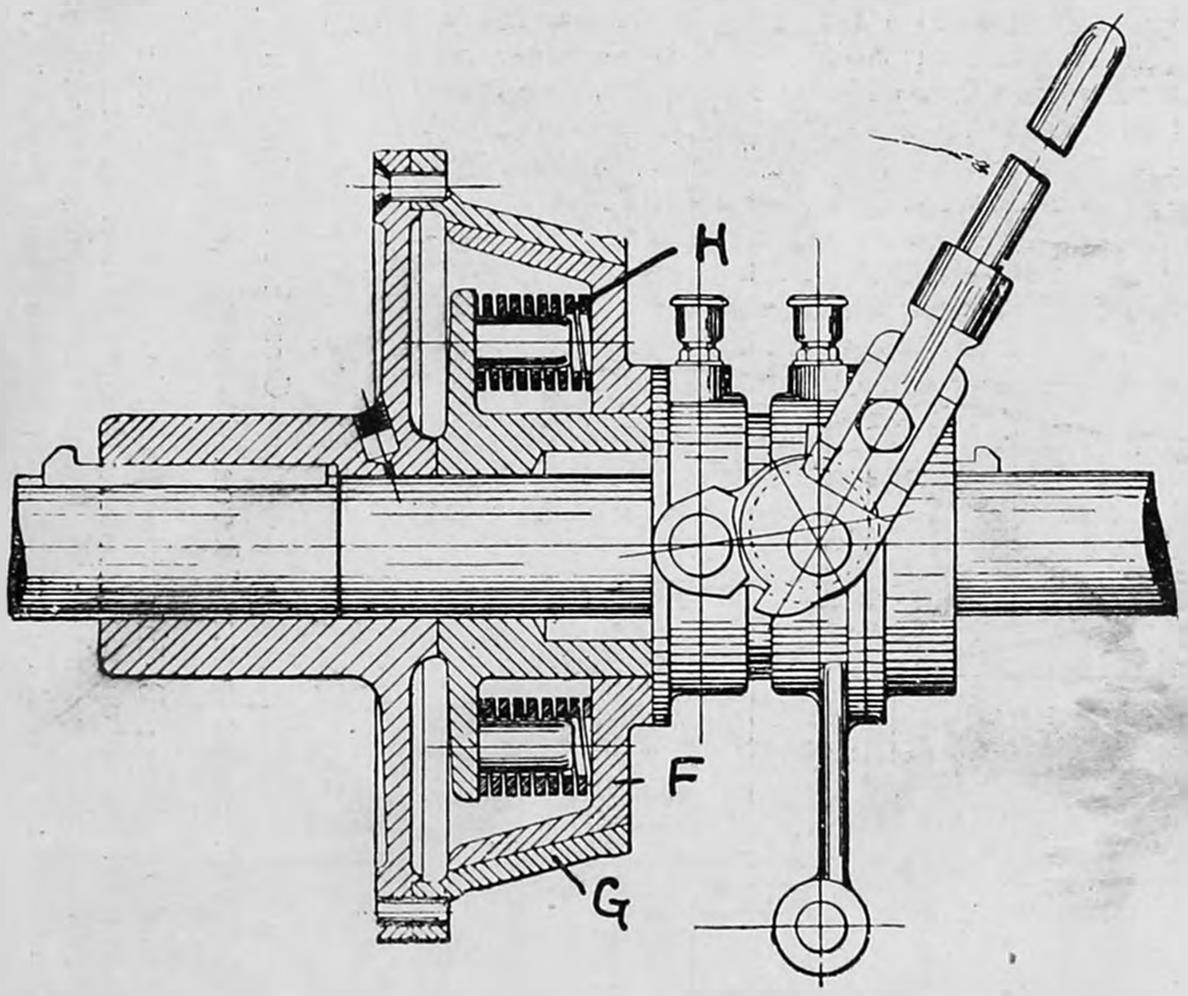


FIG. 16.—Section of "Champion" Clutch.

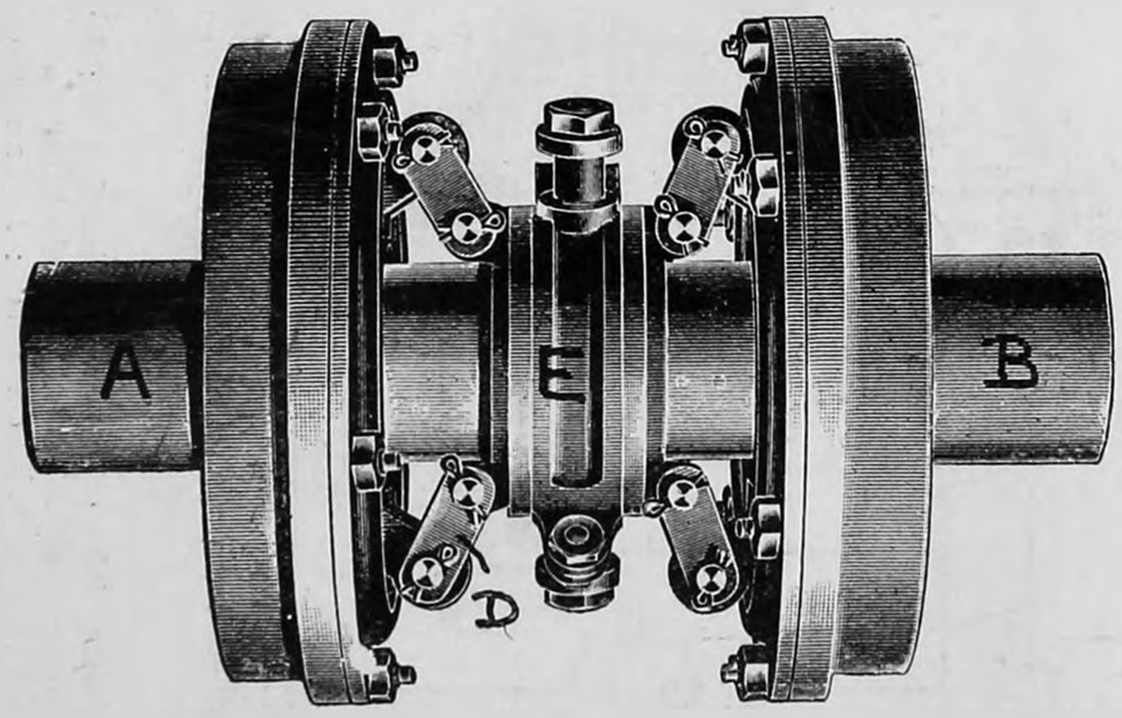


FIG. 17.—Two-way "Champion" Clutch.

two-way clutch having knuckle joints, D, instead of the eccentric action, but the internal construction is similar to that of Fig. 16. The inside springs, H, take up what little wear there is, for these clutches are not intended to be used where any slip is necessary, and the knuckle joints cause the sliding sleeve, E, to remain either in its outer or its inner position. It will be noticed that, excepting at the moment of engaging the cone, there is no end thrust, either on the central shaft or on the driving sleeves, A and B. The clutch faces are metal to metal. Messrs. Durham, Churchill, and Co. also showed a new car fitted with a pair of these clutches. The vehicle is called the "Hallamshire," and has a 7-h.p. Simms motor. We shall reserve any further description of this car for the present, as the transmission gearing is such that drawings would be necessary for this purpose.

The Collier Twin Tyre Company (Limited), of St. Albans, showed several of their patent tyres for motor cars. The outer cover is secured to the rim by means of eye bolts which are threaded over steel wires, passing through the base of the cover at each of its sides. These eye bolts project through holes in the rim and clamp the steel wire, at intervals, when they are forced toward the centre of the wheel by fly-nuts. The tyre cover is so constructed that the internal canvas interconnects two cords, which encircle the entire length of the cover beneath the tread, with two endless wire spirals inside the base. The cords are laced together through the rubber, and the steel wires, whose ends are not joined together, are enclosed in the wire spirals. These tyres are to be used upon the car which the Motor Manufacturing Company are building for the Gordon-Bennett Cup Race.

The Sinclair Motor Car Company, of Sinclair Road, W., had a very interesting exhibit of Clift cars and parts. Two complete vehicles, one of 5-h.p. and one of 8-h.p., together with a partially-built 10-h.p. car, were shown. There are many good features in these machines, and we hope to be able to describe them more fully in a subsequent issue. The attachment of the underframe upon the live rear axle and its suspension on springs above the front axle, together with the separate suspension of the body upon front and rear springs above this frame, constitutes one point of interest. The motors used are of large size, and are not intended to run at abnormally high speeds, so that the use of several speed gears is less necessary. The change-speed gearing normally gives a direct drive from the motor to the single reduction gear, and does not involve the idle working of any parts of the lower (epicyclic) speed gear. Roller bearings are used throughout in the latest machine, and a reversing gear is supplied by a similar arrangement in the main clutch to that above indicated in connection with the two-speed gearing. The thrust of the bevel gears used is taken by ball bearings.

The City and Suburban Electric Vehicle Company, of Denman Street, W., showed several of the most comfortable and stylish electric vehicles which have as yet been made. Amongst these were a victoriette (as supplied to Her Majesty the Queen) (Fig. 18), to seat two inside, a rear-driven victoria with additional seats for coachman and footman, a landaulette for four inside and two outside, and a hansom. All these vehicles are luxuriously upholstered, and the majority of them are fitted with a motor to drive each rear wheel. Their capacity on one charge is said to be from 35 to 40 miles at speeds of about 12 miles an hour. An omnibus to carry 15 persons was also shown, equally well fitted, and its capacity is given as 25 miles on one charge at 10 miles an hour.

John L. Sardy, of 34, Cock Lane, E.C., exhibited a Reading steam carriage, for which he is the agent in this country. This interesting machine will be fully described in our next issue in connection with our special articles, "The Automobile in America."

The Consolidated Engineering Company (Limited), of Slough, showed a particularly neat coil clutch of small size for automobile work. The general appearance of this is seen in Fig. 19. The central shaft, A, is turned with a drum which lies inside the circular part, B. The portion, B, takes a bearing on the shaft, A, at B_1, and a screw thread is cut on its outer surface, over which the portion, E, and the lock nut, E_1, are screwed. Three keyways are cut in the inner surface of the smaller end of the part, E, and between it and the shaft, A, are two concentric sleeves, C and D. The inner sleeve, C, rides freely upon the shaft; it is flanged inside the part, B (between the drum on A, and the part E), and it has three spiral "feathers" on its outer surface. The sleeve, D, which is in one with the flange, D_1, rides on

FIG. 19.—The Consolidated Engineering Company's Coil Clutch.

FIG. 18.—QUEEN ALEXANDRA'S CARRIAGE.

the surface of the sleeve, C, and has spiral "keyways" in its inner surface which fit over the "feathers" on C. The sleeve, D, has three parallel feathers on its outer surface, and these work in the keyways inside C. By sliding D and D_1 along the shaft the parallel feathers compel it to move parallel with E, and the spiral feathers cause it to rotate the sleeve, C, relatively to E and B. A coil which is provided inside B, between it and the drum on A, has its one end secured to B and the other to the flange on C, with the result that it is caused to grip the drum when it is tightened by the relative motion of B and C. It will be noticed that any necessary adjustment for wear can be made by loosening the lock nut, E_1, and screwing up the portion, E.

Ste. des Moteur Crouan, Paris.—Two of the exceedingly ingenious cars made by M. Crouan were shown by this Company. The one of these was a 16-h.p. vehicle seating six persons, and the other was a lighter car fitted with a 6-h.p. motor. The larger machine had the special pneumatic change-speed gear fitted to it, in which the clutches holding either of four tooth wheels to their shafts are operated by admitting compressed gases to air-tight and expansible chambers behind the moving clutch pieces. A model showing the action of this mechanism was also on view. We have on a previous occasion fully described this apparatus (*see* Vol. V, p. 22), as also the special features of the Crouan motor (Vol. V, p. 2). The simplicity of control and the comparative absence of the usual regulating levers on these latest cars are very marked.

Humber (Limited) showed two samples of the motor vehicle which they have now decided to constitute their standard type. This is a well-built machine of the Darracq type of arrangement in which a 4½-h.p. De Dion motor is employed. A radiator in front forms a part of the bonnet, and it is coupled by hinged joints to its water connections in such a way that it can be let down in front at any time when required.

The British Power, Traction, and Lighting Company (Limited), York, exhibited several of the Gardner-Serpollet vehicles, for the manufacture of which they have secured the rights in this country. The details of this system (Vol. IV, pp. 212, 341; Vol. V, pp. 56–58) are already well known to our readers, and we did not notice any more recent improvements in the cars shown. They attracted the serious attention which they deserve, and were certainly looked upon as being the greatest rivals of the petrol-driven carriage which has as yet appeared.

Carless, Capel, and Leonard not only showed the many convenient packages specially adapted by them for the storage and conveyance of their well-known petrol, but they also had samples of quite a variety of lubricating oils for all purposes. Their exhibit also included a patent benzine safety lamp, suitable for use where inflammable materials are stored, which can readily be lighted without being opened and can be locked so that it can only be opened by means of a powerful magnet.

Stern Brothers exhibited those of their well-known and very excellent lubricants and lubricators, which are particularly well adapted for automobile use. Sternoline for bearings, Sternol for cylinders, and Sternoline Paste for chains and gear wheels were amongst the samples shown.

Price's Patent Candle Company (Limited) also had a very comprehensive show of their special lubricating oils and greases. Many of their lubricants, and particularly their Motorine (Vol. IV, pp. 377–378), are known and used by a large number of automobilists.

The Monarch Motor Company showed one of their neat little launches fitted with the two-stroke petrol motor which is their speciality (*see* THE AUTOMOTOR JOURNAL, Vol. IV, p. 391).

The Creek Street Engineering Company exhibited the Capel petrol car fully described by us some little time ago (Vol. IV, p. 551).

The Petromobile Company, of Colne, had a good show of the New York tyres, which are a very heavy single-tube pneumatic type, and inside which an inner rubber tube is vulcanised to the fabric and rubber walls. The air space inside is very small in comparison with the outside diameter, the 3½-inch tyre having but 1 inch of air space. A Kidder steam car, called the "Petromobile," attracted a good deal of attention—this machine will be fully described in our special series of articles dealing with the automobile in America.

Stirling's Motor Carriages (Limited), of Glasgow, exhibited three of their popular and well-finished vehicles. This exhibit was placed in the large hall, although in the catalogue it was mentioned as being in the gallery. The low price and the practical value of these cars did not fail to draw many visitors. One of the machines shown was a light voiturette fitted with a 5-h.p. De Dion motor and with a simple two-speed gear driving the front axle. The steering is operated by a hand lever, which acts upon the rear wheels. Two larger cars were of an entirely new and very simple design. These are fitted with four-cylinder vertical motors giving 7-h.p.; the cars are fully described by us in another column. As usual, the carriage work of this Company was of the best quality, and all three machines were comfortably upholstered. Particulars of yet another type of vehicle, which is to form this Company's 1902 pattern, were circulated at this stand. The general appearance of this new light car will be not unlike the American "run-about" steam vehicles; it is to be fitted with a 5-h.p. motor of the De Dion type, with a special form of clutch, an enclosed three-speed spur gearing, and a chain-driven live rear axle. If this little machine justifies the claims which are made for it, and if it proves as satisfactory as may be expected from the details which are now available, it is sure to command a large and ready sale. It is to be ready for delivery in quantities early in July next.

The "Gare" Patent Cushion Tyre Company (Limited), Liverpool, showed a variety of their patent tyres for all kinds of road vehicles. The accompanying sectional drawing (Fig. 20) clearly shows the system upon which they are constructed. A steel tread, A, is shrunk over a specially shaped tube, B, which may be left hollow or may or

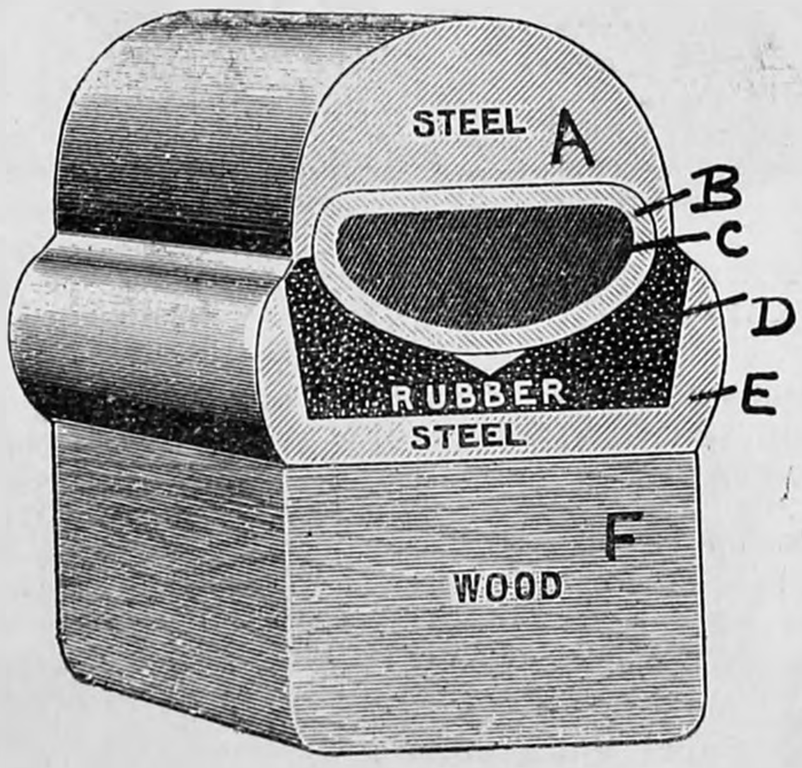


FIG. 20.—The Gare Cushion Tyre.

may not be filled up with any suitable material, C, and which rests upon a rubber cushion, D, in the steel rim, E. The steel rim is shown fitted upon a wood felloe, F. A tyre which had been used for some considerable time on any ordinary trap, and a set of wheels made for one of the Liverpool fire engines, were also shown.

The Zamol Syndicate (Limited), of Palace Chambers, Westminster, exhibited samples of their special cleaning speciality, Zamol, which is about the best material for removing grease and for general cleansing purposes which has as yet been put on the market. A special duster for metal work, which is wonderfully effective and has been christened "Clenveet," was also shown.

Chas. T. Crowden exhibited several of his special appliances for use in connection with automobiles and machinery of a similar character. Amongst these we noticed a reduction of speed gear, particularly designed for use with an electric motor, in which three rollers are used for transmitting the power to an outer rim, which forms a pulley for a belt drive. The object of this device is to avoid frictional losses by entirely dispensing with gear wheels. Mr. Crowden also showed an apparatus for setting the valves and valve gear upon steam-engines. This is a kind of indicator which is designed to save a considerable amount of time in work of this nature. A tubular frame for a light steam car was also shown, and, although incomplete for the exhibition, was interesting. This machine, when finished, is to burn kerosene, and it is fitted with arrangements for condensing the steam. Amongst other features of this exhibit were a steering joint, a special wheel of the artillery type, one of Mr. Crowden's cooling radiators (Vol. IV, p. 506), and a belt fastener of novel form.

The Hudd Syndicate, of Holborn, showed one of the petrol motors which they have just placed on the market and which differs in many respects from any of those hitherto in use. The outward appearance of this machine is seen in Fig. 21. It is of the balanced two-

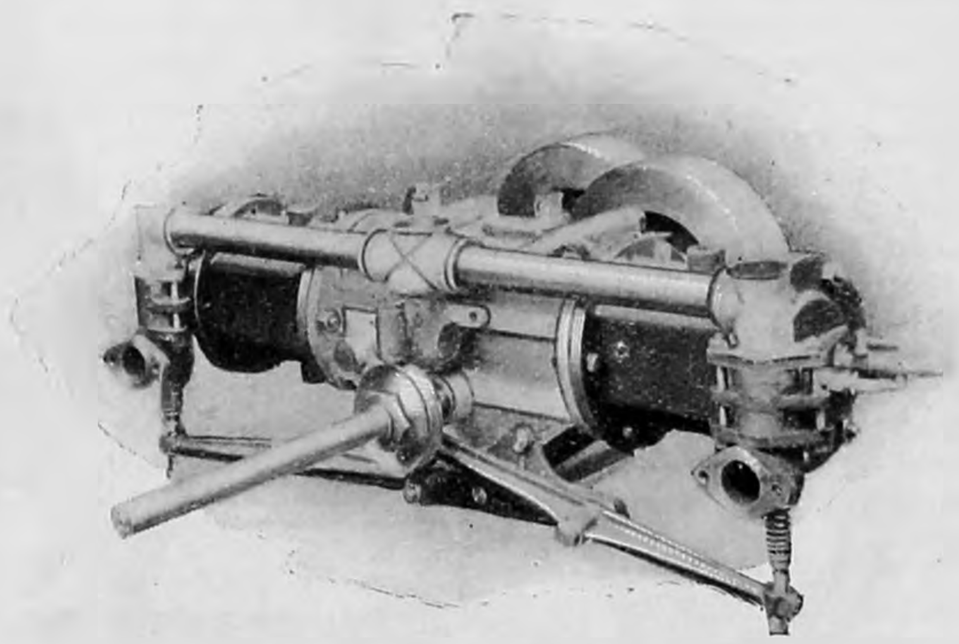


FIG. 21.—The "Hudd" Motor.

cylinder type in which two parallel crank shafts are placed inside the crank chamber, and in which the two cranks gear with a common driving and half-speed shaft placed between them. There are several novel points about this motor, and some of these were illustrated by us last month. The cam which operates the contact breaker is fitted to the half-speed shaft as shown in Fig. 22, where it will be noticed that the

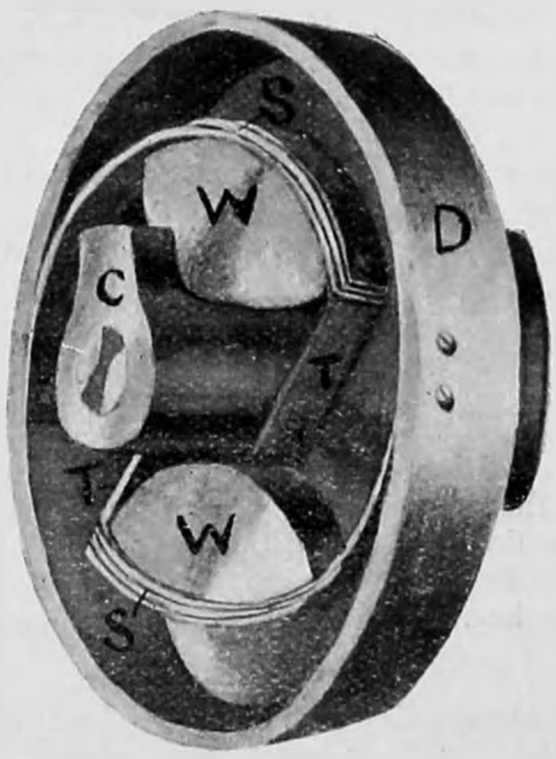


FIG. 22.—The "Hudd" Timed Contact-breaking Cam.

cam itself, C, is free upon the shaft, but is connected by springs, S, with a drum, D. The drum is fixed on the shaft, and it drives the cam, C, through the springs. Weights, W, are fixed to the springs, S, and these cause the relative positions of the drum and the cam to vary according to the speed of the shaft and the consequent shortening action of the centrifugal force on the springs, S. The action of this device is to cause ignition to occur earlier as the speed of the motor increases. Samples of each of the various novel parts of these engines were available for examination at this stall.

The Yorkshire Motor Car Manufacturing Company (Limited) showed one of the voiturettes recently described by us (Vol. V, p. 174), and they also exhibited an undercarriage fitted with motor and transmission gearing.

Bayleys (Limited) exhibited a steam motor trolley, designed to carry 4 tons. This machine is built on a channel steel frame, is fitted

with a water-tube coke-fired boiler and a compound vertical engine, and has a two-speed toothed gear.

The first light steam car built by Mr. H. A. House under his "Lifu" system arrived at the Automobile Club Show on Saturday, about 6 o'clock, having travelled up from Poole, a matter of 110 miles, during the day. The vehicle was the centre of interest to most of the automobilists present, and it was accorded a hearty welcome as the first really practical English-built light steam car which has been produced.

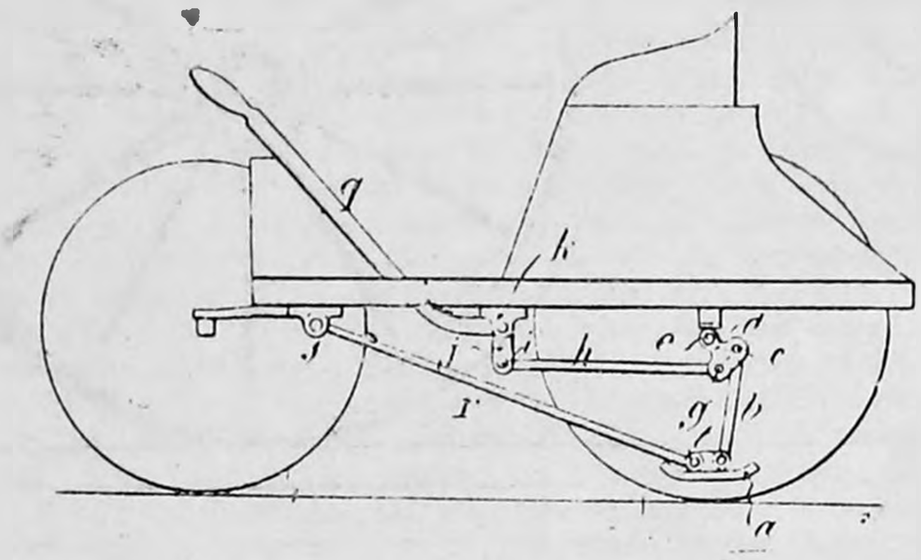
A petrol car by Messrs. Wilson and Pilcher was also running round the arena during Saturday, and was conspicuous by its noiselessness in action.

Mr. Argent Archer, 195A, High Street, Kensington, has now quite identified himself as *the* photographer of the automobile world. Some of the specimens which he had on view at the exhibition were perfect specimens of the art. The photograph of the Queen's carriage, which appears in the current issue, is from one of Mr. Archer's negatives.

CUÉNOD'S EMERGENCY BRAKE.

A somewhat novel form of emergency brake has recently been brought out by M. Ernest Cuénòd, who is well known in France and Switzerland, and to many of our readers, as a leading automobilist. In this device (Figs. 1 and 2) two shoes, *a* and *a*, which are curved to ride upon the

Fig. 1.



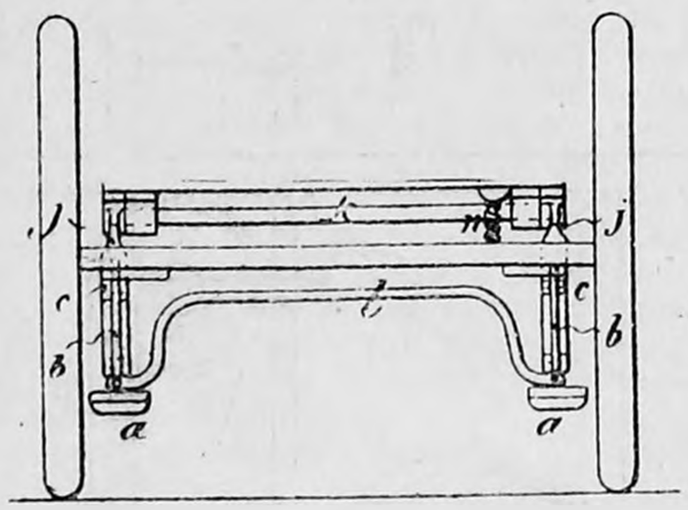


Fig. 2.

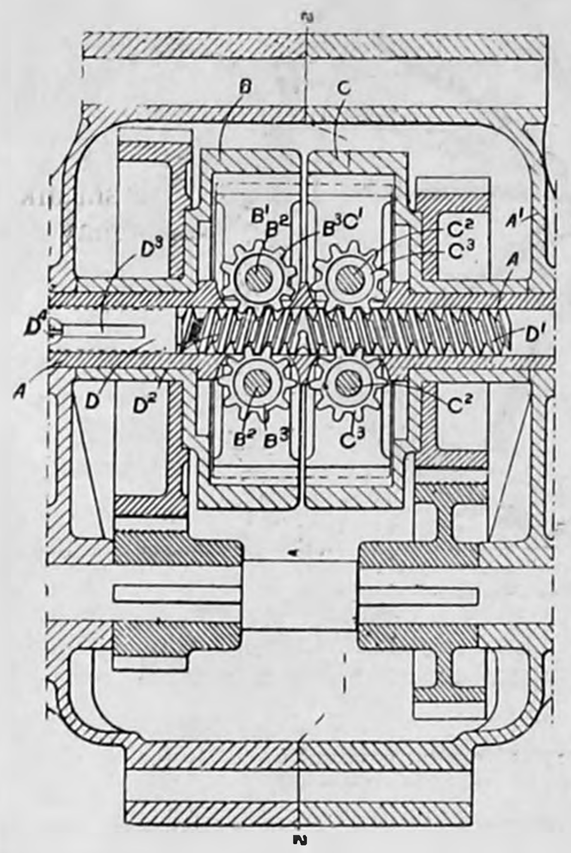
road surface when depressed, are carried by a jointed tie rod, *r*, which is attached to the front of the underframe at *s*, and are also held by a lever, *b*, and a bell crank lever, *d*. The bell crank, *d*, is mounted on the rear axle, *e*, and is also connected with a hand lever, *q*, by the rod, *h*. This system of levers is so arranged that the shoes, *a*, which are interconnected by a cross bar, *l*, normally remain in the upper position shown in the drawings, but that they can both be brought down into contact with the road when the hand lever, *q*, is drawn backwards towards the driver. This lever operates both shoes at the same time, a cross bar, *k*, connecting them in addition to the bar, *l*.

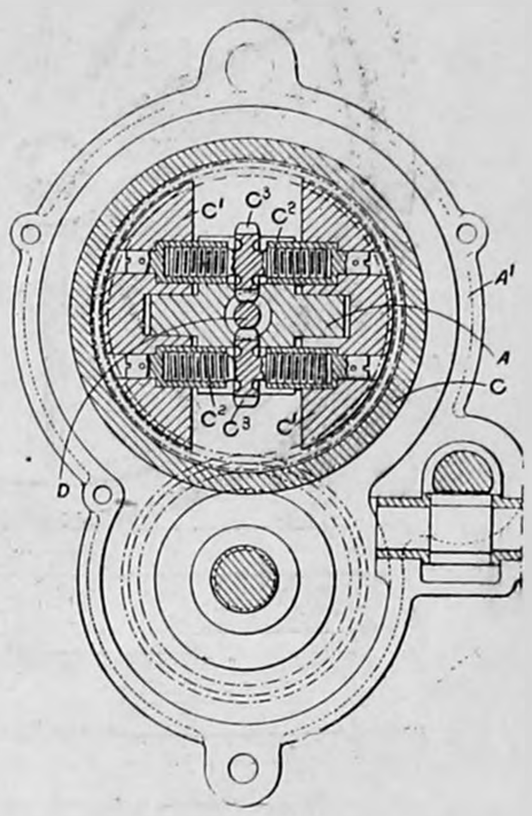
When the lever, *q*, is operated by the driver, both shoes are pressed upon the ground, and the driving wheels are partly or wholly lifted off the road, the vehicle being thus converted into a kind of sledge, and the friction of the shoes being sufficient to stop the carriage in a short distance. The arrangement appears to be simple and efficient, and it has the additional advantage of serving as a lifting jack for facilitating cleaning or repairing the wheels.

AN ADJUSTABLE CLUTCH GEAR FOR THE DE DION VOITURETTE.

The De Dion voiturette is so well known by our readers th t it is unnecessary to go into any details of its general arrangement when bringing before their notice an improved form of speed gearing which is now being fitted to it. In previous machines the two expanding clutches which bring either of the two speed gears into play were caused to engage their respective loose spur wheels by the longitudinal motion of a double rack sliding inside a hollow extension of the motor shaft, and giving a rotary motion to a pair of small pinions. The small pinions were fixed upon spindles having left and right hand threads, and being mounted in bearings about the driving shaft. The effect of sliding the rack inside the hollow driving shaft was to cause the one pair of spindles to expand its clutch blocks inside a drum, and to make the other pair of spindles contract the blocks in the other drum. Satisfactory as this mechanism is in practice, yet the clutch blocks and the containing drums are found to wear away slowly when in use, and there is no ready means of making up for this wear. In the improved design, however, and by the simple expedient of substituting a left and right hand thread for the racks, a considerable range of adjustment in this respect is secured.

Reference to the drawings will show the details of this new form of clutch gear. A represents the hollow driving shaft, whose central portion (inside the clutch drums, B and C) is cross shaped in section. Two of the arms of the cross serve as bearings for the spindles, B^2 and

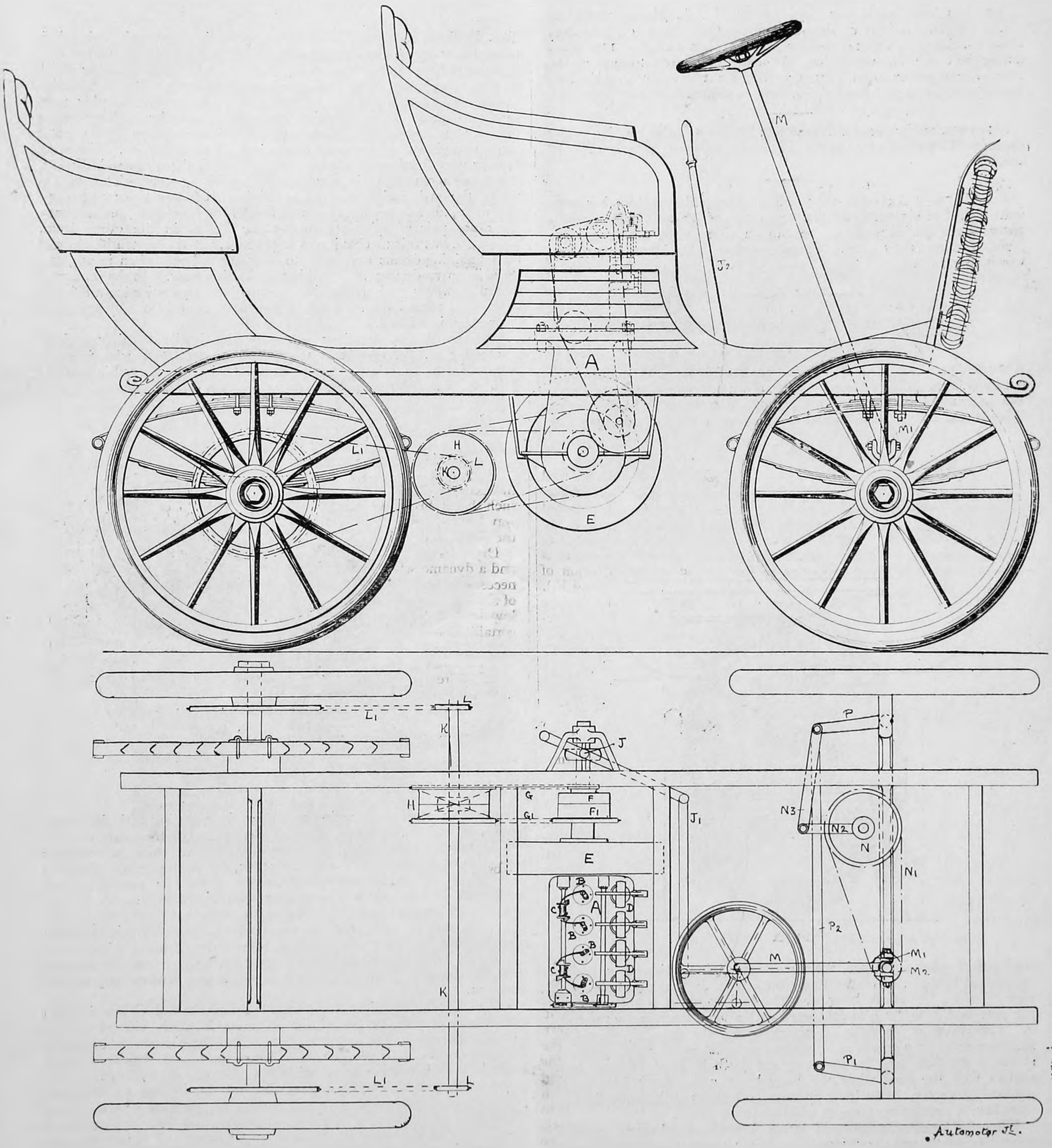




C^2; the two other arms acting as carriers for engaging with the clutch blocks, B^1 and C^1. Passing through the centre of the shaft, A, is a rod, D, which is free to slide longitudinally, but which is normally prevented by a groove, D^3, and a set screw, D^4, from rotating relatively to the shaft, A. A left and right handed thread, D^1 and D^2, is cut in the rod, D, the part, D^2, engaging with worm wheels, B^3, on the spindles, B^2, and the part D^1 engaging the wheels, C^3, on the spindles, C^2. This rod, D, acts upon the worm wheels, B^3 and C^3, in the same manner that the rack did, and it causes the blocks, B^1, B^1, and C^1, C^1, to be alternatively forced apart or drawn together by the threaded spindles, B^2 and C^2, as it is moved in one or other longitudinal direction.

It will be understood that the clutch drums, B and C, are fixed to spur wheels of different sizes, which remain in mesh with two corresponding pinions on the motor shaft, and that these drums are mounted freely upon the driving shaft, A. When the clutch surfaces become worn it is only necessary to withdraw the set screw, D^4, from the groove, D^3, and to slightly rotate the rod, D, in the one direction relatively to the shaft, A. By this motion the spindles, B^2 and C^2, are simultaneously rotated in opposite directions, and both are caused to force their clutch blocks, B^1, B^1, and C^1, C^1, apart. The improvement in this design over the older form of gearing is considerable, and it does not appear to add either to the cost or complication of the machinery.

This is one of the inventions which is covered by patents owned by the British Motor Traction Company (Limited), and in connection with which we understand that they are taking action against infringers. The number of the patent is 22,763 of 1900.



FIGS. 1 AND 2.—THE STIRLING 7-H.P. CAR (Side Elevation and Plan).

THE STIRLING 7-h.p. MOTOR CARRIAGE.

THE tendency of the last few months has been to produce cheaper automobiles by the employment of motors running at very high speeds, in conjunction with gearing giving several different speed ratios between them and the driving wheels. The objections to this system are by no means few, for not only is the life of the bearing surfaces of the motors reduced by the speed at which they run, but the output of the motors themselves can only be maintained so long as their various parts continue to perform their respective duties with a considerable degree of accuracy. It must, of course, be understood that we are far from suggesting any failure on the part of these motors to do their work—and to do it well—for their performance and reliability are little short of marvellous, but we do consider that there is much to be said in favour of cheaper vehicles in which the reduced cost of construction is due rather to a simplified transmission gearing than to a less substantial motor.

The new 7-h.p. vehicle which has been placed upon the market by Messrs. Stirling's Motor Carriages (Limited), of Glasgow, is particularly interesting in consequence of its having been designed from this point of view. As will be seen, its chief characteristics are its comparative freedom from transmission mechanism and its high-powered motor.

A few words will suffice to explain the main portions of this car, for although the drawings (Figs. 1 and 2) reproduced herewith are somewhat diagrammatic, yet, with the exception of a reversing gear which is not shown, all existing moving parts which form the propelling mechanism are seen. A four-cylinder vertical motor A, is fixed with its crank-shaft lying transversely across the centre of the framework. A fly-wheel, E, and a pair of friction clutches, F and F_1, are carried upon the crank-shaft between the motor and an outside bearing. The clutch drums, F and F_1, are attached to a large and a small chain wheel respectively, and either of them can be made to render its chain wheel solid with the motor shaft when desired; the hand lever, J_2, is connected by the levers, J_1 and J, to the clutches, and it enables the driver to operate either of them alternatively or to cause them both to run free. A counter-shaft, K, which is carried in bearings upon the framework is fitted with the usual differential gear, H, and the containing drum of this gear carries a pair of chain wheels (in line with those on F and F_1). Two roller chains, G and G_1, alternatively transmit the power from the motor to the counter-shaft, and sprockets, L, on the ends of the counter-shaft, connect it with the rear wheels by the usual outside chains, L_1.

The steering gear shown consists of a universally jointed pillar, M, which connects the hand wheel with a strong chain wheel, M_2 (on the front axle); the universal joint, M_1, allows the pillar to be used at any desired angle to suit the form of body fitted to the frame. A larger chain wheel, N, is also carried horizontally upon the front axle, and this is connected by a heavy chain, N_1, with the sprocket, M_2. The arm, N_2, is rigid with the chain wheel, N, and is connected by the rod, N_3, with the steering arm, P; the rod, P_2, joins the two arms, P and P_1, together as usual in this Ackermann type of steering.

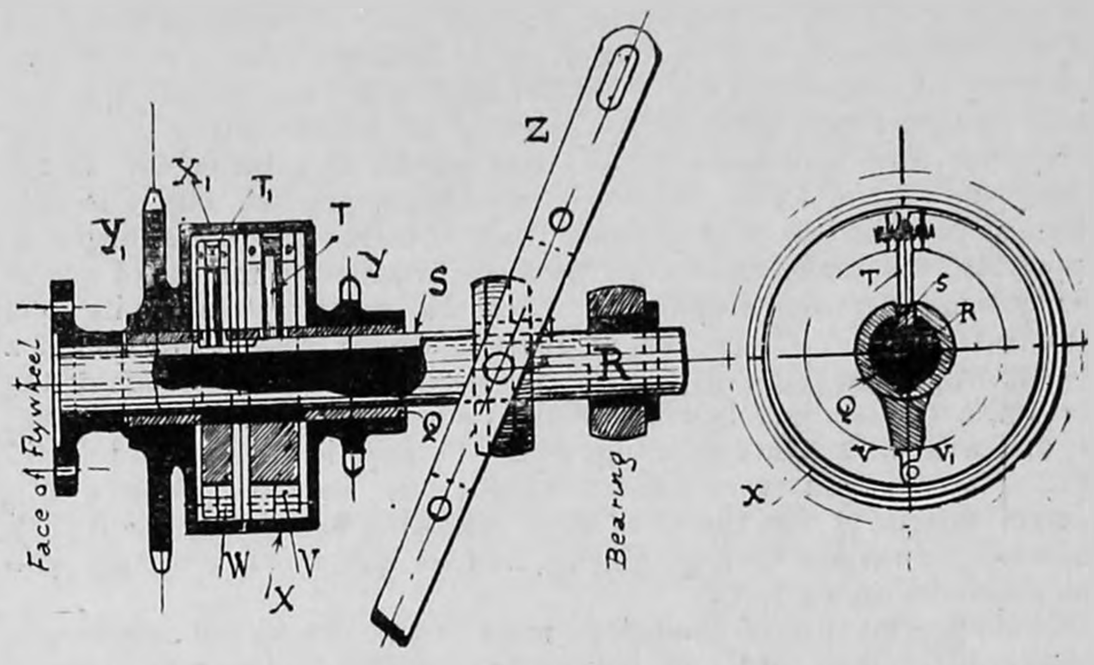
The framework of these cars is made of wood, lined with steel plates and angles where necessary; two steel cross bars are fitted to hold the motor. This frame is supported, front and rear, upon the axles by elliptical springs, and in one of the carriages shown at the recent exhibition a pair of perch rods were used to connect the two axles together—in the other car, tie rods between the counter-shaft and the rear axle only were employed.

The motor itself forms the chief feature of the car, and it possesses many points of difference from most of those now used on other cars. The four cylinders are all made together in one casting, and are mounted above the crank chamber on six steel pillars, much in the same way as in some small marine steam-engines.

The four exhaust valves are placed facing, and below, four vertical inlet valves on the forward side of the cylinder, and a cam-shaft, passing across inside the crank chamber, operates the exhaust valves in the usual way. In Figs. 1 and 2 inlet valves, D, are also shown positively opened, these being driven by a cam-shaft mounted above the cylinders and driven by a chain passing from the lower cam-shaft; the inlet valves are generally, however, operated atmospherically. A third cam-shaft, C, operates make-and-brake low-tension ignition plugs which are bolted on the top of the cylinders. These igniters are similar to others which are already known, and which are used on other engines. The last-mentioned shaft is so mounted in its bearings that it can be rocked relatively to the chain wheel driving it, and the time at which it produces the spark in the cylinders can be varied over a wide range. The diameter of the cylinders is $3\frac{3}{8}$ inches and the stroke is 5 inches. The power developed is about 1-h.p. for each 100 revs. per minute up to normal speed, so that it gives its 7-h.p. at about 700 revs. a minute.

A special form of carburettor is employed, and the petrol feed is regulated by a needle valve, which is adjusted once and for all when starting the motor.

The clutches which bring one or other of the driving chains, G and G_1, into operation, are shown in Fig. 3, where R is the shaft which is coupled direct to the motor, Q is a sleeve keyed upon the extended motor shaft, and S is a sliding feather key which is slotted so as to



engage with wedges, T and T_1, inside expanding clutch segments, V and V_1. The segments V, V_1, of each clutch are hinged together, and are driven by a carrier which forms a part of the sleeve, Q. The wedges, T and T_1, are moved outwards between the segments of each clutch by the sloping faces in the sliding key. The chain wheels, Y and Y_1, are fixed to the drums, X, X_1, against whose inside surfaces the expanding clutch segments press. The shape of the feather key is such that it brings the one clutch into action when it is moved the one way by the hand-operated lever, Z, and the other clutch when moved the other way.

Dry cells are used for effecting the ignition when starting the motor, and a dynamo which is driven by a belt from the fly-wheel supplies the necessary current when the engine is running. A single intensity coil of simple construction serves for the ignition of all four cylinders. The low-tension system employed appears to work extremely well, and is certainly less liable to electrical disarrangement than is the usual high-tension method generally used.

The water circulation is maintained by a pump, which is to be coupled direct to the dynamo in future cars, and a radiator is placed in front of the dash.

The controlling arrangements of this car are exceedingly simple. The one lever, J_2, usually remains in its high-speed position when the car is travelling, and the speed is varied by advancing or retarding the time of ignition. It is intended to connect this latter regulator to the steering pillar in such a manner that its movement towards or away from the driver will cause the motor to run faster or slower. In the present cars a separate hand lever is fitted instead. A band brake is fitted around the drum, H, of the differential gear, between the chain wheels, and a pair of brakes of a similar kind act upon the rear wheels.

Four wooden wheels of equal size are used, and these are fitted with sabstantial pneumatic tyres of the single-tube pattern.

AUTOMOBILISTS' GUIDE AND MOTOR TOURISTS' VADE-MECUM.—This work, compiled by Mr. Robert E. Phillips, F.R.S.S., and published under the direction and official patronage of the Automobile Club of Great Britain and Ireland, was last week issued from the press. The Guide, which comprises some 150 pages, contains a vast amount of reliable information condensed into the smallest possible space under towns alphabetically arranged. The information contained in the Guide embraces places where petroleum spirit can be obtained, repairers of motor vehicles, specifying in each case the particular appointments which they hold for various systems, places where motor vehicles can be stored, where accumulators can be recharged, the distances between the nearest towns where petrol or electric recharging current can be obtained, where telephonic service exists, the distances from London, early closing days, Automobile Club and C.T.C. hotels, &c., &c. The compilation of this work must have been an immense labour, with the result that it is positively indispensable to every owner of an automobile, whether it be petrol, steam, or electric. The Guide can be obtained from the publishers, F. King and Co. (Limited), 62, St. Martin's Lane, at a cost of 3*s.* 6*d.*

THE TRANSMISSION GEAR OF A MOTOR CARRIAGE.*

THE motor itself has been generally considered the most important part of a self-propelled vehicle, but the idea is growing, and not without good reason, especially amongst makers, that the method of transmitting the power from the motor to the driving road wheels is, perhaps, even more important. This may be partly accounted for by the fact that the motor itself had been brought to a high state of perfection as a fixed engine, whereas the driving gear of motor cars was, until a year or two ago, very little understood. It would appear to many at first sight, no doubt, a very simple problem to design an efficient means of conveying the power from the motor to the road wheels by utilising one of the many well-known forms employed in ordinary practice, but it is only after a year or two's experience that makers and users begin to appreciate the many drawbacks there are attached to the use of any of the systems at present employed. Each and every system has its good and bad points. It does not at present appear possible to obtain a system which embodies all the good points and which has none of the bad ones, and one gets bewildered as to what good points to make use of, and what bad points to put up with. Perhaps it will be best to give, first, a brief summary of what I consider the essential features of a perfect system (I use the term in a qualifying sense only), and then examine the various leading systems, and see how far they comply with the requirements set forth.

The following list of conditions must not be considered as arranged arbitrarily in their order of importance, as that is to some extent a matter of personal choice.

1. *Efficiency.*—By efficiency I mean economy in consumption of power, or, in other words, the loss which results in conveying the power from one point to another. It must be obvious to anyone that (unless there is very good reason for it) it is folly cutting down in weight the vital parts of the rest of the carriage to make it light and easy to force along, in order to use an inefficient system of transmission which needs a much larger and heavier motor than would otherwise be the case to overcome the heavy loss which such a system may involve. I have placed this feature first, because everything on a motor carriage has to be cut down to a very narrow margin of safety, dimensions being largely gathered from experience of what will only just take the strains each part has to stand, any allowance as a factor of safety being practically *nil.* Therefore, a perfect system should consume the very least amount of power possible in order that as much margin as practicable may be allowed in the strength of all vital parts, and not necessitate a larger motor or the use of more motive power than is really required for the work to be done at the road wheels.

2. *Adaptability.*—I mean its use without in any way detracting from or interfering with the other necessary adjuncts of a perfect road carriage. It is only reasonable to suppose that one might be very much disinclined to use what might otherwise be a very good gear, if it interfered very much with the comfort of the passengers or appearance of the car, or necessitated the placing of the motor and other parts in such positions as would prevent their being easily got at for examination and repairs.

3. *Simplicity.*—This feature is one which will appeal largely to the non-mechanical users of motor cars, and even a mechanic's interest in an intricate and complicated piece of mechanism soon wanes, when he finds out that each extra part is only so much more trouble, annoyance, and expense. It is an essential feature which may, however, be easily carried to a point where it becomes a disadvantage, and is more to be considered in combination with other desirable features than possibly any other. Nothing is, for instance, simpler than having just one direct speed on to the driving wheels, but this is only possible with an electric or steam driven car, and is quite out of the question on a carriage driven by any internal combustion motor at present known. Simplicity no doubt means economy in first cost—that is, if it does not require a more expensive motor and adjuncts—and so will always be an important factor in cheap cars.

4. *Lightness.*—As pointed out in feature No. 1, lightness is a *sine qua non* of each and every part of a car, so that it must be carefully considered in deciding on what system to adopt. It will, no doubt, be more favoured by those wanting a very light car than those who would be satisfied with a little more weight and perhaps less expense and greater durability. To obtain the best results in this direction aluminium must be used wherever practicable, and as this metal is still dear and difficult to manipulate, it means some sacrifice on the score of cheapness, and consequently it cannot be adopted on low-priced cars.

5. *Durability.*—This is an increasingly important feature of every part of a car. A few years back, when the present automobile movement was in its infancy, no one was much concerned as to how long a car would last, but now that the first flush is over users are becoming aware of the fact that what may be a cheap car in first cost may be a very dear one before it has run many thousands of miles. It does not follow that to be durable a gear must be very simple, although this is a generally accepted axiom, but its chief hope of a long existence, I think, is to be looked for in the action by which the speed change operates the material of which the various parts are made, and the way in which it is protected from the dirt and dust.

6. *Manipulation.*—This feature may be looked at in two ways. It may be considered purely as to the amount of effort or care required to operate the speed changes, or as to the general handiness in relation to repairs in out-of-the-way places, and attention and care in general.

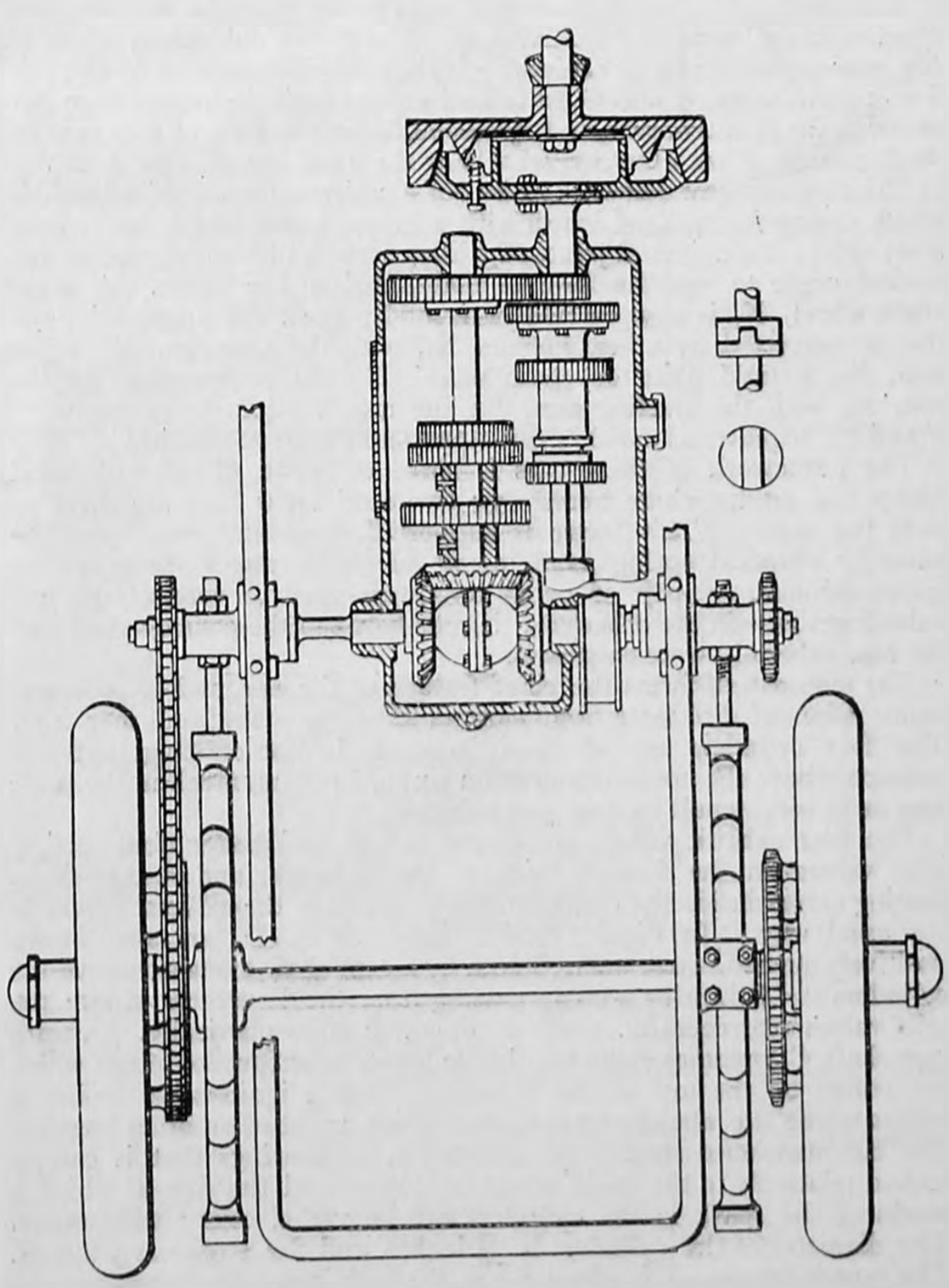
7. *Cheapness.*—I have placed this feature last, because I mean by cheapness the first cost; its ultimate cost or cheapness in working coming, I consider, under the heading of durability. Looked at from purely a manufacturer's standpoint this feature would, no doubt, be placed much earlier in the list; and as years go on and competition becomes keener it will assuredly be an important point, but at present it seems to me that many of the other features should receive preferential consideration, especially from a user's standpoint.

Having now set forth and explained the essential features, let us see how the various systems comply with each.

[NOTE.—I do not propose to enter into the question as to who designed or originated the systems, or into their early history, as that aspect of the subject is of no use whatever to the man who wants a good and satisfactory transmitter, and in giving a name to any of the systems I merely make use of the name with which each system is generally associated, in order to distinguish one from the other.]

I.—PANHARD SYSTEM.

Vertical engine in front of car, friction clutch to engine, sliding change-speed gears arranged lengthwise of the car, bevel gear wheels to cross or differential gear shaft, and chains to both rear driving wheels.



Panhard and Levassor System.

* Read by Mr. HERBERT AUSTIN before the Cycle Engineers' Institute at the Agricultural Hall, London, May 9th, 1901.

The Daimler, Mors, Cannello Durkopp, and Napier come under this heading, being almost identical with a Panhard car.

Efficiency.—Admitting the necessity of making the various parts of a car as light as possible, it is obvious that the system should not be too dependent on the rigidity of the framework to which it is fixed. An examination of the Panhard system at once shows that it is very largely dependent on the framework, because the bearings of the engine, the gear box, and differential gear shaft should all be kept exactly in line, or otherwise the efficiency will be very much impaired.

Partly with the view of overcoming this defect, and to allow of the gear box being removed without dismantling the side brackets, &c., the outer ends of the differential gear shaft are made separate and connected to the centre portion by claw couplings.

This is a very dubious advantage, and it is a question whether, under certain circumstances, it is not making matters worse. No doubt it obviates the necessity of stiffening up various parts, and helps to keep down the weight, but most mechanics will come to the conclusion that there must be a considerable loss of power in short outer bearings, which have to carry so much of the strain, and which will often be considerably out of line with the centre portion, owing to their being fastened to a part of the frame which is not very rigidly connected to the part carrying the centre. To keep the gear box and engine in correct alignment has been found to be a very difficult undertaking in high-powered cars, as, apart from the deflection of the frame resulting from the irregularities of the road, the engine exerts a very powerful twisting action, which must at times seriously reduce the efficiency of the driving mechanism. The use of bevel gears between the top change speed shaft and the cross shaft is necessary because the engine is placed at right angles with the direction in which the car moves, and while this is probably the most convenient method to adopt, it is nevertheless indirect and wasteful. I well remember the first time I saw the sliding gear system of changing speeds on a Panhard and Levassor car at their factory in Paris some five or six years ago, and how barbarous the idea of dashing one gear into another appeared to me at the time. Later experience with this and other gears has driven me to the conclusion, much against my will, that it is the most efficient method, once the gears are in mesh.

As the rear axles are connected to the frame by springs, the drive between the wheels and the differential gear shaft must be flexible and as direct as possible, in order not to deflect the axles. Any indirect or rigid drive would limit the action of the springs, and would necessitate having the axle guided between horn plates similar to those used on a locomotive. This would be very undesirable, and as chain driving is so direct and flexible, it is difficult to see how the Panhard system could be improved in this respect. In deciding on the connection between change-speed gear and the axle, it should be borne in mind that as little dead weight as possible should be placed on the axle, especially when solid tyres are used, or they will be subjected to very severe shocks when going over rough ground. Tyres being at present the most unsatisfactory portion of a car, it is evident that the Panhard system in this respect is a good one, and to get the best results the sprockets and chain wheels should be kept rather small in diameter and wide apart, so that the twisting out of line of the back axle shall not cause too great a side strain on the chains. To sum up, the Panhard system, on the whole, cannot be considered an efficient one, and there can be no doubt that the excellent results already obtained would be readily surpassed if the defective parts of this system of transmission were improved.

Adaptability.—On the score of adaptability the Panhard system is good. The motor is in front, away from the carriage body, and the heat and danger from fire are isolated as much as possible. It can be easily got at without dismantling the body, &c.

The speed-change gear is below the frame, and it allows the carriage builder full scope to put on what type of body he considers best, without having to make allowance for any mechanism beyond the fact that the footboards must be loose, to allow of the gear being examined.

Having the engine in front, and covering it with a suitable bonnet, distributes the weight better, and allows the passenger to sit well back, makes the car ride better at high speeds, and generally takes away a good deal of the horseless appearance so much associated with a motor car.

Simplicity.—The Panhard system, compared with many others, cannot be considered very simple; in fact, there are few more complicated, and yet it must be borne in mind that it has usually four forward speeds and reverse, and that some of the other methods obtain their simplicity by having only two forward speeds and no reverse. Its chief complications lie in the right angle drive between speed-change shaft and differential gear shaft, the method of obtaining the reverse speed, and the differential gear shaft in three pieces.

Lightness.—A car with this system of transmission cannot be built very light without sacrificing its durability and efficiency, because, as before pointed out, it requires a very rigid frame, and consequently a rather heavy one. The power has to be conveyed practically the whole length of the car.

Durability must always be largely governed by efficiency. If a motor expends a certain proportion of the power it exerts in overcoming undue friction, it will mean rapid wear on those parts causing the friction, and it follows that the parts will not be durable. The conclusion was arrived at that this system could not be very efficient, and consequently some portions cannot be very durable. The system of sliding one gear through another will always be wasteful, especially where care is not taken to release the clutch first, and it is a question whether some of the efficiency gained by this device had not better be sacrificed for increased durability. In designing a speed-change gear it is of the utmost importance that the change may be effected very quickly, or otherwise the car will lose momentum on a hill, and necessitate commencing on the lowest speed, instead of being able to go up, say, on the second speed. Anyone who has driven a car with Panhard system of change gear will have experienced considerable difficulty in getting the teeth of one set of gears into mesh with the others under certain conditions, and a moment's consideration will readily explain this. To get sufficient strength, the parts cannot be made very light, and consequently the double clutch, the square shaft carrying the sliding gears, the sleeve with gears attached which slides on this shaft, form together a considerable mass of metal, which has an equivalent inertia or momentum, as the case may be. Now, supposing we are using the top speed, and wish to change to the second, the sliding gear shaft running at normal speed, say 700 revs. per minute, it is obvious that before the change can be effected, this shaft must be made to run at a much increased speed (about 950), and as this has to be done by the edges of the teeth on the gears, it cannot be a matter of surprise that considerable wear takes place; in fact, it is a wonder they last as long as they do.

The method of obtaining the reverse by sliding one bevel wheel into another causes a very severe strain, with consequent wear on the bearings next to these wheels, especially as it is almost impossible to locate the wheels so that their pitch lines coincide exactly.

Owing to the way the large chain wheels are fixed to the road wheels, a gear-case cannot be fitted which would be at all satisfactory or worth the trouble, consequently the driving chains suffer from the dirt and dust thrown on to them by the tyres, and wear out more rapidly than if they were nearer to the centre of the car.

Manipulation.—A perusal of the foregoing clause will lead one to the conclusion that it is not altogether an easy matter to manipulate the speed changes on this system, and this surmise is to a certain extent correct. Unless the clutch is released completely from the motor before the attempt to change speed, and the car is running somewhere about the speed it will when the connection is made, then the gears will grind away at each other and the effort to get them into position will be annoying and difficult. To stop the car or proceed slowly in traffic, the clutch, operated by a pedal, is very convenient, especially with wheel steering, any system requiring the use of one hand being only suitable for lever steering. The general arrangement of the Panhard system is convenient for repairs or cleaning. The bonnet is quickly removed, and the motor can then be got at also. The speed-change gear can be examined without disturbing the carriage body, but breakdowns generally are difficult to put right in country places, because if anything does go wrong it is usually something beyond the scope of a wayside repair.

Cheapness.—As to first cost, there can be no doubt that this system is one of the dearest. The large number of parts, the need for correct alignment and rigidity, and the accuracy required in making the change-speed gearing in order to ensure its not being noisy, all prevent the system being used where cheapness is the main consideration. There is more value in work in the change-speed gear box of a Panhard car than in all the transmission gear of a Benz put together.

II.—BENZ SYSTEM.

Horizontal engine at back of car, belts with fast and loose pulleys to cross, or differential gear shaft and chains to both rear driving wheels. Similar cars are the Star, International, Marshall, and others.

Efficiency.—It would be difficult to devise a more efficient mechanism than that used in the Benz system, without sacrificing a good deal of its flexibility. A belt is certainly not the most efficient means of connecting two shafts, especially when it slips; but it must be judged in connection with its other advantages, and in any case it may be made very satisfactory if the bearings carrying the shafts are fitted with balls, as they usually are. Generally speaking, this system suffers from the use of pulleys which are too small in diameter and too wide. To get the best results belts should only run on large pulleys, and at a comparatively high speed.

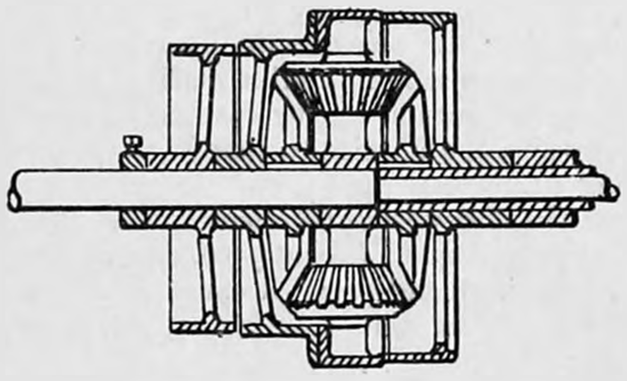
As very small pulleys cannot be employed, driving direct on to the balance gear shaft necessitates the use of sprockets which are too small to allow of a proper rolling action to the chain, and consequently there is a considerable loss of power at this point, which might easily be remedied by using an intermediate pair of gears to reduce the speed, instead of trying to do it all, or nearly all, by the sizes of the chain wheels.

Adaptability.—This system is anything but handy to fit a graceful carriage-body to. The engine, under the passenger's seat, with its large pulleys and belts, prevents the adoption of any other type of body than the dogcart style, without either raising the centre of gravity perilously high, or getting the belts, &c., too near the ground.

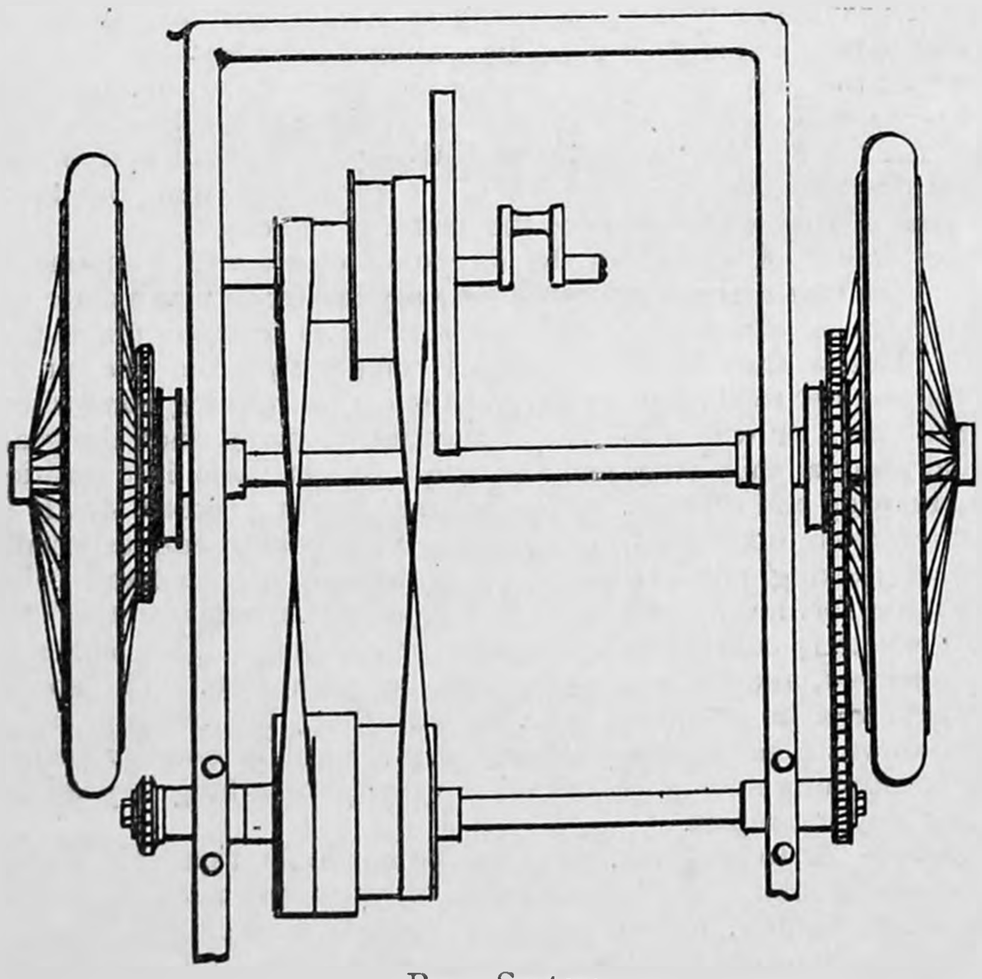
The use of tube ignition is out of the question, because the heat and danger from fire would be too great, and the inconvenience of having to disturb the passengers for every little adjustment, together with the way in which the oil and grease get on to the body, makes this system about as unhandy as it can be.

As generally built, this car is very horseless looking, and requires something in front to balance the heavy rear portion.

It is practically impossible to build a very fast car on this system, because there is so little weight on the front wheels, and if a powerful motor were applied, it would simply lift the front of the car up, and



Benz Two-speed Gear.



Benz System.

try to make it turn a somersault backwards, especially in going up a steep hill. Even with low-powered cars this trouble is experienced when the Crypto gear is used.

Simplicity.—This is the leading feature on a Benz type of car, and accounts very much for the large sale which this car has had. To design a simpler transmission gear would be a difficult job. A reverse gear is not always fitted, and, when it is, the belt driving it is usually conspicuous by its absence, having been taken off to ease the engine, or lost on the road. As high speeds are not permissible, the two forward speeds are, generally speaking, enough; any further variation being obtained by allowing the belts to slip on the pulleys. It will be noticed that the crank-shaft, differential gear shaft, and rear axle are all in parallel lines, and that no complications, such as right-angle drives, are used.

Lightness.—It is possible to build a very light car on these lines, so far as the transmission gear is concerned, without getting the vital parts weak. The belt drive, being flexible, absorbs the impulses of the engine, so that the differential shaft and chains may be lighter than with a more rigid drive. The use of only two speeds and a slow maximum, of course, assists very much, though its chief advantage in this direction lies in its flexibility. The belts do not necessarily require heavy cases, such as are used with geared drives, and the frame may be built very light, and does not require to be rigid in any way. The weight being mostly on the back, the front axle and wheels may be less heavy, and the weight saved is more than sufficient to stiffen up the rear portions.

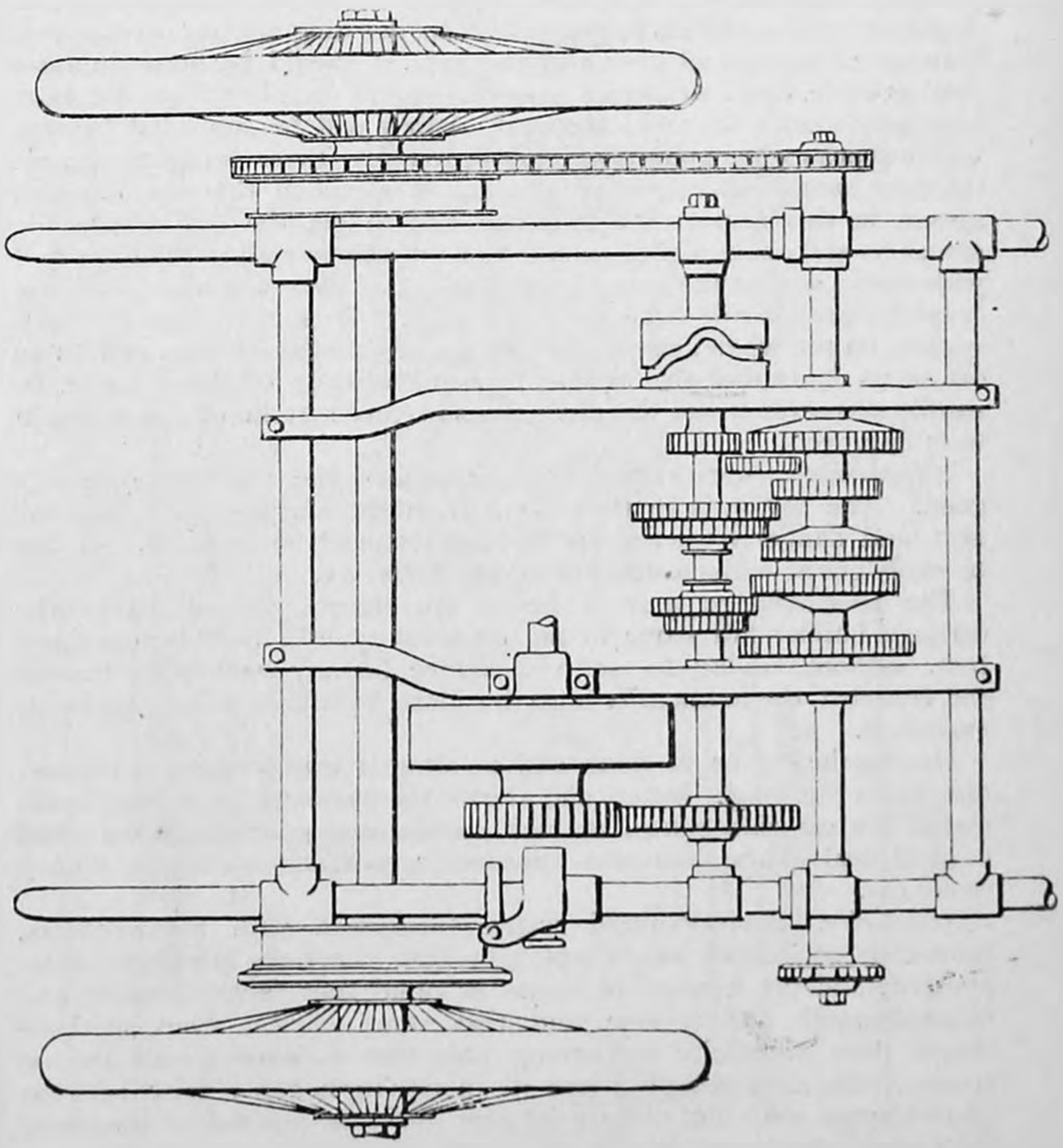
Durability.—Because efficiency governs durability so much, this system should be durable, and apart from the belts and chains there is very little to wear out; but as it is employed almost exclusively on very cheap cars, little care has been taken to get the best results, and consequently it has, no doubt, been often condemned as wanting in durability when the fault lay in the quality of the workmanship and material, and the want of protection against dirt and dust. The small sprocket and large chain wheel necessitated by the reduction of speed, tend to make the chains wear out quickly. A seven-tooth sprocket is really too small, and, if at all possible, nothing smaller than one having eight teeth should be fitted. A large chain wheel brings the chain too close to the ground, and it thus picks up a lot more of the mud and dust.

Manipulation.—Nothing could be easier than moving the belts from one pulley to another, the effort required being very small, and necessitating no more care than a little consideration for the belt in not moving it too quickly, especially when changing from the high to the low speeds. The transmission gear is readily got at for repairs and adjustment, and these may often be done by unskilled labour; but in considering the position of the motor as part of the transmission, then some allowance should be made for the difficulty and annoyance in getting at it.

Cheapness.—Flexibility, low speed, and simplicity all combine to render this system about as cheap to build as it is possible to get one. It is not necessary to have a rigid frame, to be very accurate in the setting of the engine in relation to the differential shaft, or to provide any expensive gears or gear cases. In the designing of this car practically everything has been sacrificed to cheapness, or, to be more exact, low first cost.

III.—PEUGEOT SYSTEM.

Horizontal engine at back of car, friction clutch to engine, spur gears to shaft carrying sliding change-speed gears which engage direct into differential shaft, and chains to both rear driving wheels.



Peugeot System.

Efficiency.—The most noticeable feature of this system is the directness of the drive. The engine is coupled direct to the change-speed shaft through a pair of gears and a clutch. If properly made and rigidly supported, there cannot be much lost in this part of the transmission. The change-speed gear is on the same lines as the Panhard, and under the same conditions, except that the objectionable bevel gears are dispensed with, and only one simple reverse speed is provided.

The balance gear shaft, being without joints, must be more efficient than, and the side chains quite equal to, the Panhard.

While this system is very direct, it is also quite as rigid as the Panhard. There is no elasticity except in the side chains, and were it not for these the shocks caused by inequalities in the roads would tend to loosen or damage many parts of the motor and gear.

Generally speaking, the system must be very efficient, if well made, rigidly supported, and run with ball bearings to all shafts.

Adaptability.—Being under very similar conditions to the Benz as to position of engine, &c., the same remarks apply, with the exception that as the engine is reversed, tube ignition is often fitted, though the portion of body above the breech end of engine must be metallic, or it would otherwise catch fire. There is some advantage in this system over the Benz in the balancing of the dead weight as the heavy portions of the engine are nearer the front of the car, although not sufficient to allow of the passengers sitting far enough back to be comfortable. Unless one of the gears between the crank-shaft and speed-change shaft is made from raw hide or fibre the noise will be very considerable, especially as they cannot very readily be boxed in and run in grease to deaden the sound.

Simplicity.—Although not so simple as the Benz this system is better than the Panhard, as it dispenses with the objectionable bevel gear drive and the divided cross shaft.

Lightness.—Being more direct than the Panhard it can be built somewhat lighter, though not sufficiently perhaps to warrant its adoption in preference, unless it had other good features. Taken altogether it must be classed among the heavy section.

Durability.—As it is more direct and more efficient than the Panhard it should be more durable, although, as it is usually run at a higher nominal speed, the results may not always warrant such a conclusion.

Manipulation.—So far as mere manipulation of the change speed is concerned, there is very little difference between this system and the Panhard, although having only one lever to operate the forward and reverse speeds, the reverse motion may be engaged quicker, and there is less confusion on this account. Repairs and renewals would be under practically the same conditions, but as usually arranged the internal parts of the motor are very difficult of access, and require a considerable amount of time to dismantle.

Cheapness.—It is not the simplest form of transmission, yet the fact that the bearings are arranged in a self-contained case must be a considerable saving in erection. The shafts all lie in parallel lines, and present no difficulties in the way of rapid and systematic duplication.

IV.—DE DIÉTRICH.

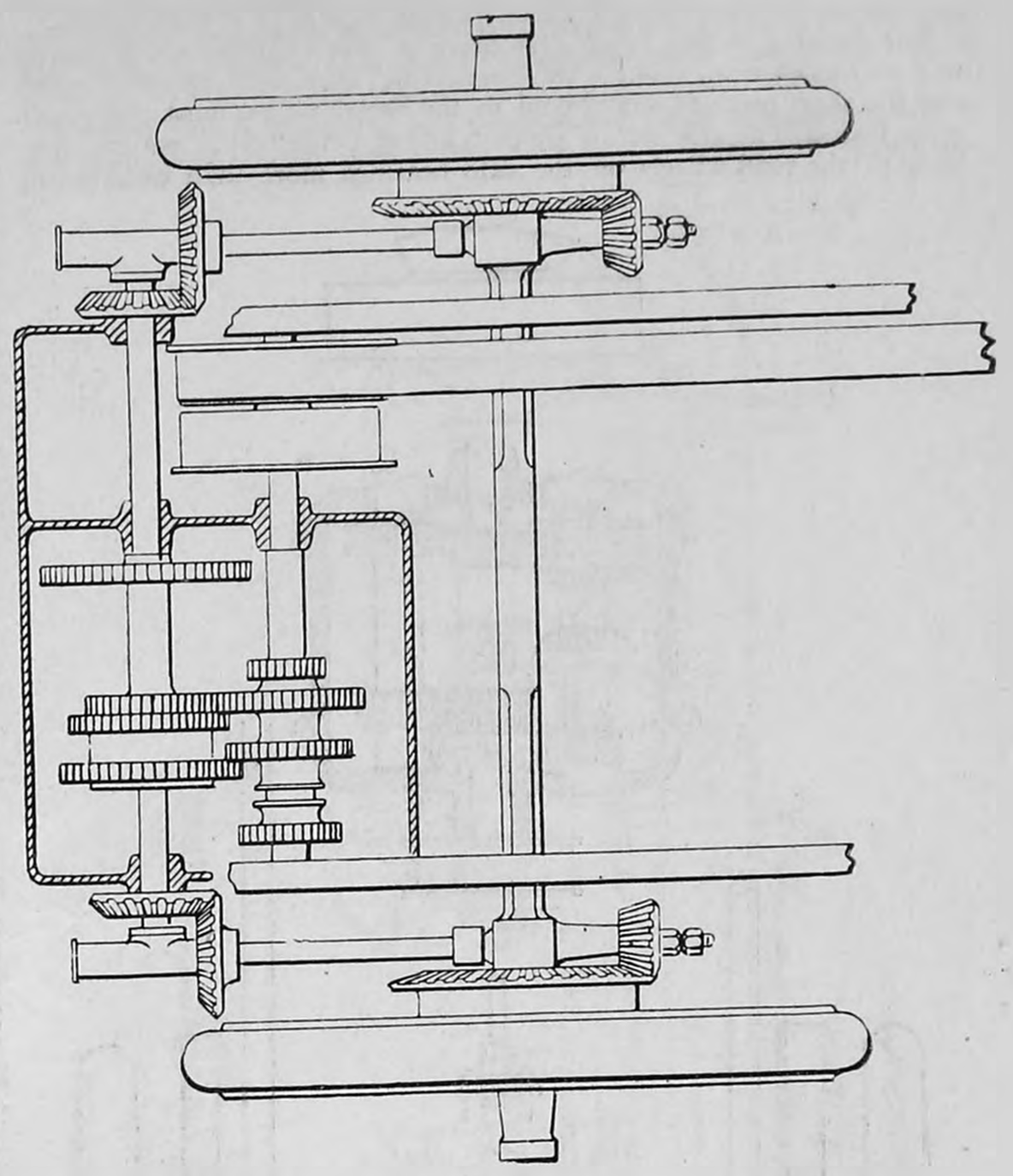
Horizontal engine in front part of car, belts to fast and loose pulleys on shaft at rear, sliding change-speed gears to differential gear shaft, bevel gear wheels to two longitudinal side shafts, and bevel gear wheels to rear driving wheels.

Efficiency.—The first portion of this transmission is under similar conditions to the Benz, with the exception that a longer belt is permissible. Sliding gears similar to the Panhard give the necessary changes of speed, the belt being shifted on to the loose pulley when the change is made. The remainder of the gear is, however, quite distinct from the other types, and involves some startling departures from ordinary practice. Bevel-wheel driving is not favoured by engineers where more direct means can be employed, and yet this system has four pairs. What the designer had in view in adopting this roundabout method of driving the road wheels, I cannot conceive; and even if it were made in the very best manner, it could not fail to be an extremely wasteful system. In order to allow the axle free play, the side shafts must be fitted with two universal joints each, and these leave very little room to get any satisfactory length of bearing to the ends of the shafts. Ball bearings would no doubt save some of the frictional loss, but the reaction of the strain of turning the road wheels must come on the springs, or be taken up by levers fixed to the frame. In my humble opinion the springs should never be called upon to take this reaction, although it is a practice sometimes followed on light and cheap cars. The method of securing the road wheels in position must be very substantial, or the side thrust of the bevel wheels would force them off the axles.

Adaptability.—This system is almost as handy as the Panhard, the only disadvantage being the position of the change-speed gears in certain styles of body.

Simplicity.—This system is one of the few which are more complicated than the Panhard, the extra complications lying in the bevel gear connection previously mentioned.

Lightness.—The belt drive between engine and change-speed gear obviates the necessity of having a very rigid frame, and for this reason



De Diétrich System.

it may be made lighter than the Panhard, though a portion of this advantage is lost in the side shafts and bevel gears, which must be made heavier than the chain connections. I am, of course, assuming that the same amount of care would be exercised in properly boxing in the gears in both systems.

Durability.—As the belt connection admits of a very light fixed pulley, the momentum of the sliding change gears is not so serious a matter as with a clutch, and by making the driven pulley larger than the driver the speed of the gear may be reduced. Both these variations contribute largely to the life of the gears in comparison with the Panhard, and if chains were used to couple the differential gear shaft to the road wheels this system might be considered very satisfactory.

Manipulation.—The lesser momentum of the sliding gears, &c., requires less effort than the Panhard to effect a change, although the belt cannot be shifted as quickly as the clutch. As a belt can be slipped so much better and with less damage than a clutch, the starting of the carriage may be more gradual, and save the unpleasant jerks often experienced with a clutch.

So far as being able to get at the various parts and repairs of breakdowns are concerned, this system may be classed in about the same category as the Panhard.

Cheapness.—The saving effected by using a flexible drive and lighter framework is lost in the bevel-wheel gearing, and it is questionable if a car could be made as cheap on this system as the Panhard.

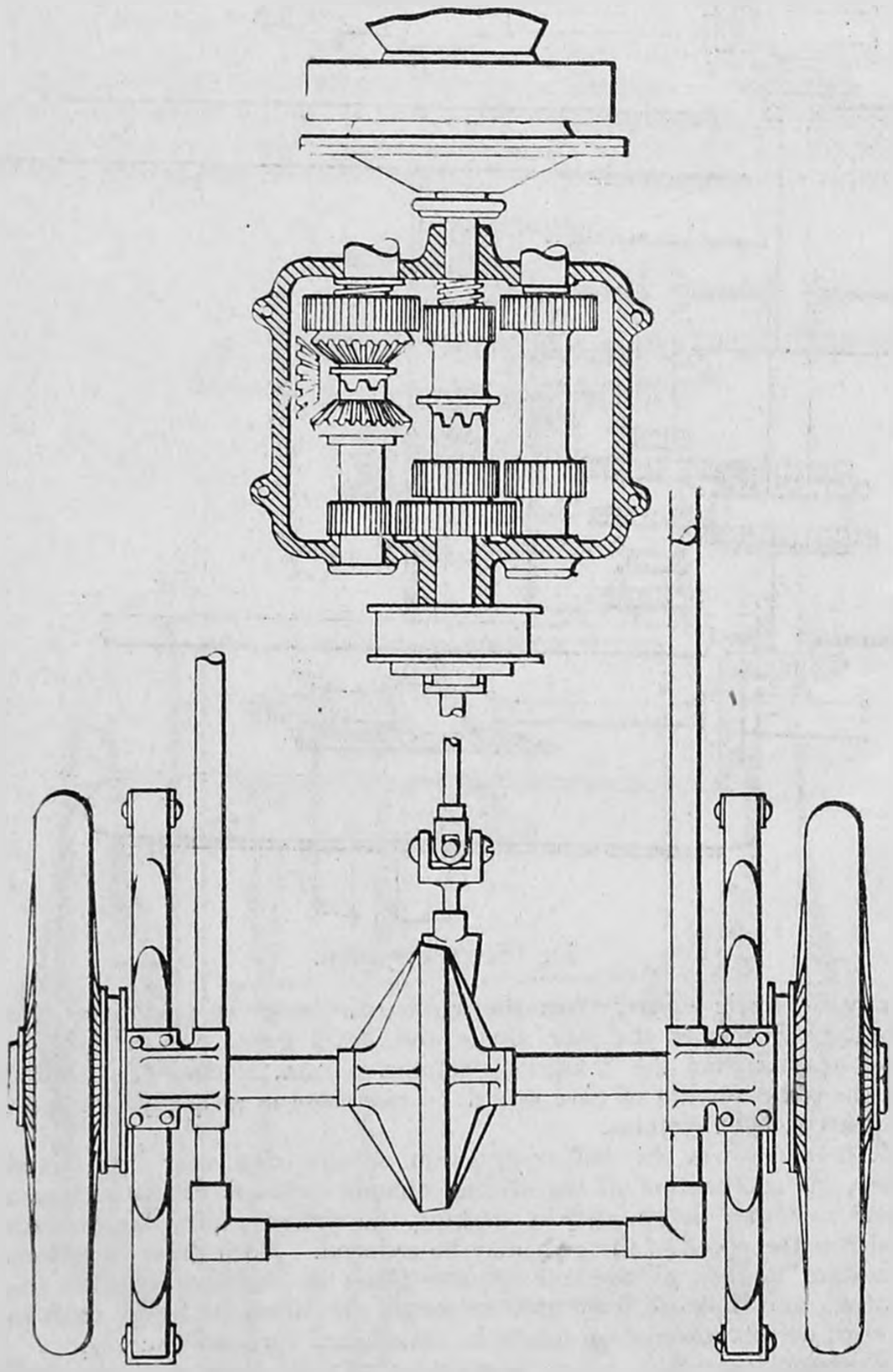
V.—RENAULT.

Vertical engine in front of car, friction clutch to engine, special change-speed gear arranged longitudinally, universally jointed shaft to bevel wheels on differential gear shaft, which forms a live back axle, the ends of which are fixed into the road wheels. The Darracq and several other small cars belong to this category.

Efficiency.—This is the first system in the series in which more

than one pair of gears in the change-speed box are in mesh at one time. There has been much controversy as to which is the best all-round method—using gears always in mesh, and engaging a pair at a time by some sort of clutch, or making each pair of gears act as its own clutch, and having only one pair at a time in mesh. There can be no shadow of a doubt as to which is most efficient, and were they judged only from this standpoint the former would have to go to the wall. There are many variations of the clutch, such as sliding keys, &c., but all of them cause a lot of friction, especially at high speeds.

The remarks on the bevel gear drive of the Panhard apply equally well to this system, though the connecting shaft with universal joints and the short piece of shaft fixed to the bevel pinion must cause even more loss. The side chains are certainly dispensed with, but the overhang of the road wheels on the axle bearings more than cancels any



Renault System.

advantage gained by that alteration. The system is hardly ever used on anything but very light vehicles, consequently the disadvantages are not so accentuated as they would be on heavy carriages.

Adaptability.—There is very little to say on this point, as the positions of the various parts are very similar to the Panhard, the only advantage being the cleanliness and neatness gained by dispensing with the side chains.

Simplicity.—This system is deceptive, and at first sight one would be inclined to consider it very simple, but on closer examination it is found that the only parts of the Panhard gear dispensed with are the chains and sprockets, and this only at the expense of having a live axle. If the complications of this special form of change-speed gear are taken into consideration, there is really no saving whatever.

Lightness.—There is nothing to pick between this system and the Panhard on the score of lightness; in fact, it is a question whether equal strength and power could be transmitted satisfactorily unless it were made heavier. The back axle is a source of great weakness, and must be made very rigid, and consequently bulky.

Durability.—It is somewhat misleading to compare a system unless one takes the best examples of that system, and in condemning the Renault change-speed gear on the score of durability, allowance should perhaps be made for a better arrangement of clutches and gears always in mesh. Instead of sliding the gears sideways into mesh, the Renault dash theirs in at right angles to the shaft centres. Both systems are bad, but separation of the pitch lines is only permissible in very extreme cases, and is about the worst thing one can do with a pair of gears. If the mechanism pushing the gears into mesh were not flexible, the teeth would very often meet on top of one another and smash something. It will be noticed that there is no flexible medium between the motor and the road wheels, and this fact must militate very seriously against its durability.

Taking these facts into consideration, it would be unreasonable to expect this special example of the system to be durable.

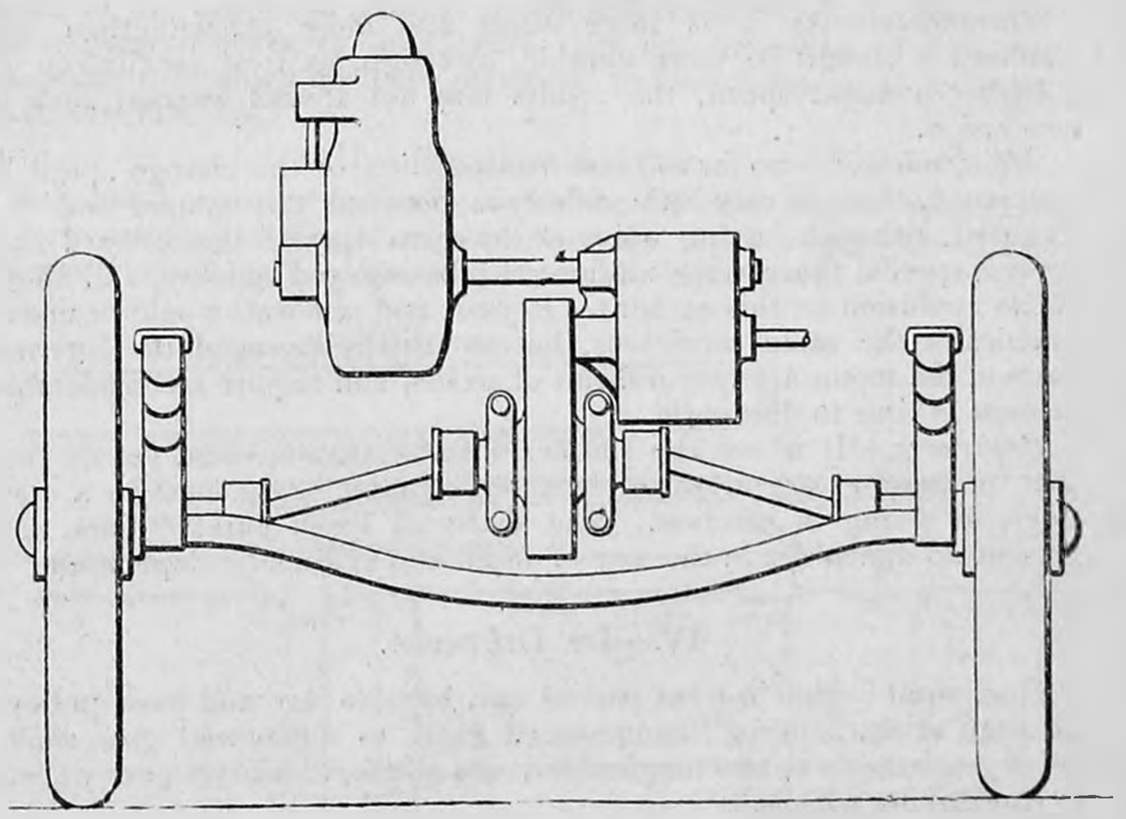
Manipulation.—As usually arranged, the changing of the speeds is not to be compared to the Benz, and is, if anything, more difficult than the Panhard; but in respect to repairs and cleaning, there is very little to choose between it and the latter.

Cheapness.—On small cars it may be slightly cheaper to make than the Panhard, but this is very questionable, because, although the rear axle and side chains are dispensed with, the live axle must be made at least three times as large and heavy as the cross shaft of a Panhard, and pneumatic tyres are almost a necessity. Nevertheless, this system seems to be gaining ground with several firms who make small cars in large quantities, and it is no doubt well arranged for cheap duplication.

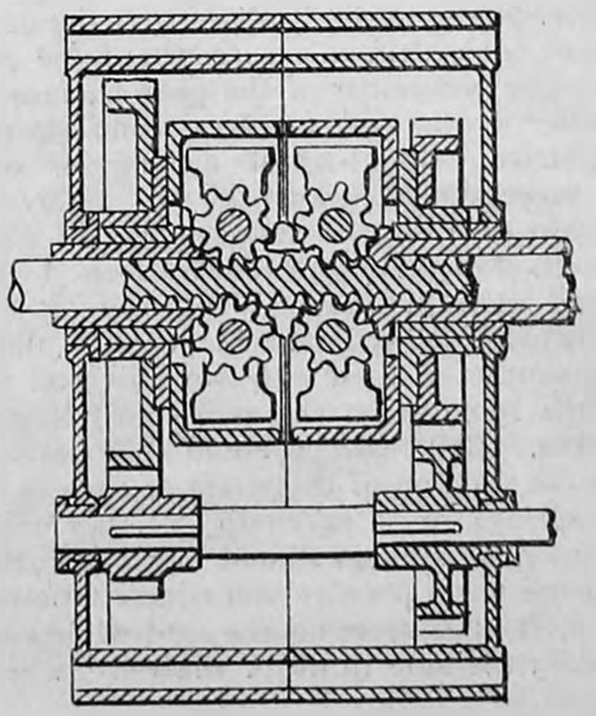
VI.—DE DION.

Vertical engine at back of car, connected to special two-speed gear operated by clutches, and two universal jointed shafts, one to each rear driving wheel.

Efficiency.—This system is about as direct as it is possible to make one, and yet allow the axle free play in relation to the motor and



De Dion System.



De Dion Two-Speed Gear.

speed-change gear; consequently, provided the various parts are well made and the shafts are fitted with ball bearings, it should be very efficient. As the engine speed is very high on this type of car, sliding change-speed gears would be rather troublesome, and the constant mesh with friction clutches is a good instance of where a certain amount of efficiency has been sacrificed in order to provide a more satisfactory speed-change gear. It is very questionable, however, if this system would be even a moderate success on cars with solid tyres owing to its rigidity. The shocks from irregularities in the road surface would be so great as to necessitate some flexible medium in the drive.

Adaptability.—As this system has only been employed for light voiturettes, the position of the engine is not so objectionable as it would be in large cars, in which case it would be even more awkward than the Benz or Peugeot, owing to the height required to clear the vertical motor. In other respects the central drive is cleaner and neater, and obviates the trouble of keeping the side chains properly adjusted.

Simplicity.—This gear is simple, but it must, of course, be remembered that there are only two speeds, and generally no reverse, although one is fitted if required. The clutches are very difficult to get at, but, if large enough for the power, should cause no trouble, as the pressure on them may be increased by pulling on the change-speed wheel.

The gear box is connected to the rear axle with pinion and wheel, thereby dispensing with bevel gear drives and chains, although the universal joints are retained, and the wheels are not so well supported by the axle as in some types. A good feature of this drive is the small amount of dead weight on the road wheels, thus wearing the tyres and straining the wheels less than a live back axle would.

Lightness.—It is difficult to see how this system could be made any lighter than the Renault, or, in fact, any of the cars previously mentioned, if an equal number of speed changes and equally powerful slow-running motor were used in each case. It is only used at present with a very high speed motor, and this is where the weight is saved.

Durability.—Owing to the motor, as usually made, running at a very high speed, and the efficiency being lowered by keeping the gears always in mesh, it is only reasonable to expect considerable wear, especially as the bearings on which the change-speed gears are supported are very short when the wheels are running light.

Universal joints, when running at a high speed and transmitting much power, wear out rapidly unless made very large and heavy, because the surfaces in contact must of necessity be small, and in the system under consideration there is no flexible medium between the motor and load wheels, so that any moving part not well supported will wear more rapidly than would otherwise be the case.

Manipulation.—Having only two speeds, and these operated by friction clutches, the engagement of one or the other becomes a very simple matter, but the form of clutch is not so suitable for quick disengagement as the leather-lined cone clutch for heavy work, and if this gear were arranged with, say, four forward speeds and reverse, it would be more complicated and difficult to manipulate, especially with wheel steering.

Owing to the rigidity of the whole of the mechanism repairs are more apt to be a serious matter than with a system like the Benz, where one might expect a certain amount of warning before a part gave way altogether.

Cheapness.—Size for size, and with the same speed changes and motor speed, this system would cost quite as much as the Panhard, and perhaps considerably more. On small cars, and with a limited number of changes, a high-speed motor, and cycle type road wheels, it is very suitable for manufacture by cycle makers, and consequently may be produced cheaper than those systems which require more individual care and attention.

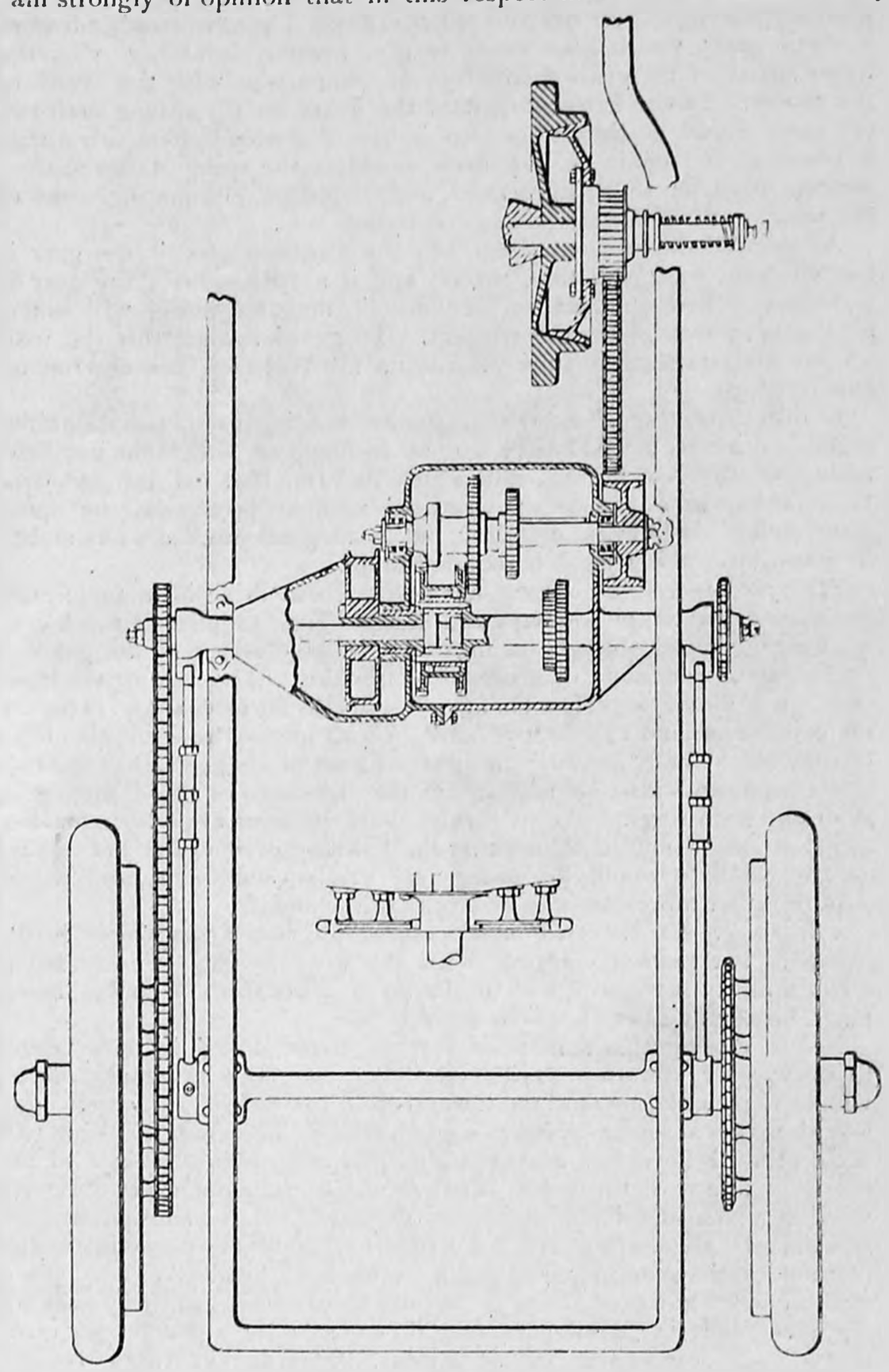
VII.—WOLSELEY.

A.—Horizontal engine in the front of car, belt with tightening device, sliding change-speed gear engaging direct into differential gear shaft, and chains to both rear driving wheels.

B.—Horizontal engine in front of car, friction clutch to engine, chain to change-speed gears engaging direct into differential gear shaft, and chains to both rear driving wheels.

Efficiency.—To speak of Wolseley products is rather a delicate subject, and I would prefer that someone else criticised this system. Having designed it I am perhaps inclined to favour it, though it may be as well to state here that if I knew of a better one I would be only too ready to make use of it, because a thoroughly satisfactory system, to the best of my belief, does not at present exist. In arranging all the shafts parallel with each other, and connected by chains, or chains and belts, the object sought for was to obtain the greatest amount of efficiency combined with flexibility. Realising that it would be next to impossible to construct a framework sufficiently rigid to keep the shafts in line, it was decided to provide enough elasticity in the connecting mechanism to allow the frame to bend and twist without affecting the alignment of the bearings on each part. Therefore the motor case was made strong enough to carry its various parts rigidly in line, and the gear box likewise, the fixing to the framework in each case being such that considerable movement might take place without straining anything. In one case an endless leather belt is used, and in the other a chain. Both methods, so far as this connecting part is concerned, have proved very satisfactory, though the former would hardly be suitable for large or powerful cars. The belt drive is not so efficient on a long and trying hill as the chain, but on short switchback slopes the "life" and "go" of the belt arrangement are very noticeable.

To give greater efficiency, ball bearings are fitted throughout, and I am strongly of opinion that in this respect motor cars will eventually



Wolseley System.

follow cycles. The latter received special attention, no doubt, because the rider had to supply the necessary motive power, and he was earlier convinced of the great gain in using ball bearings. It is only a question of time when the owner of a motor car will realise that efficiency means less expense and more comfort, even if he does not have to push the car himself.

Adaptability.—Both patterns are on about the same footing as the Panhard in this respect, the various parts being in similar positions, and therefore the remarks on the Panhard gear apply equally well to the Wolseley.

Simplicity.—On this score they stand about midway between the Panhard and Benz, or on equal terms with the Peugeot, the bevel wheel drive, divided cross shaft, and separate reverse gear of the Panhard being dispensed with, but the speed-change gear and clutch mechanism retained.

I personally do not at present see how three or four speeds forward and a reverse, together with the same flexibility, can be obtained in any simpler manner.

Lightness.—Owing to the whole gear being so flexible, the frame can be made light, and requires no second framework to carry the engine and gear box. With the belt drive the gears and box can be made considerably lighter than with the chain, because the belt is more elastic, and absorbs the impulses of the motor better.

Durability.—In both modifications the Panhard system of speed changing is employed, with the advantage in the case of the belt that a set of gears would outlast 10 sets on a Panhard, on account of the absence of all jar in moving the gears into mesh.

As showing the saving effected by using the belt, I have taken out the gear on the car No. 40, which ran in the 1,000-Mile Trial last year. This gear (which I have brought here for inspection) has been in constant use for two years, and has driven the car, weighing 13 cwt. without passengers, for nearly 13,000 miles. There is another feature in both cases which also tends to give greater durability, viz., the lesser speed of the gears themselves in comparison with the speed of the motor. In the Panhard system the gears on the sliding shaft run the same speed as the motor, but in the Wolseley system advantage is taken of the chain or belt drive to reduce the speed of this shaft—making it easier to change speed, and, therefore, eliminating some of the wear on the gear teeth due to changing.

As pointed out in connection with the Panhard gear, if the gear is not efficient, wear will take place; and if a part only of the gear is inefficient, then the portion between it and the motor will suffer, although in itself it may be efficient. To guard against this the road wheels and transmission gear shafts on all Wolseley cars are run on ball bearings.

In order that there may be no misunderstanding as to the durability of the belt in this drive, I have here an endless belt which has just been taken off the No. 40 car, and which has run that car for just over 12 months, in all kinds of weather, without protection, for quite 8,000 miles. It is worn, certainly, but it is a good proof as to its ability to stand up to the work it is required to do.

Manipulation.—The arrangement with chain drive is on practically the same terms as the Panhard and Peugeot, and requires as much care in changing speed, though owing to the reduced speed of the gears, a slight gain is obtained under certain conditions. The belt drive, however, gives almost a perfect change of speed so far as ease and certainty are concerned, and can be operated by the merest novice without jar or difficulty, chiefly because the gear cannot be changed until the belt is released, and also on account of the lightness of the sliding gear shaft and its fittings. As to repairs, both patterns are a little handier to get at and dismantle than either the Panhard or Peugeot, but repairs on the wayside would be under very similar conditions, and would require rather more care and ability than the Benz.

Cheapness.—Of the two modifications, the belt arrangement is the cheaper, but neither compare with the Benz in this respect, being about midway between it and the Panhard, allowance, of course, being made for the number of speeds in each case.

Before closing this somewhat lengthy paper I feel in duty bound to draw your attention to the merits of the Hall Hydraulic Gear, which, if it were not for its lower efficiency, weight, and high cost, would make an ideal system, especially for heavy cars. You will notice that I have not attempted to give any definite values to the efficiency in any of the gears, because, unless each and every one were working under identically the same conditions, the conclusions arrived at would be misleading, and consequently it is difficult to compare any of them on the score of efficiency with the Hall gear. Without going into figures, however, it may be safely assumed, for the sake of argument, that the Hall gear has an efficiency of about 80 per cent. (result of an exhaustive test at Messrs. Vickers, Sons, and Maxim's works, Sheffield), and the portion of the transmission on, say, a Wolseley car, which it would displace, viz., the change-speed gear, about 97 per cent. Judged only from this standpoint, it would have no chance whatever, but as it has a gradual increase or decrease of speed, the ratio of gearing may be made to suit the gradient it is wished to climb, and for this reason it should be credited with a certain amount of extra efficiency over a step-by-step gear. How much it is almost impossible to say. I have heard 10 per cent. mentioned, but I look upon this as only a guess in the dark.

As regards adaptability, simplicity, lightness, and cheapness, it is somewhat behind the others, but it should be very durable owing to its working immersed in oil under pressure, and it is even easier to operate than the belt on a Benz car.

The starting of a car with this gear on is very gradual, without noise or jar of any kind, and this is quite a necessity on large and heavy vehicles. I have not mentioned the gearing employed on steam and electric cars, because I found my remarks were already getting out of bounds, but I think it will be readily seen that many parts are analogous to one or other of the systems, and the same observations would, of course, apply in either case.

SELF-PROPELLED LURRY FOR MILITARY PURPOSES.

WITH a view to obtaining the best self-propelled lurry for military purposes, the Secretary of State for War offers three prizes:—

A first prize of £500,
A scond prize of £250, and
A third prize of £100,

for the three self-propelled lurries which shall be adjudged, after a series of trials carried out by the War Office Committee on Mechanical Transport, to be best suited to military requirements.

2. The trials will commence on Wednesday, December 4th, 1901, and will extend over a considerable period, so that the vehicles may be thoroughly tested.

The exact nature of the trials will be determined upon by the above committee. A general scheme will be drawn up and issued as soon as possible to all intending competitors, but the committee reserve to themselves full powers to carry out any additional tests they may deem necessary, whether included in the general programme or not. The committee reserve to themselves the power of rejecting any vehicle which does not comply with the requirements published herewith, or of suspending, at any stage, the trials of any vehicle which in their opinion has proved itself unsuitable.

3. The decision of the committee as to the comparative merits of competing vehicles will be final.

4. Firms or individuals who intend to enter for this competition must send in their names to the Secretary, Mechanical Transport Committee, War Office, Horse Guards, Whitehall, on or before September 1st, 1901.

5. No vehicle will be admitted to the trials unless a fully-dimensioned set of drawings and a specification, giving complete details of the lurry and trailer exactly as submitted for trial, together with a statement of the purchase price of the lurry and trailer, have been lodged with the Secretary, Mechanical Transport Committee, before December 4th, 1901, the date of the commencement of the trials.

6. A firm or individual may enter more than one lurry, but the conditions of paras. 4 and 5 must be complied with for each separate lurry entered.

7. His Majesty's Government to have the right of purchasing after the trials any or all of the competing vehicles at the price stated by the competitor under para. 5.

8. All designs and specifications lodged under para. 5 will be considered confidential. Those of the vehicles that may be purchased will be retained for the purposes of the Government, but without prejudice to patent rights. Those of vehicles not purchased will be returned to the competitors after the trials.

Note.—Certain firms have already been asked to send in designs for a lurry for the consideration of the committee, and some have already communicated with the committee. It has, however, now been decided to institute an open competition.

STATEMENT OF REQUIREMENTS OF SELF-PROPELLED LURRY FOR MILITARY PURPOSES.

1. The lurry to be capable of being used on rough roads, and to a limited extent across country. To be able to go wherever a country cart can go, and to be capable of being driven through an opening 7 feet 6 inches wide.

2. Nett load to be 5 tons, of which 3 tons must be carried on the lurry itself and 2 tons on a trailer; these weights are exclusive of fuel and water, all of which must be carried on the lurry.

3. Total platform area not to be less than 15 square feet for each ton of nett load.

4. The lurry platform and that of trailer to be fitted with removable sides and ends about 2 feet high.

5. The top of the lurry platform, when the lurry is ready for loading, not to be more than 4 feet 3 inches from the ground level, and that of the trailer not more than 4 feet.

6. The lurry, carrying its full nett load of 3 tons, and drawing a trailer loaded with 2 tons, to be capable—

(1) Of a speed of eight miles per hour on fairly level roads in fair condition.
(2) Of a mean speed of at least five miles per hour on average roads, up and down hill.
(3) Of taking its full load without assistance on an average road, up a slope of 1 in 8.

7. The weights should be so distributed that the lurry should always be under control on slopes up to 1 in 8, whether loaded or empty.

8. Proper arrangements to be made that no part of the machinery be liable to damage from mud or dust.

9. Any casings used must be easily removable.

10. In order to avoid damage to the lower portions of the machinery from touching the ground when going over rough country, or in the event of the wheels sinking into soft ground all such portions must be strongly protected, and, except in the case of the driving gear, must not be less than 18 inches from the ground; the driving gear should be kept as high as possible.

11. The lurry to be capable of efficient control, and steering at all speeds, and of reversing at low speeds, and of being worked and controlled by one man.

12. The lurry to be able to run for 48 hours without overhaul or cleaning.

13. The driving wheels not to be less than 4 feet 6 inches in diameter, nor less than 9 inches wide across the tyres, which may be fitted with plain diagonal road strips.

14. No restriction is placed on nature of fuel or class of engine, steam, internal combustion, or otherwise, except that oils under 75° Fahr. flash point (Abel's close test) must not be employed. In the case of steam-engines, an alternative arrangement for burning solid or oil fuel is desirable.

15. In the case of steam-engines, the construction of the boiler must be such as will comply with the requirements of the Manchester Steam Users' Association.

16. No limit is placed on tare weight, but the total weight will be taken into consideration as stated in para. (*c*) below.

Note.—In considering the merits of the competing vehicles, special importance will be paid to the following points:—

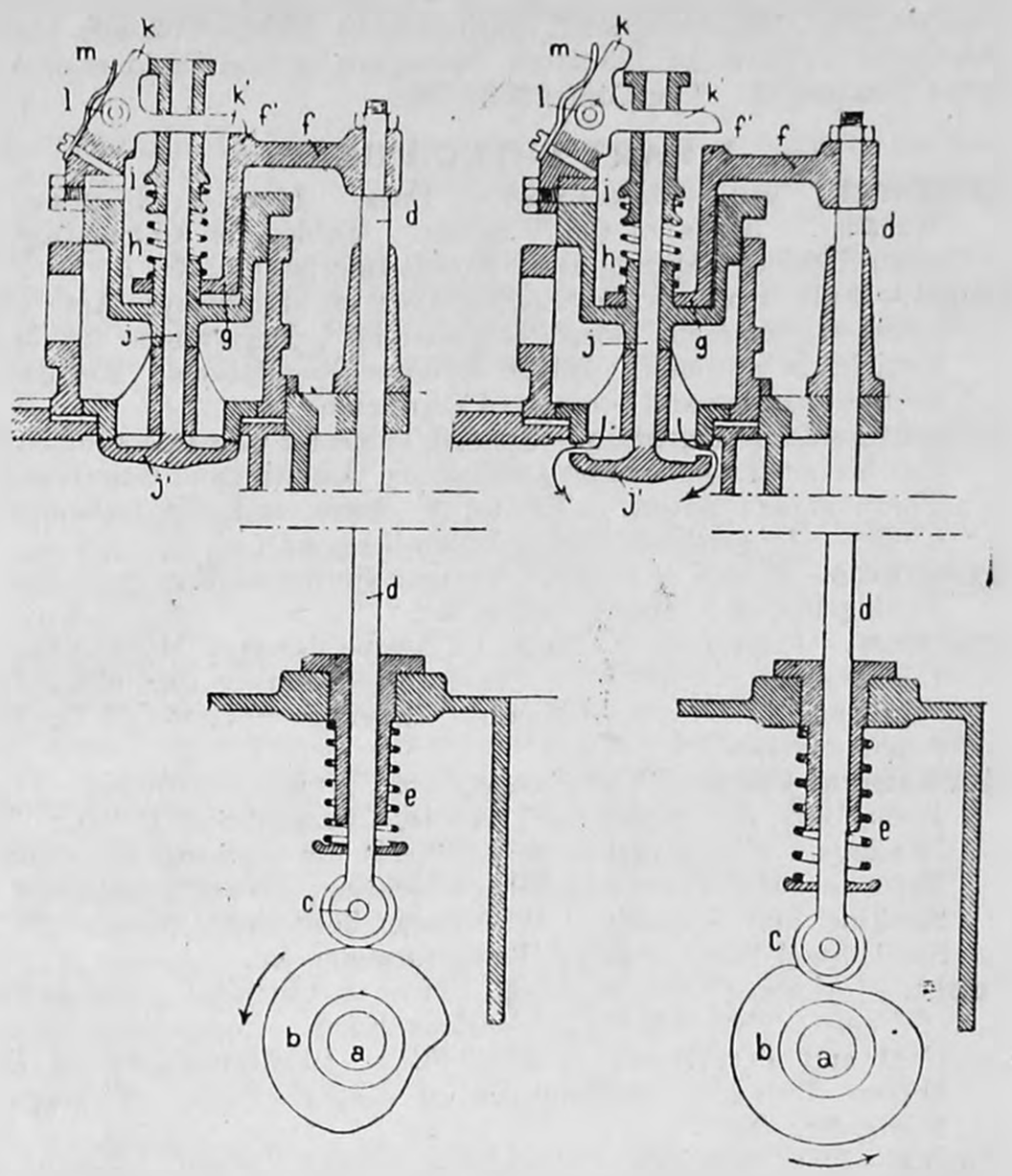
(*a*) Prime cost having due regard to efficiency.
(*b*) Distance that can be travelled by the vehicles when fully loaded with 5 tons, with the fuel and water carried on the lurry. (Great importance will be given to this point.)
(*c*) Economy in weight.
(*d*) Durability.
(*e*) Accessibility of all parts.
(*f*) Simplicity of design.
(*g*) Ease of manipulation.
(*h*) Absence of noise, vibration, and smoke.

PEUGEOT'S ADMISSION VALVE.

IN order to obtain the maximum power from an internal combustion engine, when it runs at a high rate of speed, it is necessary in those motors now in use to make the spring which closes the admission valve of such a strength that it both allows the valve to open readily, and that it can close the valve quickly at the end of the suction stroke of the piston. Although it is evident that a full charge can never be drawn into the working cylinder, and that the volume which is drawn in becomes less as the speed of the motor increases, yet manufacturers do not seem to have hitherto found the additional mechanism of a positively operated valve to be warranted in practice. This is a point which may not have received the attention which it deserves, but the fact remains that all the high-speed motors now on the market are provided with atmospherically-operated inlet valves. There are many reasons why a positive valve would (apart from mechanical complication or difficulties of design) allow of greater output and of greater reliability from a given engine, but there are also several reasons why a prejudice—resulting largely from an incomplete understanding of the oil-engine problem—should not unnaturally have arisen against them.

Without going into this question at any great length—and much would have to be said if it were dealt with at all thoroughly—we may point out, on the one hand, that, with a positive inlet valve, a greater volume of explosive mixture would at the higher speeds be drawn into the cylinder than at present, in consequence of the early and wide opening of the valve, and in consequence, too, of the sudden closing which would be effected by a stronger spring; but that, on the other hand, a considerable amount of the mixing action of the present partially-open valve would be lost, and that the force of each explosion would not tend to increase as much as it now does, when and if the speed of the motor is being decreased by overload. These last points may in reality be otherwise expressed by stating that carburettors are or have been none too perfect, and that the regularity of working of high-speed motors has in the past been imperfect. It remains to be seen whether, with the progress which has been made in these directions, the atmospheric valve will still hold its own against those positively actuated.

The Peugeot inlet valve, of which we give a drawing both in its open and its closed positions, is not, strictly speaking, positively operated although the result obtained by the device is the same and it is difficult to see how it is superior to a more simple and purely positive valve. In the left hand sectional view the valve, *f'*, is held against its seat by the spring, *h*, which is compressed to a greater extent than usual by the piece, *d*, owing to the raised position of the cam-operated rod, *d*. This rod, *d*, carries the piece, *g*, on an arm, *f*, and it is provided at its lower end with the roller, *c*, which is pressed against a cam, *b*, on the half-speed shaft, *a*, by the spring, *e*. The end of the valve rod, *j*,



is fitted with a sleeve, *i*, which is shaped in such a way that it receives the spring, *h*, at its lower end and that it engages with a pivoted bell crank, *k*, at its upper extremity. The one arm of the piece, *k*, tends to hold the valve open, when it has been opened, and it is held in this position by a flat spring, *m*. The arm, *k'*, is so shaped that it is lifted from its lower position by a projection, *f'*, of the arm, *f*, when the cam raises the rod, *d*. The cam is so arranged that it allows the rod, *d*, to drop just before the beginning of the suction stroke, and it thus causes the spring, *h*, to exert a reduced pressure on the valve rod, *j*. The valve then opens atmospherically, and the catch-piece, *k*, rocking about the pin, *l*, holds it in this position. During the remainder of the suction stroke the cam gradually raises the rod, *d*, and after compressing the spring, *h*, it releases the valve rod, *j*, and allows the valve to be closed suddenly.

Mo-Car Syndicate (Limited).—We regret to record that on the 8th inst. the entire Glasgow premises of this Syndicate were completely destroyed by a fire which broke out at about 10.15 p.m. The premises consisted of a brick building, 90 feet square and two storeys high, with five shed roofs running east and west, and a lesser building, 60 feet by 40 feet. The former was used as a workshop and manufactory, and the latter as a pattern loft and offices. Both were involved in the destruction. The damage is estimated at some £10,000 to £12,000. The Chairman of the Syndicate is Sir William Arrol, M.P., and a great number of other well-known business and commercial men in the West of Scotland are associated in the Company with Sir William. Mr. George Johnston was the manager of the Company, and it was Mr. Johnston's patents which were being chiefly exploited and advanced to a commercial success by the Company.

NOTICES.

Contributions and articles likely to prove of interest to our readers will receive due attention, but in all cases the name and address of the writer must be given, not necessarily for publication.

All matter intended for publication should reach us not later than the 10th of each month, and be addressed to THE EDITOR OF "THE AUTOMOTOR AND HORSELESS VEHICLE JOURNAL," 62, *St. Martin's Lane, London, W.C. Stamped envelope must be sent if the manuscript is required to be returned. The Journal is published the middle of each month.*

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The Automotor and Horseless Vehicle Journal.

A RECORD AND REVIEW OF APPLIED AUTOMATIC LOCOMOTION.

MAY 16TH, 1901.

DIARY OF FORTHCOMING EVENTS.

Notices to be included under this heading should reach the Office not later than the 12th of each month.

The Automobile Club of Great Britain and Ireland

(With which is incorporated the Self-Propelled Traffic Association)

1901.		
May 25–29	...	Whitsuntide Tour to France, *re* Gordon-Bennett Cup.
May 25–27	...	Tour to Oxford and neighbourhood.
June 6, 7, 8	...	Three Days' Demonstration of Motor Vehicles before Delegates of County Councils, &c.
July 2 ...	...	Quarterly 100 Miles Trial (last day for entries, June 29).
July 6 ...	...	Open Hill-Climbing Trials (last day for entries, July 4).
July 17 ...	...	Annual Motor Cycle Race Meeting.
August 12–24	...	Tour in Ireland.
September 2–7	...	Trials at Glasgow Exhibition (last day for entries, August 24).
October 1	...	Quarterly 100 Miles Trial (last day for entries, September 28).
November 9	...	Anniversary Run (last day for entries, November 7).
November 14	...	Anniversary Banquet.

Special Club Days.—Wednesdays will be special Club days. It is hoped that members will endeavour to be at the Club for introduction and inter-communication on Wednesdays from 5 p.m. onwards.

The Liverpool Self-Propelled Traffic Association.

(Being the Local Centre of the Automobile Club of Great Britain and Ireland).

1901.		
June 3 ...	...	Third Trials Dinner.
June 3–7	...	Heavy Trials. (For particulars of Competition, *see* THE AUTOMOTOR JOURNAL for June, 1900, p. 485.)
June 3 ...	...	Hill-Climbing and Manœuvring Trials.
June 4 ...	...	Distance Trial—Liverpool to Manchester, *viâ* Widnes, Warrington, and Eccles.
June 5 ...	...	Distance Trial—Manchester to Liverpool, *viâ* Bolton, Hindley, St. Helens, and Prescot.
June 6 ...	...	Distance Trial—Liverpool to Blackburn, *viâ* Knowsley, Rookery, Billinge, Wigan, and Chorley.
June 7 ...	...	Distance Trial—Blackburn to Liverpool, *viâ* Samlesbury, Preston, and Ormskirk.

General Events.

1901.		
May to November		Glasgow International Exhibition, including Automobile Section.
December 4	...	War Office Lurry Trials.

Foreign Events (Trials, Races, &c.).

(All French road racing fixtures are subject to confirmation by the French authorities.)

1901.		
May 15–20	...	Tourist Race (U.A.F.).
May 23 to June 6		Vienna Automobile Exhibition (Oest. A. Club).
May 29 ...	...	Gordon-Bennett Cup—Paris-Bordeaux.
May 29 ...	...	Paris–Bordeaux (A.C. de France).
1901.		
June ...	...	Cab and Light Delivery Van Trials (U.A.F.).
June 1 ...	...	Paris Accumulator Trials (A.C. de France).
June 12 ...	...	Light Car Challenge Cup (groups of three cars) (*l'Auto Velo*).
June 24–27, &c.		Paris–Berlin, 775 miles (A.C. de France).
July ...	...	Tour de Belgique, eight days.
September	...	Criterium de l'Alcool (U.A.F.), Paris–Lille.
October...	...	Heavy Vehicle Trials (Poids Lourds) (A.C. de France).
October 14	...	Alcohol Motor Competition (U.A.F.).
1901 ...	...	Tour de France (A.C. de France).

ANSWERS TO CORRESPONDENTS.

C. L. (Bournemouth).—We are sorry that you are missing the key-number to the lot. Under the circumstances we are not prepared to make a bid.

E. H. M. (Plymouth).—You are right in your surmise as to the gearing. If you use this material we should be much obliged if you would let us have your experiences with it, as we are interested in knowing its practical capabilities.

A. M. H. (Redcar).—We have sent the two numbers which you require, and may mention that there is a later description of the system on p. 57 of Vol. V (November, 1900).

T. M. (Southampton).—The designs you suggest would hardly be suitable at present for our columns. They would be more in keeping with the *Carriage Builders' Journal*, 16, Eldon Street, E.C.

M. K. (Leeds).—We do not believe in the system. It has been tried times out of number, and always failed.

J. F. (Hamilton).—You are not the only person seeking the gentleman. At present he is busy in America. You will notice the announcement of his bankruptcy in last month's issue.

J. T. C. (Brighton).—(*a*) Electrical Undertakings. (*b*) The Joel is a totally different system, full particulars of which appeared in a recent issue of our journal.

O. A. (Clapham).—(*a*) An appeal has been entered, therefore it is impossible to discuss it, but we had occasion to give our opinion before the case, which entirely coincides with the decision of the magistrate. (*b*) The list is embodied in the "Automobilists' Guide."

E. L. (Cambridgeshire).—(1) We have sent you three back numbers containing that for which you ask. The difficulty of the problem is considerable, and has not been satisfactorily solved in any vehicles yet placed on the market. The reply quoted by you gives the reason for this. (2) Although others are promised, the only steam light vehicle on the market which burns paraffin as distinguished from petrol is the Gardner-Serpollet. Steps are being taken to adapt the Clarkson burner to those of the Locomobile type. (3) Messrs. Roots and Venables make the only known English vehicle, which is driven by an oil-engine burning paraffin.

J. R. (Cardiff).—These dimensions depend entirely upon the speed at which you wish to work. You will find formulæ for making the necessary calculations in THE AUTOMOTOR POCKET-BOOK.

TEUF-TEUF.—There is no doubt that a second box would make a considerable difference. It need not add to the back pressure if it is properly proportioned to its work. Want of space is generally the sole reason for their size.

F. J. (Paris).—(1) We should be glad to receive full particulars. Many previous attempts to make a variable gear on this principle have been made and have generally ended in failure. The crushing strain on some of the parts is enormous. (2) Yes, we saw it over there last week.

****In consequence of the space occupied by the Automobile Club Exhibition it has been necessary to hold over a number of important articles, including the continuation of "The Automobile in America," "On the Influence of the Diameter of the Wheels on the Power Required for Propelling Automotors," "Compensating Gear for Motor Vehicles—Its History and Development," &c.*

THE "ELECTRICAL ENGINEER" AND THE "NATIONAL" ACCUMULATOR.

As a general rule, perhaps, a wise man does not reply to criticism. The late Professor Jowett once said that the way to get on in life was "never to retract anything, never to apologise, and never to reply to criticism." In general we attempt to live up to the last part of this counsel of perfection, but occasions arise at rare intervals when it becomes advisable, if not necessary, to depart from it. Such an occasion, we venture to think, is presented by an article which appeared in the *Electrical Engineer* for April 19th last. It was headed "Accumulator Trials," a title which is calculated to attract. If the title of the article had corresponded to its contents, it would have run :—"Tests of the 'National' Accumulator as carried out by the staff of THE AUTOMOTOR JOURNAL, and how little we think of them." The learned writer of the article commences with a paragraph stating that the testing of accumulators is not such a simple matter as it appears to be to those unaccustomed to the work, and goes on to give *in extenso* the article in which we summed up the results of our tests. The inference is obvious, especially when we consider that the writer specially states he selects these tests from THE AUTOMOTOR JOURNAL "with a view of illustrating the way accumulator trials should not be made" (*sic*).

Says the writer of the article : "The first thing which strikes one in looking through the above account of experiments carried out by the staff of THE AUTOMOTOR JOURNAL is that a special attempt was made to obtain a large discharge in ampère-hours from a given cell. In order to do this it will be seen that the cell was always charged up more than once." Well, that was precisely what we wanted to do. We do not know whether the *Electrical Engineer* has followed the application of accumulators to electric traction sufficiently to be aware of what, at the date on which we went into the question of the results yielded by the "National" or Rosenthal accumulator, was the highest amount of energy per pound of cell that had been obtained. In this country, at any rate, the highest watt output per pound of cell is approximately 10 watt-hours per pound under any circumstances. This has been obtained by the Crowdus accumulator. But the Crowdus accumulator would not stand on open circuit sufficiently satisfactorily for commercial purposes, and its life was so phenomenally short that it was commercially useless. Now we know that the "National" accumulator, as proved over and over again by the performance of the Joel car, had *reasonable* life. Exactly what its life is we do not know yet. At any rate, we know that the cell tested was one of the 32 cells which had run a car at least 500 miles, that since February last the tests described in the March number of THE AUTOMOTOR JOURNAL were made, that since those tests were made the cell has been frequently charged and discharged, and that at the present moment it is, as far as can be seen, as good as ever ; so that, as far as the life goes, one can only judge by indications. What we wanted to ascertain, and what is of importance from the automobile point of view, is what number of watt-hours per pound could be got out of the cell under the most favourable circumstances. If the life of an accumulator is reasonable—and we know in this case that it is so—this question of output is practically the only point that matters to the automobile engineer. What has efficiency to do with the question? Does anybody for a moment suppose that with two accumulators, one giving, say, 5 watt-hours per pound and an efficiency of 80 per cent., and the other 10 watt-hours a pound and an efficiency, say, as low as even 50 per cent., that the automobilist would not infinitely prefer the latter? Under almost all circumstances the cost of the energy is comparatively trifling. It is the weight of the battery, and the distance that a car can be run with it, which is of real importance. That the *Electrical Engineer*, or its staff, does not realise this fact is a proof, if any were needed, besides the general lines on which the article is constructed, that the *Electrical Engineer* is hopelessly out of touch with the conditions governing the problem of the application of electrical power to the propulsion of vehicles. Of course, the novice has usually studied accumulators only from the point of view of the station battery, if even that. In the station battery efficiency is of prime importance—the question of weight of practically none whatever. But this is not so when you mount an accumulator on a car and it has to pull itself along. In addition, the *Electrical Engineer* hazards the assertion that the conditions of charging, viz., intermittently, are not such as would occur in actual practice. As a matter of fact, however, such intermittent charging of electromobiles is the rule rather than the exception, and even if it were not so, it would be well worth accommodating a cell of high $\frac{\text{capacity}}{\text{weight}}$ in this comparatively unimportant respect.

Another point at which the homely aspect of the novice peeps out under the lion's skin of the reviewer is in the assumption that in making our tests the number 2 was employed to multiply the ampère-hours by in order to obtain the watt-hours. That is a mistake which the novice usually makes, and which the novice is therefore most inclined to attribute to others, but in our tests the number was in the case of every discharge obtained by a careful averaging up of the voltage readings taken at every half hour of each discharge. The writer in the *Electrical Engineer* is astonished that this comes out in some cases slightly higher than 2, and that fact ought, perhaps, to have given him pause, for if we had fallen into the novice's error of multiplying merely by 2, we should not have employed a multiple slightly higher than 2. The writer in the *Electrical Engineer*, it is true, employs in this connection the word "factor," but we submit, with all respect, that the use of the term "factor" is incorrect, and displays a want of familiarity with the conventions of elementary mathematics, some slight acquaintance with which we have been accustomed to regard as essential for the training of a physical experimentalist. Because the *Electrical Engineer* writer is unable to understand how the average voltage would come out above 1·9, he throws doubt on our volt-meter. He may be interested to hear, therefore, that the instrument in question was a Weston standard volt-meter reading accurately to a hundredth of a volt, and had just been recalibrated.

The question of the voltage of an accumulator is a very interesting one. Whether an average of 2 volts or a little more can or cannot be obtained throughout the discharge depends on the structure of the positive plate. A number of accumulators like the E.P.S. and plenty of others have a lug of practically inactive lead at the top, and a quantity of inactive lead between the peroxide throughout the plate. This lead becomes *superficially* covered by a thin coating of peroxide, but on discharge this is soon reduced, and the metallic lead of the positive plate becomes in consequence a polarisable and gradually polarised surface. As soon as polarisation commences on any portion of the positive plate it means a drop of voltage. This drop will take place sooner or later according to the amount of polarisable surface which an accumulator presents. Every lead accumulator after charging reads approximately 2·2 volts. With the E.P.S. type of accumulator this voltage sinks rapidly when the battery is discharged to something under 2 volts, because the thin coating of peroxide on the metallic lead exposed rapidly becomes exhausted. Now with the "National" accumulator there is no metallic lead exposed on the surface of the positive plate at all. There is consequently no polarisable surface, and we do not as a result get the sudden drop which with accumulators of the E.P.S. type is always noticeable after the commencement of a discharge. If the *Electrical Engineer* had taken the trouble to *observe* the discharge curves we gave on p. 270 of the March number of THE AUTOMOTOR JOURNAL, it would have seen two things :—Firstly, that these curves differ from the curve obtained on discharging an E.P.S. accumulator by *not* showing the same sudden drop after the start ; and secondly, as a consequence they show that about 50 per cent. of the work is done above 2 volts. This type of discharge curve is not peculiar to the "National" accumulator. It is the characteristic of every well-made accumulator in which there is no polarisable surface on the positive electrode, and before the writer in the *Electrical Engineer* undertook to criticise our results, this is one of the elementary facts connected with the problem, with which he ought to have made himself acquainted.

We have, we think, said sufficient to enable an opinion to be formed as to how far the *Electrical Engineer* is sufficiently versed in accumulator theory and practice as to entitle it to sit in judgment upon the careful experimental results obtained by other people who are anxious to do justice to a new and apparently valuable battery. But the attitude of the paper in question is one which we cannot altogether refrain from using as a text for a few somewhat more general remarks. It is characteristic both of the attitude of the technical Press generally in this country towards what is new, and particularly of the electro-technical Press towards anything connected with the problem of automobilism. That department of automobilism which is concerned with the application of electricity to the propulsion of automotors is both interesting and important. It is one in which we should have looked for guidance and assistance to the electrical Press. But, as a matter of fact, what do we find? They have given in general not as little attention to it as they decently could, but less. Where do we find in the English electrical Press any adequate space bestowed upon the various aspects of this problem which ought to have been equally theirs as ours? To what extent have they dealt with the problems

of motor design for light vehicles, with the question of controllers and battery connections, with the questions of balance and design of parts? The article to which we have replied above is an example of the only too general attitude of the electrical Press when dealing with the subject of new accumulators for traction purposes, with the question of the application of electricity to automobilism generally, and with those who are attempting to solve or assist in the solution of these problems.

PATENT LAW FOR INVENTORS.

THERE are few things of greater interest to persons of mechanical and constructive ability—in particular the class of people which we flatter ourselves form the majority of readers of THE AUTOMOTOR JOURNAL—than the question of how a person of initiative and inventive capacity can ensure a pecuniary return from the exercise of his particular talent. To deal satisfacto ily with this problem is practically to write a treatise on Patent Law. There are plenty of bulky tomes bearing such a title, and they are rather calculated to repel the uninitiated. Like many subjects, however, that appear forbidding at the first glance, this is one which is not devoid of attraction when its outer aspects have become familiar. Still few people would readily succeed in extracting from the existing treatises the information of which they stand in need, and they more usually betake themselves to one of the numerous patent agents whose places of business line the approaches to the Patent Office. This is generally rather an expensive process—usually beyond the means of that hero of romance the poor inventor; and its results are not universally satisfactory. We propose in the present series of articles to make an attempt to give the inventor who does not feel disposed to consult a reliable patent agent or, what is much better, a patent barrister in good practice, the kind of information he is likely to require. It is far from our intention to attempt to replace the treatises above referred to, which are primarily, if not exclusively, books of reference, but merely to give the reader who is in possession of an idea, which he thinks of value, as succinctly as possible the information he is likely to need in order to form an opinion as to whether it is worth protecting by patent, and, if so, how he should proceed to obtain and be able to support his rights, both in this and other countries.

Almost the first question that occurs to a person who supposes himself to have invented something is, Is it patentable? And this means not, at any rate in the United Kingdom, can he obtain a patent for it, as patents are here hardly ever refused, but whether, having obtained a patent, he is likely to be able to support it in a Court of law? The first rough test he may apply is that of ingenuity. An invention at the present day to be supportable must be ingenious. It is perhaps a pity that this should be so, and there is reason to believe that this was not always the case, but now it is the law. The House of Lords has made it so. Consequently, the first thing the inventor has to do is to decide for himself the question of the ingenuity of his invention. On this point perhaps he is not altogether always the best or most unprejudiced judge. A cynical critic once said to a poet, that when he had written anything, the best way to form a judgment of it was to try and imagine what he would think of it if it had been written by So-and-so. If he then still considered it good, he need not consign it to the waste-paper basket. Similarly an inventor would perhaps do well, in attempting to judge his own invention, to consider for a moment what he would think about it if it was put before him as the product of somebody else's genius. If it stands this test he may proceed to consider it further. This further consideration, however, is not an easy matter. It in reality consists of attempting to form an opinion as to what a judge in Chancery is likely to hold upon the point. It is the proud boast of the English legal profession that English judges are always swayed in forming their decisions by precedent, while foreign judges pay little regard to this fetish, and form their judgments as they feel inclined. This, however, approaches very closely what is known as a legal fiction, for nothing emerges more clearly from the consideration of the decisions that have been given in patent cases than that what a judge would look upon as constituting ingenuity in an invention is an unknown and apparently unknowable quantity.

This element of ingenuity, which is now a *sine quâ non* for a patent to be maintainable in the Courts, has been gradually introduced by the judges, one cannot help thinking, in deference to the pressure of counsel for the defence in patent actions, for patent law is based upon the Statute of Monopolies, and of ingenuity in the Statute of Monopolies there is no mention. The statute is careful to define an invention as "a new manufacture within this realm, which other people shall not use," that is to say, a manufacture shall not at the moment of its introduction be in use. Now this is novelty, and nothing else. The law also gives patents to importers. If a traveller sees an invention in operation in a foreign country, he may come home and apply for a patent for it, and if it has not been previously described or published in this country, his patent will be quite good if the invention is good. Again here there is no question of ingenuity. He is given a patent for introducing something that is new, and presumably useful, and for that alone.

However this may be, at the present day, that is to say, practically since the passing of the new Patent Law of 1883, ingenuity is an essential. There seems to be no authenticated case of a patent being upset prior to that date for want of ingenuity only, apart from want of novelty, though patents were upset for something very closely akin to want of ingenuity, viz., on the ground of what was known as "analogous user." It was Lord Abinger who gave perhaps the most famous announcement of the law on the question of analogous user, when he said that someone who had discovered that you can eat peas with a spoon would not be able to support a patent for using a spoon to eat soup. But this was really not the want-of-ingenuity argument. Patents upset on the ground of analogous user were really upset because there was no new manufacture. When you find out that a thing that already exists may be used for a purpose to which it was not previously applied, there was no new manufacture established in the sense of the Statute of Monopolies, unless it required to be adapted to that use, and that adaptation might constitute a new manufacture. When it did so, it usually required ingenuity to do it, and perhaps it was in this way that the notion that ingenuity must inhere in a patent to make it supportable, arose. However it arose does not after all much matter. It is the law now, and inventors must reckon with it. There is something to be said for it, and that is that the grant of a patent is essentially a bargain between the patentee and the State, and that unless he gives some consideration in the way of the exercise of ingenuity, anybody might have hit upon doing the same thing, and the consideration fails.

It is unfortunate from many points of view that this element of ingenuity, which a patent must now possess to be supportable, is such an undefined quantity, and that the decisions of the Courts have been in this respect so contradictory. Long ago a great invention revolutionised the iron trade by the introduction of hot blast. This was an invention, the patent for which claimed the heating of air in a vessel near the blast furnace, and the employment of air so heated for the blast. Not long after this patent was generally adopted another inventor took out a patent for using hot blast in a blast furnace in which the only difference was that the coke which had previously been employed as fuel was replaced by anthracite or smokeless coal. It will hardly be believed that such a patent was upheld, but it was, though what invention it presents is a mystery. That, however, was long ago (1830). It certainly would not be supported now. Quite recently a really very meritorious invention for cutting out tie slips, which was undoubtedly exceedingly useful, and which distinctly presented ingenuity, was upset by the House of Lords. They admitted it possessed some ingenuity, but not, they thought, enough to support a patent. Lord Shand, who, although concurring with the other judges, on this occasion waxed somewhat sarcastic, said he thought he saw what the other lords meant, that though the invention was ingenious it was not ingenious enough. On the other hand only a few years before that a patent was upheld by the same august tribunal for disinfecting clothes by the agency of superheated steam in apparatus which only differed from previously existing apparatus of the same kind by having the doors of the chambers in which the process was carried out made stronger and stouter than had previously been done. Their lordships upheld that patent. In the light of these cases it becomes scarcely an exaggeration to say that the view that is likely to be taken of the ingenuity of any particular invention, depends upon which way the wind blows. All that the inventor can do, therefore, is to satisfy himself or, what is perhaps better, an impartial friend who understands the subject, that his invention possesses some ingenuity, and is not merely a case of using existing appliances in a somewhat different way to what has been done before, and to trust to luck that it may be supported. Of one thing he may feel tolerably certain, that if it proves a commercial success, which is evidence that it supplies a real want, a more favourable view of its ingenuity is likely to be taken, or, what is much the same thing, a less amount of ingenuity will carry him through. One other point may also console him. There are usually between 25,000 and 30,000 patents completed annually. About 50 patents, sometimes more, but seldom 100, come into Court in a year. Of those, generally speaking, about half are supported, so that it is 10,000 to 1 against his particular patent being upset. It is good long odds.

In addition to the possession of ingenuity, which has generally become known by the legal cant-phrase of "subject matter," though that term was originally somewhat wider, requisites of the supportable

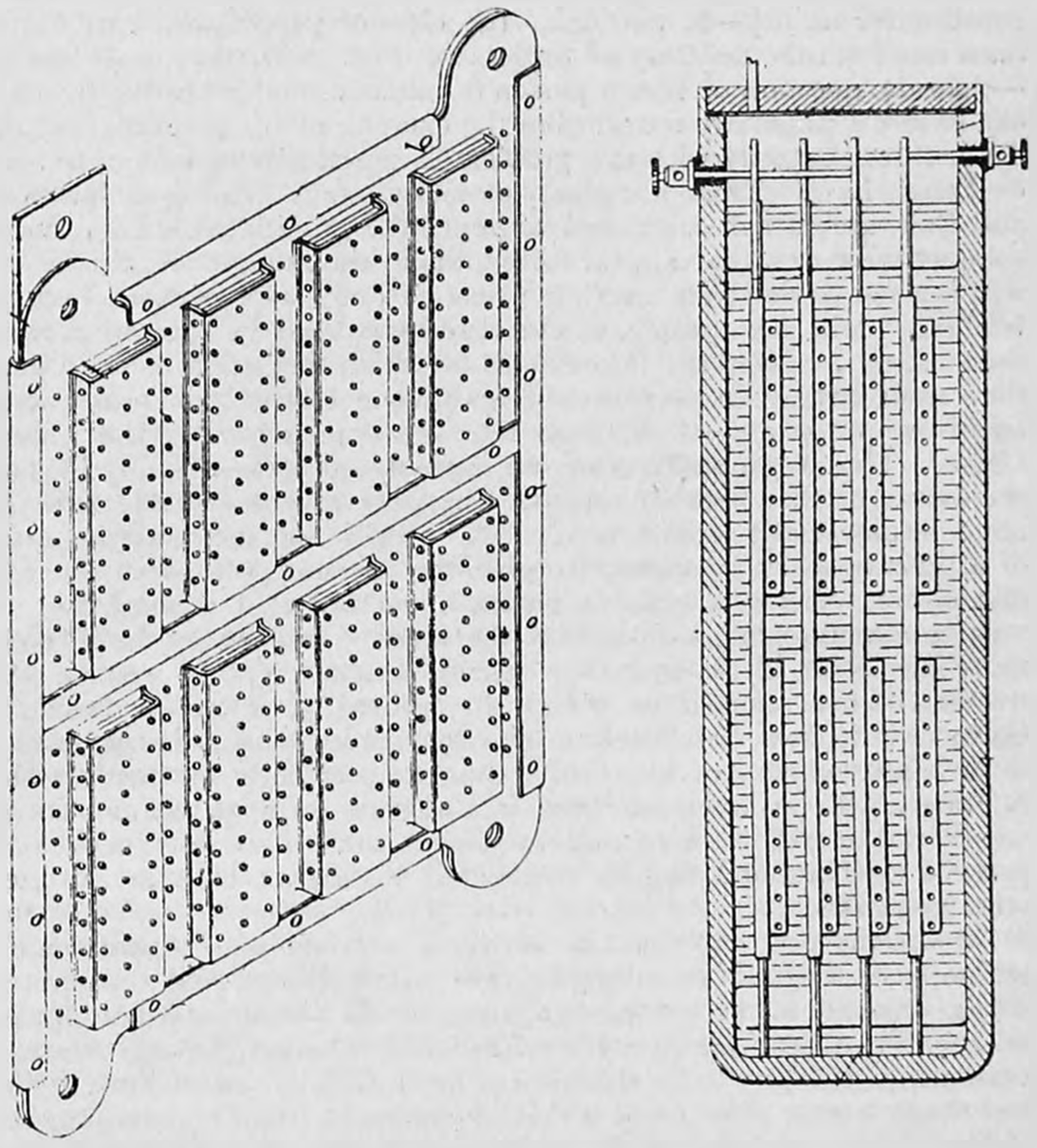
patent are utility and novelty. Of these, utility can really only be decided after the event. Now the proof of the pudding is in the eating, and commercial success is generally looked upon as an evidence of utility, for under ordinary circumstances people will not usually largely buy or use a thing which is not useful. It is not, however, fair to argue that want of commercial success shows want of utility, and that argument is not in fact admitted. Apart from the commercial test, which can be expressed more or less quantitatively, utility, like ingenuity, is largely a matter of taste and opinion. The commercial proof of utility is therefore the best thing to rely on.

When we deal with novelty, we are on surer ground. It is difficult to prove that an invention is novel. Steam power was used for opening temple doors in the Egypt of Ptolemaic times, and nickel steel seems to have been known to the Pyramid builders. But it is often comparatively easy to prove that an invention is *not* novel. Perhaps the best and cheapest way to do this is to apply for an American patent. The official fees are small, and if there is anything existing in the way of previous patents in almost any country, the American Patent Office is very likely to turn it up, and triumphantly brandish it in the face of the would-be patentee. Of course the American Patent Office sometimes lets things through that are not new, and their knowledge of the literature of a subject is nothing like as extensive as their knowledge of patent specifications. In this respect the German Patent Office is unrivalled. If an inventor has applied in Germany and America, and neither of those patent offices have turned up anything to invalidate his invention, he has got something to be pleased about. This really will not cost him very much. If he only wants to get the benefits of the search, he may make the American application direct to the Comptroller of Patents at Washington, sending him a postal order for £3 2*s.* 6*d.* A cheap German agent will file an application for him for £4 or £5. If he employs an English patent agent to make a search for him the result may or may not be more reliable and exhaustive. It will certainly cost him a great deal more. Some few patent agents employ responsible members of their staff to do their searching, but in general the searching is done by independent search clerks, who work on their own in the Patent Office Library, and are usually remunerated for their services at the munificent figure of 1*s.* 6*d.* an hour. The poor inventor will, on the whole, therefore, perhaps be well advised to rely upon the results obtained by the German and American patent offices, supplemented possibly by efforts of his own, and to forego the advantages which he might derive from searches conducted in this country on the usual lines.

EDISON'S NEW ACCUMULATOR.

A GOOD deal has been written and said in recent technical publications on the subject of the copper-cadmium cell for which Edison has recently taken patents in this and other countries. Any attempt to solve the eternal accumulator problem by the application of new chemical principles, or rather perhaps we should say of chemical principles which are new in relation to this particular problem, is of necessity of high interest, as the prospects of further progress on the lines of the lead accumulator are not particularly encouraging. Edison's accumulator is an attempt to make a workable accumulator from what are, in part at any rate, new principles. We say in part advisedly, as one part of his inventions refers to the well-known copper-oxide positive plate to which, when used with a zinc negative, we have already frequently referred.

In a previous number an article, which dealt with the so-called Cupron primary battery, pointed out that one of the difficulties attending the use of copper-oxide as a depolariser in a battery was its tendency to go into solution to a certain extent in the caustic alkali electrolyte. In the Cupron element an attempt is made to get over this difficulty by the addition of 1 per cent. of hyposulphite of soda to the electrolyte. It appears, however, from experiments of rather exhaustive character which have recently been made in Germany, that the effect of the hyposulphite is only transient. After a while, when its battle with the copper, so to say, has exhausted it, the copper goes into solution as before, and going into solution deposits on the negative, producing the well-known trouble of local action. Edison attempts to get over this difficulty in a different way, viz., by a special process of preparing the copper-oxide block which he employs for depolarising. He alleges that he has discovered the tendency of the copper-oxide to dissolve to be due to the presence of metallic copper with the oxide, and also apparently suggests that it may be caused by the copper-oxide block being too dense, and he describes a special process for manufacturing the blocks, which he says prevents the solution. This consists of reducing copper carbonate to metallic copper by the action of hydrogen. The finely divided copper obtained in this way is compressed with moderate pressure into flat blocks. These blocks are then heated in a closed space for six or seven hours at a temperature not exceeding 260° Centigrade. "If higher temperatures are employed the density of the black oxide will be undesirably increased. After being thus oxidised the copper blocks are reduced electrically to metallic copper, and are then re-oxidised on charging by the current until they are converted into the red oxide (Cu_2O)." The positive plate consists of a number of pockets of thin sheet copper perforated and riveted to a copper plate, which is also perforated, and into these pockets the blocks above described are inserted. The negative plates are precisely similar, except that into their pockets are inserted corresponding blocks of finely divided metallic cadmium. The whole arrangement—which can be readily understood from the accompanying sketches, which are taken from Edison's British specification—



is enclosed in a nickel or copper vessel and hermetically enclosed. The electrolyte consists of a 10 per cent. solution of caustic soda. The specification states that "the voltage of my improved battery is 44 volts," but this is obviously a misprint, as the potential difference of cadmium and copper is about 0·45, so that 0·44 is what is probably intended.

This battery, at any rate, provides considerable food for thought, and the argument on which the *rationale* of the process is said to be based is a little hard to grasp. It seems extremely doubtful whether the finely-divided copper can be converted throughout into the red cuprous oxide without leaving either unoxidised copper present on the one side, or peroxidising the copper into Cu O on the other. But if any metallic copper is present, then, according to Edison, the copper is going to dissolve. In any case, this is likely to occur if the cell is discharged too far. Perhaps that is the reason why he specifies a 10 per cent. solution of caustic alkali, as 25 and 30 per cent. solutions were what was generally employed in the zinc copper battery. With such a percentage solution it seems quite impossible that capacities in any way approaching those obtainable with a copper-zinc cell would be procurable. If there is anything really in the way of decided improvement in Edison's positive plate, it may have a future in combination with a zinc negative, provided the difficulties of getting the zinc to redeposit satisfactorily on charge, with which we have dealt in a previous number, can be overcome.

That difficulty is no doubt responsible for Edison having betaken himself to cadmium. Cadmium is not soluble (unlike zinc) in caustic alkali, and therefore does not redeposit on charge. It acts, in fact, exactly like the spongy metallic lead in the ordinary lead accumulator. But what does this mean? The reason why the use of zinc as a negative, either in the copper-zinc cell or to replace the negative in a lead cell, gives rise to such a great economy of weight is just because it is soluble. It is not that the combining weight of zinc is so much

less than that of lead, but because the lead, during the discharge of the battery, becomes superficially coated with a layer of sulphate, which interferes with the further action of the acid upon it. Consequently an enormous excess of spongy metallic lead has to be used in the negative. Now, with the finely-divided cadmium that Edison uses in his negative, the condition of affairs is practically the same as with the spongy lead negative in the ordinary accumulator. During the discharge it must become coated with a film of oxide of cadmium. The amount of cadmium present therefore will of necessity bear the same sort of relation to the amount of zinc that would be required to supply a similar amount of energy as does the spongy lead in the ordinary battery. That means that the cadmium negative must be a vast deal heavier for the same number of ampère-hours furnished by the battery than is the case with the copper-zinc accumulator. Now, the voltage of Edison's battery is practically half that of the copper-zinc cell. His negatives must, on the other hand, be considerably heavier; 30 watt-hours per pound of cell is the most that has ever been got out of the copper-zinc combination, the practical working figures being about 24 or 25. How we can expect more than 10 or 12 watts per pound of cell from the Edison combination is not, therefore, as the result of a theoretical examination of the battery, altogether apparent. Such an examination is, at any rate, calculated to predispose to a certain amount of mild scepticism in regard to the statements about the Edison battery which have recently appeared in the Press.

NOTES OF THE MONTH.

THE Corporation of the city of Glasgow have recently invited tenders for the construction of a motor dust van.

A COMPLETE list of all persons in the United Kingdom owning motor vehicles is to be compiled by the A.C.G.B.I.

THE Automobile Club Show is announced to be held at the Agricultural Hall from April 19th to 26th next year.

THE Ryde Town Council have resolved to grant licenses for the running of motor omnibuses, a service of which it is proposed to start in the Isle of Wight.

THE *Coachbuilders' and Wheelwrights' Art Journal* this month published working drawings and coloured plates for the carriage body for a Panhard motor and for a Daimler motor.

THE Stanley Show Committee, in announcing their 1901 Show, to be held on November 22nd to 30th, invite applications, in addition to cycles, &c., for motor carriages, motor cycles, and accessories.

THE newly-constituted board of directors of the Daimler Motor Company (Limited) consists of Sir Edward Jenkinson, K.C.B., Mr. T. Bailey, M.P., Captain C. C. Longridge, Mr. J. H. Mace, and Mr. J. S. Critchley.

LORD KINGSBURGH, the Lord Chief Justice Clerk of Scotland, upon one of the recent trial runs of the A.C.G.B.I., counted from Dashwood Hill to Whitehall Court (31 miles), 1,442 horses, of which only three took the smallest notice of the motor car on which Lord Kingsburgh was riding. Even these three did not show any symptoms of real alarm.

THE Naval and Military Exhibition opening this month at the Crystal Palace announce that there will be a section devoted to inventions, patents, and designs connected more or less with naval and military matters, which will show the progress made since the days of the 1851 Exhibition. Inventors can get particulars of free spaces from Mr. Henry C. Braun, C.E., 236 and 238, Pentonville Road, King's Cross.

THE *North China Herald* of January 9th last states that there is a splendid opening in Shanghai for a motor-car company to build, repair, and let out for hire motor vehicles of all kinds. These vehicles are admirably adapted to an absolutely flat city like Shanghai. The same paper, says the *Board of Trade Journal*, also notes that there is a good opening for another or the same company to run electric trolley omnibuses in the principal streets.

THREE Daimler motor omnibuses have been acquired by the Southampton Corporation, to seat 12 persons and the driver, at £490 each. The other tenders were—T. Coulthard and Co., £600 each; Motor Manufacturing Company (12 persons, excluding driver), £565; Motor Manufacturing Company (11 persons, including driver), £468; Wolverhampton Cycle and Steam Motor Company (steam), £365; Julius Harvey and Co. (steam), £650; and Simpson and Bibby (steam), £600.

THE indignation of the owner of a horse-drawn vehicle when his unattended horse is slightly startled, whilst he is calmly inside a public-house or some business premises, is proverbial. It is, therefore, refreshing to find that Earl Russell, smarting at having recently damaged his motor car through the behaviour of a vicious horse, caused the owner of the horse and cart to be summoned at the Alton Petty Sessions for leaving his horse unattended on the public highway, with the consequence that the owner has been mulcted in a 5*s.* fine. Small as the fine is, it is sufficient to remind owners of horses what the law is, albeit it has practically become obsolete by custom.

WE have received a new list of agents for Pratt's Motor Spirit from the Anglo-American Oil Company (Limited), which contains 880 agents, as against 512 in the booklet issued by the Company in November last. This will be found useful for the purpose for which it is issued, but the whole of the agents contained in this new list will be found embodied, in conjunction with all other information as to repairers, electric recharging stations, &c., in the "Automobilists' Guide," which was published last week by Messrs. F. King and Co. (Limited), 62, St. Martin's Lane, W.C., under the direction and official patronage of the Automobile Club of Great Britain and Ireland.

HER MAJESTY THE QUEEN acquired some few months back an electric victoria from the City and Suburban Electric Carriage Company. Up to now this vehicle, which was the centre of attraction at the Automobile Club Show at the Agricultural Hall, has only been used at Sandringham, but we trust Her Majesty will soon gain sufficient confidence in her acquisition to use it before long in London and, we hope, in the Park. Her Majesty was always pleased to demonstrate to her friends a secondary use to which the carriage could be put, by personally switching on the car batteries, after having returned from a spin through the Sandringham grounds, to the electric wires of her special apartment and lighting the room by that means. We give an illustration of the carriage elsewhere.

KING EDWARD, besides subjecting the whole of his stud in the Royal Mews, Windsor Castle, to the "ordeal of the motor car" by Dr. Bruce Porter, who about a year ago performed the same office for our late Queen, is making use of the automobile more frequently week by week, and last month, instead of travelling from Sandringham to Newmarket in his usual manner by special train, drove over on his 12-h.p. Daimler, at times being credited with a speed of up to 30 miles an hour, the police carefully keeping the road for His Majesty. It is curious to find notified almost side by side with this departure that motor cars are not allowed on the private roads near the stands on Newmarket Heath. We wonder at which point the King was warned off.

THE British imports of motor cars for March, as compiled by the *Carriage Builders' Journal*, are—

From the United States: 67 cars, value £8,908,
,, Continent: 154 cars, value £25,067,

the total for the three months ending March being 418 cars, value £68,762. To appreciate these figures a comparison of the first returns in 1898 must be made with present imports. In 1898 there were imported from the Continent 12 motor cars of a declared value of £3,222; these have grown to a *monthly* average during 1900 of 84 motor cars, valued at £14,520; and during the first three months of this year the average per month has been 139 motor cars, valued at £22,920. The total imports for the past year were 1,013 cars, value £174,248, out of a total for all forms of carriages, wagons, wheels, axles, &c., of £288,760.

THE London County Council, at their meeting on the 30th ult., resolved to purchase, at a cost of £286, a steam motor vehicle from the Locomobile Company of America for use by the Fire Brigade. Mr. Gilbert, Chairman of the Fire Brigade Committee, in reply to Mr. Beachcroft, who objected to the Council going to America to purchase a car, when he

stated that any number could be purchased in this country, said that the chief officer, who was an expert on this subject, had recommended that particular type of car. It is very gratifying to find Commander Wells adopting this form of locomotion, as although the order in itself is of minor importance, the fact that a start has been made by the brigade to recognise automobilism as a practical and existing fact is a step in the right direction. One of the main objects of the present purchase is to get the members of the brigade used to the handling of automobiles, the immediate purpose of the present car being for messages and supplies, and for taking officers of the brigade to and from a fire. As a forerunner of greater things we hail the departure with satisfaction.

THE West Ham borough engineer, Mr. John Morley, has recently reported upon the reorganisation of the Highway Department of the borough, and advocates the employment of motor cars for municipal purposes. In speaking of these he points out that heavier loads can be taken at practically twice the speed, and, therefore, in half the time occupied on the journey by horses. There is practically no limit as to the time they can remain at work, except that it would be necessary to work them by shifts. They can be obtained with interchangeable parts, so as to be available either for carrying road sweepings or for street watering, as occasion may require. The expense of erecting buildings for storage would not be so great as providing stables for horses, as sheds only would be required, and, again, as they do more work, so many would not be necessary, and the space would be further minimised. There is no doubt, he adds, that, as the district develops still more, it will be necessary to travel further afield for shoots, especially for the deposit of house refuse, in which case the advantage derived from the extra speed of the motor will be more appreciated.

MR. J. COLMAN, of the Broadway, Woking, recently undertook to carry the Post Office mails between the Woking post office and West End, Chobham, but, apparently, the experiment did not meet with the approval of the local police, as, on the very first day on which the mails were carried, a constable, upon ascertaining that there was no name of the owner on the vehicle, summoned Mr. Colman before the Guilford Bench "for that he on April 9th, at the parish of Woking, did contravene the regulations of the Local Government Board, made in pursuance of the Light Locomotives Act, 1896, by allowing a locomotive used for the carriage of goods to be used on the highway there without having the name and address of the owner legibly painted thereon."—Defendant pleaded not guilty, on the ground that he was at the time on the King's service.—The Chairman: I am afraid that won't help you.—Mr. Colman then handed to the Bench a communication from the Solicitor to the G.P.O., stating that it should be pointed out to the magistrates that the motor car was not being used for carrying goods, but solely for the conveyance of His Majesty's mails, and was, therefore, on the same footing as other vehicles similarly employed.—After consultation, the Bench dismissed the case. We fancy the police must have very little to do in the neighbourhood of Woking.

LIEUT.-COLONEL R. E. CROMPTON last month read an extremely interesting paper, entitled, "The Cycle as an Aid to Military Operations in South Africa," before the Cycle Engineers' Institute. Mr. Crompton pointed out that the work done by the mechanical traction section, of which he had control, had been so satisfactory that, acting under Lord Roberts's instructions, he was working to help forward the question of design for mechanical transport in all forms for military purposes. The War Office, he said, had the intention of producing efficient traction trains resembling the old traction trains, only better, which would be independent of fuel and water supply to a far greater extent than had ever yet been attempted, the use, for instance, of the internal combustion engine, and possibly those of the Diesel type. Besides using heavy engines for transport, lighter kinds of automobiles would be used wherever a wheel carriage had ever gone. He was convinced from what he had seen that they could show with lighter haulage as great superiority over animal traction as had been shown with heavy haulage. Wherever he saw wheel tracks on the veldt he felt convinced they could have got a mechanically-propelled vehicle. The introduction of motor traction into warfare would also prove a great factor in the lessening of sickness amongst the troops. The dreaded enteric, which killed three times as many men as were killed by the Boers, was entirely due to animal transport being used. Dead horses, which were present everywhere, polluted the water and the air, and the bringing up of animal forage necessitated an enormous drain on their transport. If they could supersede animal transport wherever possible, commencing with the big stuff, and eventually coming down to quite the small stuff, the impedimenta of war would not hang so heavily upon an army.

SPEAKING of the congestion of London streets *The Field* says:—"The spread of motor-car traffic will no doubt do much to remedy matters in this direction. Were the horse definitely banished from London streets there would indubitably be an immense saving of space. The carrying capacity of the existing highways would be doubled at one stroke." The horse will not go yet awhile, but: "Not even the most ardent lover of horses could desire to see their use continued here." Again: "If machine-driven traffic were the rule, asphalted streets (and a minimum of repairing) would be the rule also." *The Field* adds several suggestions, with most of which our readers are already familiar.

IN the case which we report elsewhere, of Mr. Charles Augustus Smith, of Cobham, Surrey, who was fined by the Kingston magistrates for travelling at too great a speed having regard to the traffic on the highway, it was elicited in cross-examination of the police at the trial that there was only a van and a butcher's cart on the highway at the time, and the traffic was not in any way interfered with or disturbed; notwithstanding this the magistrates convicted. This conviction was appealed against by way of special case. There is no appeal according to the law of this country from a Criminal Court, except by special case, which is a statement of the law points raised, and that statement has to be made by the magistrates, so that of course they state it in their own peculiar way. In the above case they stated that they found as a fact that Mr. Smith was travelling between 18 and 20 miles an hour, although the evidence on which they found this was guess work, and Mr. Smith himself swore he was only going eight miles an hour. And although there was no evidence at all to support this finding they set it out in the case, and the judges of the High Court concluded that they could not go behind this statement, whether it was true or not. The Kingston magistrates therefore have succeeded in holding their own un-English views, and the sooner a Criminal Court of Appeal is established, where the cases can be thrashed out if the parties desire to have an appeal, and not have to argue it on the *ex parte* statement of such magistrates, the better it will be for the course of English justice. The contemptuous way in which evidence for the defence is treated, in favour of the evidence by the police, by the Kingston Bench is notorious.

FOREIGN NOTES.

KING VICTOR EMMANUEL OF ITALY has been converted to automobilism.

W. K. VANDERBILT, jun., has been elected a life member of the A.C. de France.

AN automobile 4 cents postage stamp is promised from America in connection with the Buffalo Exhibition.

THE competition of carburants which was to have commenced on the 1st inst. has been postponed by the A.C.F.

COUNT ALBERT DE DION, of De Dion and Bouton, by the death of his father last month, presumably now becomes the Marquis De Dion.

L'Auto is the title of a new Italian illustrated fortnightly automobile journal, edited by Dr. Francesco Vallardi, at 48, Corso Magenta, Milan.

THE Poitiers Sporting Union have organised an International Course over 200 kiloms., from Poitiers to Tours and back, for automobiles weighing not more than 450 kilogs.

ON the occasion of the Gordon-Bennett Cup, the A.C. de F. have arranged for an excursion, starting on the 27th inst. from Paris to arrive at Bordeaux on the 29th, to witness the finish of the race.

THE proprietors of the *Horseless Age* of New York have removed their offices to Rooms 196 and 197, Times Building, 147, Nassau Street, exactly opposite their old quarters.

THE city authorities of Hanover have just appropriated 80,000 marks (4,000/.) for three automobiles for the use of the city's fire department, provided that they prove satisfactory during a certain trial period.

THE Holland Automobile Club have elected Baron de Zuylen honorary president, and the Chevalier J. L. de Nahuys president. The Club has recently decided to have a tour through Holland, covering about 527 kiloms., spread over four days, starting and terminating at Utrecht.

THE General Council of the Province of Gironde have granted a sum of 200 francs for the Paris–Bordeaux Automobile Race, to be run on the 29th inst., following the Gordon-Bennett Race. We wonder how many years will elapse before our authorities follow this excellent example.

THE German Emperor has, through the Duke of Ratibor, President of the German Automobile Club, announced his intention of giving a prize in connection with the Paris–Berlin automobile race. The President of the French Republic has also officially promised to contribute a prize.

THE Vienna–Graz–Budapest Race (521 kiloms.), organised by the Automobile Club of Austria, takes place from June 13th to 16th. It will be run in three stages, an exhibition for competitors being held on June 20th, at Budapest. There will be two categories: one for racing vehicles and the other for vehicles for sale.

THE Cyclists' Race from Paris to Bordeaux, held last week, created the usual sensation along the route. Also, as usual, a feature was the flying squadron of motor cars, which followed the cyclists with extra machines, repair outfits, clothes, food, and sustaining drinks, and on one of which rode the officials managing the race.

THE A.C. de Belgique Flying Kilometre Race, under the presidency of Prince Albert of Belgium, will be run off on the 19th inst. The event will take place on the Dieghem and Melsbroeck Road, and will be run under A.C.B. rules. There will be the usual 10 classes, from motor bicycles upwards, special classes being provided for steam and electric vehicles respectively.

THE dates for the Nice week for 1902 are already announced, viz., April 6th, Corso Fleuri; April 8th, racing cars (Nice–Salon–Nice), tourist vehicles (Nice–Draguignan–Nice); April 9th and 10th, automobile exhibition; April 11th, the mile and kilometre record; April 12th, La Turbie hill climb, and "Concours d'elegance" at Monte Carlo. M. Jellineck has already entered two vehicles.

THE Lombard-Gerin system of electric road vehicles, which take current from overhead conductors, is about to be put into practical operation, a service of buses being about to be started between the town and railway station of Eberswalde, Germany. The system was shown at work at the Vincennes annexe of the Paris Exhibition last year, and was described by us in April, 1900, p. 343.

THE Paris–Bordeaux race, which takes place immediately after the start of the Gordon-Bennett Cup on the 29th inst., will be run *viâ* Buc, Saint-Remy, Limours, Ablis, Chartres, Vendôme, Tours, Poitiers, Angoulème, Montguyon, Libourne, &c. The classes will be for two-seated cars under 650 kilogs., two-seated light cars from 400 to 650 kilogs., voiturettes from 250 to 400 kilogs., and motor cycles and voiturettes under 250 kilogs.

WE regret to record the death of Mr. Frederick W. Tousey, assistant secretary of the Automobile Club of America, who died at his home in Bridgport, Conn., on April 22nd, of pneumonia, resulting from a cold caught on the night of the opening, on February 16th, of the new A.C.A. Club-rooms, at Fifth Avenue, New York. Mr. Tousey will be best remembered by automobilists for the active assistance which he gave to Mr. Claude Johnson in last year's 1,000 Miles Trial.

THE Mercedes Daimler cars have been withdrawn from competition in the Gordon-Bennett Cup by M. Jelleneck, the reason given being that the vehicles were not selected to compete by the German Automobile Club until April 4th last, and that they would therefore not be ready in time. This reason hardly appears adequate under all circumstances. The vehicles are, however, to run in the Paris–Berlin Race, the first built being the property of Mr. Wm. Dannat, the American artist.

A NEW work will shortly be published by Dunod, 49, Quai des Grands-Augustins, Paris, entitled "Les Automobiles Electriques," by the well-known electrical engineers, Messieurs Gaston Sencier and A. Delasalle, with a preface by M. Charles Jeantaud. The work will comprise 400 pages, and will be illustrated. From the practical experience of the authors the work should prove of such value to electrical automobilism as to justify an English edition of the work being brought out.

AN exhibition is announced to be held at the Tauride Palace, St. Petersburg, opening on November 14th next, and closing on February 14th, 1902. The exhibition will be confined solely to the manufacturers and producers of the British Empire, and is under distinguished patronage. The Commissioner for the United Kingdom is Mr. George Collins Levey, C.M.G., the offices being 22, Conduit Street, Regent Street, where all particulars can be obtained. There is, however, a possibility of the opening being postponed until March, 1902.

PARIS–BERLIN.—The route and distances for the tourist vehicles in this race have now been issued. The route will be—June 22nd, Paris–Reims, 160 kiloms.; June 23rd, Reims–Luxembourg, 210 kiloms.; June 24th, Luxembourg–Coblentz, 185 kiloms.; June 25th, Coblentz–Frankfurt, 130 kiloms.; June 26th, Frankfurt–Eisenach, 181 kiloms.; June 27th, Eisenach–Leipzig, 174 kiloms.; June 28th, Leipzig–Postdam, 138 kiloms.; June 29th, Postdam-Berlin, 31 kiloms. There will be two categories, viz., "voitures contrôlé," and "voitures non-contrôlées."

MME. VEUVE J. LOCKERT was on the 24th ult. entertained at a banquet in Paris, in honour of her nomination as an *officier d'Académie*. The good qualities of Mme. Lockert (who, upon the death of her husband, M. Louis Lockert, took up the entire responsibility of continuing the *Chauffeur*, and has since earned as editor the respect of the entire French automobile world) and her daughters were enumerated by M. Chauveau, and amongst those present to honour this much-esteemed lady were M. and Mme. Léon Serpollet, M. and Mme. Thévin, M. and Mme. G. Chauveau, and MM. Vignat, Brillié, &c.

THE excursion of the U.A. de France, announced to take place from the 15th to the 20th inst., will embrace Pithiviers, Orleans, Blois, Chambord, Tours, Vendôme, Chartres, Ablis, Etampes, Paris. The Union strongly emphasises the point that the event is a "promenade," without any idea of speed competition in any form. On the 19th, however, there is to be a "Course de Voitures" from Courville, Brou, Bonneval, and Chartres, over 100 kiloms., after allowing for neutralised districts. The speed trial is open to tourist vehicles only. A number of entries have been received, but the disqualification notice of the A.C. de France to all competitors will probably reduce the starters to very narrow limits.

THE Light Car Challenge Cup Competition being organised by *l'Auto Velo*, in which each entry has to be made in groups of three cars, is to be run off on June 12th over 200 kiloms. on the Sézanne–Vitry-le-Francois road. At some trouble the organisers have selected a course which is almost devoid of habitation, the one exception being the village of Fére-Champenoise, which has been neutralised (10 minutes). There are several splendid bits of road absolutely straight, on which it is anticipated some good times will be recorded. We gave details of the competition on p. 352 last month. In addition to the three-group class, *l'Auto Velo* proposes also to receive entries of single vehicles for recording their times over 100 and 200 kiloms.

A NOVEL attempt is to be made by M. Louis Godard, the well-known aëronaut, to cross the Atlantic from New York to Gibralter in a balloon. The Paris *Figaro* gives details of M. Godard's scheme.

The distance to be covered is calculated at between 5,000 and 7,500 kiloms. with a fair wind, it being estimated that he should accomplish the journey in anything from 4½ to 40 days. The balloon will be of 11,000 cubic metres capacity, and will carry 10 passengers, including three aëronauts, besides M. Godard, a naval captain, and five scientific explorers, for whom provisions are to be taken for 40 days. The balloon is to be fitted with floating apparatus, which, it is believed, will keep it constantly at a height of about 300 feet above the level of the sea, the balloon being steadied and maintained in its course by means of this special device, which consists of a buoy, an "equilibrator," which is a hollow cone with its larger end foremost, and a "deviator," which is a screw with wide pallette blades. Arms and ammunition, an aluminium petroleum motor boat, and several small balloons for refilling the large one, will also be carried. M. Godard is satisfied of being able to forecast the winds, and of using the floating apparatus for remaining immovable when they may be contrary. The cost of the voyage is estimated at £8,000. It is expected that the expedition will not be ready to start until July, 1902.

THE Criterium de Provence will take place on July 28th, on the Salon–Arles road (100 kiloms.). The vehicles will be classed under the new classification of the A.C. de F., viz. : Motor cycles up to 250 kilogs. ; voiturettes, 250 to 460 kilogs. ; light cars, 400 to 650 kilogs. ; heavy cars, 650 kilogs. and above. The light cars will run the course in the morning, and the motor cycles and heavy cars in the afternoon.

In connection with this race there will also be a special trial for vehicles in which awards will be made to each car in regard to its speed as related to its declared horse-power, the horse-powers being verified by the judges afterwards. There will be minimum speeds fixed for the various horse-powers, but at present the scale has not been published, but the following figures are published as the result, it is stated, of previous experience in past years, viz :—

Cars : 8-h.p. (40 kiloms. per hour), 9-h.p. (45 kiloms.), 10-h.p. (50 kiloms.), 12-h.p. (55 kiloms.), 14-h.p. (60 kiloms.), 16-h.p. (65 kiloms.), 18-h.p. (70 kiloms.), 20-h.p. (75 kiloms.).

Voiturettes : 6-h.p. (40 kiloms.), 8 h.p. (50 kiloms.), 10-h.p. (60 kiloms.), 12-h.p. (70 kiloms.).

Motor cycles : 3-h.p. (45 kiloms.), 3½-h.p. (50 kiloms.), 4-h.p. (55 kiloms.), 4½-h.p. (60 kiloms.), 5-h.p. (65 kiloms.), 5½-h.p. (70 kiloms.), 6-h.p. (75 kiloms.).

THE Berlin police authorities issued last month new regulations for the use of motor cars and similar vehicles in the public streets of the capital. All motor vehicles are to be provided with easily-worked steering gear and trustworthy brakes, and all excessive noise and obnoxious smoke, steam, or smell is to be avoided. When a velocity of 15 kiloms. an hour is used, the vehicles must be so built that they can be stopped on asphalte within eight metres at most. Warning must be given with a bell. The lantern, when lit, must fully illuminate the way at least 20 metres in advance. Every motor must have a number stamped by the police, the name of the maker, and the weight and horse-power, on a clearly visible plate. Motor cars not owned by Berliners may be temporarily used in the capital, provided their drivers can show an official certificate from their own police. Similar certificates, *visèd* by German officials, must be carried by foreign motor owners. Contravention of the regulations is punishable by temporary or permanent prohibition. The owner is responsible for his vehicle and for the driver, and must notify all changes concerning it, or his address, to the police. The driver must be over 18, and must have an official certificate from a public expert or from a driving school ; and he is liable to temporary loss of his certificate in case of negligence. He is also responsible for the condition of the vehicle. The police can prohibit the use of certain streets. The speed at dusk and on municipal roads must not exceed 15 kiloms. an hour, and is to be relatively diminished in crowded, slippery, and curving streets, or when crossing narrow bridges, &c. Motor races are only permissible with the consent of the police. On leaving the car, the driver must fasten up the machine and brake, to prevent improper use. The other clauses state the fines to be imposed for contravening the regulations.

PENNINGTON, inventor, promoter, &c., about whose whereabouts little has been heard lately, is on deck again, says the *Chicago Motor Age*. He has turned up in Philadelphia, with a war automobile, in the demonstration of whose speed he has caused himself and two companions to be arrested and, at a cost of $22·50 for fines, has secured newspaper notoriety which would have cost him many hundreds of dollars in any other way. This escapade occurred one night on Broad Street. Now he wants to wager $5,000 to $500 that he can give a start of 25 miles to any other automobile in Philadelphia in a run to Atlantic City and back. He is probably well aware that the authorities would not permit any such race. As a talker about large sums of money Pennington was always a great success. He asserts that his machine will travel 75 miles an hour on smooth pavements, 130 miles on a railroad track, and 35 miles over ploughed fields, statements which are sufficient to stamp his claims as ridiculous. His latest assertion is that he is negotiating with the Russian Government for the adoption of his machine for military purposes, and that agents of the Government are now in this country waiting to see him. The machine, which has caused all the stir, has been on exhibition at the store of one of the local dealers, and is described by the local papers as "a curious contrivance of machinery, wires, bicycle seats, pneumatic tyres, machine guns, and a gasoline motor. Briefly, it is a skeleton steel frame 9 feet long, upon which are seats for seven men, five soldiers, an engineer, and a speed regulator. Four wheels, each 15 inches in diameter and 6 inches wide support the truss frame. The motor is placed at the rear. In addition to the bicycle seats for the men, there are places for two machine guns at either end, and contrivances by which the entire upper part of the machine can be concealed by a screen of armour plate. When this is in position the vehicle is about 6 feet in height and 4 feet wide." The usual Pennington Company is being organised, as a matter of course, to exploit the machines.

THE conditions under which the First Annual Endurance Contest of the Automobile Club of America will be held are to hand. It is to be a 500-mile endurance test, and held during the week commencing September 7th, from New York to Buffalo. The total distance will be divided into stages for each day, covering approximately 85 miles per day, the run occupying six days. The contest will be open to all classes of self-propelled vehicles, but no manufacturer, agent, or private owner will be allowed to enter more than three vehicles in any one class. The vehicles will be divided into five classes, and all four-wheeled vehicles shall carry two or more persons, viz. : —

Under 1,000 lbs. class—Four-wheeled motor vehicles, weighing under 1,000 lbs.

1,000 to 2,000 lbs. class—Four-wheeled motor vehicles, weighing between 1,000 and less than 2,000 lbs.

2,000 lbs. or over class—Four-wheeled motor vehicles, weighing 2,000 lbs. or over.

(The above weights in all three classes are to cover the vehicles in commercial running and operating condition, with all tools, fuel, and supplies on board.)

Motor cycle class—Motor bicycles, motor tricycles, and motor quadricycles.

Public service class—Public conveyances and freight conveyances. These shall carry a minimum weight of 750 lbs., exclusive of their driver.

The governing condition of the test will be the average speed for the six days, and any competitor falling below an average of eight miles per hour for any one period will not receive any credit for that period. Certificates will be awarded by the Club as follows :—A. Certificate, average speed from 12 to 15 miles per hour ; B. Certificate, average speed from 10 to 12 miles per hour ; C. Certificate, average speed from 8 to 10 miles per hour. No average speed in excess of 15 miles per hour will be recognised. Public service vehicles will receive a certificate stating their average speed, which must not be less than eight miles per hour, and the weight carried will also be stated in the certificate. All vehicles, whether electric, steam, or gasoline, or otherwise, will operate in the same class, divided only as designated by weight. Controls are also to be established on the Hill-Climbing Trial near Little Falls, which trial will be a separate matter. The entrance fee for all classes, motor cycles excepted, will be 50 dollars for each vehicle. In the motor cycle class the entrance fee will be 25 dollars for each vehicle.

"MOTORIA," Balderton Street, Oxford Street, W., has passed into the hands of Messrs. George F. Milnes and Co. (Limited), the tramcar and vehicle builders, of Birkenhead. Mr. H. G. Burford, late of Messrs. Burford, Van Toll, and Co., of Twickenham, and recently with the Motor Manufacturing Company (Limited), has taken entire charge of these premises as manager for the Company. We understand that Messrs. Milnes and Co. have arranged to go largely into the automobile business, whilst in the Balderton Street premises there will be available fully-equipped repairing shops with the finest up-to-date tools. There will also be on view cars, ranging from 6-h.p. to 30-h.p., built to the design of the Simms Manufacturing Company (Limited).

THE AUTOMOBILE CLUB OF GREAT BRITAIN AND IRELAND

(With which is incorporated the Self-Propelled Traffic Association).

The Big Event.—OFFICIAL TRIALS AT GLASGOW, ORGANISED BY THE A.C.G.B.I., WITH THE CO-OPERATION OF THE SCOTTISH A.C., AFFILIATED TO THE A.C.G.B.I.—The following are the recommendations made by the Glasgow Trials Sub-Committee. Manufacturers or members who have suggestions to make are invited to send them without delay to the Club Secretary for submission to the Committee :—

1. *Number of Days.*—Five, viz., Monday, 2nd, to Friday, 6th, of September.

2. *Average Distance per Day.*—90 to 110 miles, to end daily at the Glasgow Exhibition, giving as far as possible a total of 500 miles.

3. *There should be a Trial Run every day.*

4. *Date of Arrival of Vehicles in Glasgow.*—Vehicles to be in Glasgow at the place appointed on Friday morning, 30th August, at 10 a.m.

5. *Daily Time of Start.*—8 a.m.

6. *Speed Rules.*—In order to prevent excess in speeds vehicles will not be permitted to pass certain points before the expiration of a certain period from the time of starting, plus the total time occupied by stops, from all causes, since the start.

If a vehicle arrives before time at one of these points and has to wait for the expiration of the period, the stop will be counted an involuntary stop and marks deducted accordingly from the possible maximum of marks. Détours to avoid arriving at a point before time will be accounted as stops.

No speed in excess of the legal limit will be recorded or recognised. Endeavours will be made to persuade the Secretary for Scotland to raise the limit from ten to fourteen miles per hour.

7. *System of Marking.*—There will be a maximum number of marks for each day's run, say 300, and one mark will be deducted for every minute during which the vehicle is at rest from the time of starting to the conclusion of the run except for—

(*a*) Compulsory stop (if any) for luncheon.
(*b*) Traffic.
(*c*) Tyre trouble.

There will also be deducted, in addition, one mark for every minute in excess of the official maximum time for the run, the marks for stops having first been deducted.

The official maximum time will be the time which would be occupied by a vehicle in traversing the trial route at the maximum legal speed plus the extra time occupied in controls and dangerous zones.

Example :—A run of 110 miles at 10 miles per hour = 11 hours.

This run includes 10 miles of controls in which the speed must not exceed 8 miles an hour.

The time in traversing these controls instead of being 1 hour (*i.e.*, 10 miles per hour) would be (at 8 miles per hour) 1 hour 15 minutes.

Therefore the official maximum time for the 110 miles would be 11 hours and 15 minutes.

The maximum marks are 300.

A vehicle has involuntary stops on the journey amounting to 15 minutes.

Owing to slowness, it occupies on the journey (including the 15 minutes' stop) 12 hours.

It should not have occupied more than the official maximum of 11 hours 15 minutes + 15 minutes for stops.

Therefore it has not kept up to the official time, but is in excess by 30 minutes.

Its marks therefore would be 300

less 15 + 30 =	45
Total	255

Stops for punctures, traffic, or stops (if any) luncheon are added to the maximum official time, but not represented by marks deducted from maximum marks.

8. *Awards.*—There will be no prize fund and no cash prizes. In the Manufacturers' and Agents' Section first prize and second prize medals will be given in each class.

Certificates will only be given in respect of vehicles which have made an average of not less than 8 m.p.h. on the total Trials, after deducting loss of time by control limits and tyre-troubles.

The awards will be made by a Judges' Committee.

The Judges' Committee will, in making their awards, take into consideration the marks gained, the design and workmanship, general performances, condition (at end of Trials), seating capacity in comparison with price of the vehicles, and the reports as to the observance of Rules by the drivers.

In the Private Owners' Section no competitive awards will be made, but commemorative medals will be given in respect of vehicles which successfully complete the Trial.

9. *Display of Vehicles at the Glasgow Exhibition.*—It is proposed to exhibit the vehicles daily at the Glasgow Exhibition.

10. *Definition of a Privately Owned Vehicle.*—Section II. Privately owned vehicles entered by members of the Club. The vehicles to be driven by the owners or by their substitutes or servants, but the owners, substitutes or servants shall not be, or be about to be, engaged in the manufacture or sale of such vehicles.

11. *Official Programme.*—The Official Programme will consist solely of a card for each day's trial.

The card will contain the route for the day, the rules affecting the trial, and a list of the vehicles entered under their various classes.

12. *Announcement of Results.*—It is proposed that the marks obtained by each car for the day's run should be exhibited on a screen to be illuminated by night to be displayed in the grounds of the Glasgow Exhibition.

It is further suggested that arrangements should be made with the publishers of the Daily Programme at the Glasgow Exhibition to publish therein each day the records of the Trial vehicles.

It is also further suggested that arrangements should be made with the publishers of the Daily Programme of the Glasgow Exhibition, by which firms entering cars for the Trial may insert illustrated advertisements of their vehicles in the Programme of the Glasgow Exhibition during the period of the Trial at a fixed sum per page.

13. *Hill-Climbing Trials.*—The Trials will comprise certain hills on which records will be taken of the time taken by the various vehicles in making the ascents. These records will be published, but no speed in excess of the legal limit will be recorded or recognized.

14. *Delivery Vans and Heavy Motor Vehicles.*—Provided that six vehicles are entered there will be a special class for delivery vans and motor vehicles designed for heavy loads, of a tare of not more than three tons.

These vehicles will run under observation, over courses of from 20 to 50 miles per day.

15. *Observers.*—Every vehicle will carry an official observer.

Vehicles which do not provide a seat except for the driver cannot be entered for the Trial. A seat must be placed at the disposal of the Committee for an observer on each vehicle.

An observer will ride on a different vehicle every day, taking the number next in rotation.

Observers on vehicles in the Private Owners' Section must be provided by the owner, subject to the approval of the Club Committee and subject to no objection being made within a week of the Trial by other owners in that section.

16. *Tyres.*—The tyres on a vehicle may, subject to the approval of the owner of the vehicle, be entered for trial by the makers of the tyres for the Trial.

The system of marking will be the deduction of one mark from the maximum number of marks for every minute's delay on the roads owing to tyre trouble.

The condition of the tyres will be daily noted and recorded by the official observers.

Tyres can only be entered for competition if they are fixed to vehicles in Section I, viz., motor vehicles entered by manufacturers or agents. A vehicle may be specially entered under Section III (tyres and other parts) with a view to testing tyres, not the vehicle.

17. *Entrance Fee.*—Although the expenditure on the programme, etc., will be very considerably reduced (the cost of printing amounted last year to three-sevenths of the entrance fees) this year's trial will involve two items of expenditure which had not to be set against the receipts from entrance fees of last year's trial, viz., the cost of (*a*) medals and diplomas (this cost was almost entirely defrayed by voluntary subscription in 1900) ; and (*b*) expenses of observers.

It is proposed therefore that the entrance fees in Section I should be the same as last year, on the understanding that in the event of there being a surplus the balance shall be proportionately returned to those entering vehicles in Section I.

The entrance fees in Section I (vehicles entered by manufacturers and agents) will therefore be :—

£20 per vehicle if paid before 12 noon on Saturday, 1st June, 1901.

£25 per vehicle if paid after Saturday, the 1st June, at 12 noon and before Monday, 1st July, at 12 noon.

£30 per vehicle if paid after Monday, 1st July, at 12 noon and before Thursday, 1st August, at 12 noon.

£40 per vehicle if paid after Thursday, 1st August, at 12 noon and before Saturday, 24th August, which is the final date of entry.

The entrance fee for delivery vans and heavy vehicles is the same as above.

The particulars of the vehicles entered prior to the 1st July need not be supplied until that date.

The entrance fees in Section II (Private Owners' Section) will be :—

£5 per vehicle if paid before 12 noon on Saturday, 1st June.

£10 per vehicle if paid after 12 noon on Saturday, 1st June, and before Monday, 1st July, at 12 noon.

£15 per vehicle if paid after Monday, 1st July, at 12 noon and before Thursday, 1st August, at 12 noon.

£20 per vehicle if paid after Thursday, 1st August, at 12 noon and before Saturday, 24th August, which is the final date of entry.

It must be understood that the owners of vehicles entering in Section II are entirely responsible for the provision of a suitable observer and the payment of his expenses.

In Section III, that is tyres, wheels, springs, axles, the entrance fees will be as follows :—

Class A. Tyres, £25 per vehicle.
Class B. Wheels,
Class C. Springs,
Class D. Axles, } £10 per vehicle.

to be paid before 12 noon on Thursday, 1st August, 1901.

18. *Other Regulations.*—Generally speaking other regulations will be similar to those which controlled the 1,000 Miles Trial of 1900.*

19. *Electrical Vehicles.*—In the event of makers of vehicles propelled by electricity expressing their willingness to enter vehicles to run over suitable distances during the course of the above trials, inquiries will be made and further particulars will be published.

Alcohol Committee.—A meeting of the Alcohol Committee was held on April 24th, when there were present Dr. Boverton Redwood, in the Chair, Mr. Bertram Blount, and Mr. W. T. Pretty.

Mr. Blount expressed the view that so far as experiments had yet been carried out there seemed to him to be little to expect from alcohol as a suitable motive power for motor vehicles.

Mr. Pretty related his experiences with regard to the use of alcohol in a recent trial which he had given it. He drew attention to the advantages in connection with the use of alcohol in respect of its emitting no smell whatever, and of its more expansive explosion and tconsequently smoother running. It was ultimately, at the suggestion of the Chairman, decided to recommend to the Club Committee that the terms of reference should be extended so as to enable the Committee to consider and report on the fundamental question whether the advantages attaching to the employment of alcohol as a substitute for petroleum in internal-combustion engines were such as to render it important in the interests of automobilism that existing impediments in the way of such use in this country should be removed.

It was also recommended that the Committee be strengthened by the addition of Mr. W. J. Leonard and some representative of the alcohol distilling interest.

Irish Tour.—Particulars are given by Mr. R. J. Mecredy, in Club *Notes and Notices*, in connection with the proposed arrangements and routes for the Club Tour which is to be held from August 12th to the 24th, so as to arrive at Glasgow in time for the Trials' week to be held at the Exhibition. Mr. Mecredy goes fully into the details of the best method of getting motor vehicles from Bristol or Liverpool to Waterford, Liverpool to Dublin, &c., and gives some interesting particulars for each day's run, pointing out the class of roads, nature of the scenery, and all the special features to be observed during the run. Many points of great historical interest are noted, and for those who are able to spare the time to participate in the Tour a magnificent trip should result.

Gordon-Bennett Cup.—Last month we published the Club rules in connection with this event, to be run on the 29th inst., and we now reproduce the official itinerary as it appears in *Notes and Notices*. The Club propose as one of the Whitsuntide Tours to arrange for members to witness the race, starting on the 25th inst. and returning to London on the 30th. Full particulars of these arrangements made by the Club appear in *Notes and Notices*, which provide, through Mr. Dick Farman, of the General Automobile Agency, 100 to 104, Long Acre, W.C., for a supply of motor vehicles for those automobilists who do not care to ship their own vehicles for so short a period. These vehicles are to start from Boulogne on Whit Sunday, May 26th, stopping the night at Amiens (85 miles), arriving the next day in Paris (90 miles), and, after witnessing the start of the race, returning to Rouen on the 29th, arriving in London at 7.5 p.m. on the 30th inst., *viâ* Dieppe. Alternative suggestions are made for members to ship their motor vehicles to France, *viâ* Folkestone and Boulogne, or direct from Chamberlain's Wharf to Boulogne, or from Liverpool to Bordeaux. The following is the itinerary :—

ITINERARY.	Intermediate Kilos.	Total Kilos.	Distances in English miles.
Département de Seine et Oise—			
Passage à niveau de Saint Cloud (Départ)	0	0	0
Versailles	7	7	4·37
Buc	3	10	6·25
Toussus, Châteaufort...			
Saint Rémy les Chevreuse	10	20	12·5
Les Molières			
Limours	7	27	16·87
Bonnelles, Rochefort...	9	36	22·5
Saint Arnoult, Ablis	14	50	31·25
Département d'Eure et Loir—			
Le Gué de Longroy	9	59	36·87
Le Moulin Rouge	12	71	44·11
Chartres	8	79	49·48
Luisant, Thivars	8	87	54·05
Bourdmière	7	94	58·40
Vitray en Beauce	5	99	61·87
Bonneval	11	110	68·75
Flacey Marboué	8	118	73·75
Châteaudun	6	124	77·5
Cloyes	11	135	84·37
Département de Loir et Cher—			
Saint Hilaire	8	143	89·37
Pezou	8	151	94·37
Vendôme	11	163	101·87
Saint Amand	14	177	110·62
Département d'Indre et Loire—			
Château Renault	12	189	118·12
Monnaie	15	204	127·5
Tours	16	220	137·5
Chambray	7	227	141·87
Montbazon	6	233	145·62
Sorigny	7	240	150
Sainte Catherine	10	250	156·25
Sainte Maure ... ... } La Celle Saint Avant ... }	4	254	158·75
Département de la Vienne—			
Port de Piles	12	266	166·25
Les Ormes	4	270	168·75
Dangé	4	274	171·25
Ingrandes	8	282	176·25
Châtellerault	7	289	180·62
Les Bords de Naintré	8	297	185·62
La Tricherie	5	302	188·75
Clan	8	310	193·75
Grand Pont	5	315	196·87
Poitiers	6	321	200·62
Croutelle	6	327	204·37
Vivonne	12	339	211·87
Les Minières	9	348	217·5
Couhé Vérac	8	356	222·5
Chaunay	11	367	229·37
Département des Deux-Sèvres—			
Les Maisons Blanches	8	375	234·37
Département de la Charente—			
Ruffec	13	388	242·5
Les Négres	6	394	246·25
Mansle	11	405	253·12
Tourriers	9	414	258·75
La Chignole	6	420	262·5

* THE AUTOMOTOR JOURNAL, December, 1899, p. 123.

Itinerary.	Intermediate Kilos.	Total Kilos.	Distances in English miles.
L'Houmeau Pontouvre	8	428	267·5
Angoulême	3	431	269·37
La Couronne	7	438	273·75
Roullet	6	444	277·5
Petignac	8	452	282·5
Barbezieux	13	465	290·62
Reignac	7	472	295
La Graule	7	479	299·37
Département de la Charente Inférieure—			
Chevanceau	6	485	303·12
Montguyon	10	495	309·37
Département de la Gironde—			
Guitres	22	517	323·12
Libourne	15	532	332·5
Arveyres	5	537	335·62
Beychac	11	548	342·5
Les Quatre Pavillons (Arrivée) ...	9	557	348·12
Total	—	557	348·12

For members not participating in the Gordon-Bennett Race at Whitsun an alternative Club Tour has been arranged, with Oxford as the headquarters, on the nights of the 25th and 26th inst., runs being arranged from that city each day.

Rubber Tyres and the Act.—Mr. C. Phipps Carey, the Chief Engineering Inspector of the Local Government Board, has notified to the Automobile Club that he much appreciates the courteous offer for a practical experiment to be made with a motor car fitted with *solid rubber* tyres which are under the width prescribed by the regulations (under the Locomotives on Highways Act, 1896) in relation to the weight of the motor car, and that the Board will be very glad if such experiments can be made (under the least favourable conditions as to the state of macadamized roads).

Following on this correspondence, the Club Secretary suggested to the L.G.B. that the Inspectors of the Board should make a journey on a car weighing over a ton and having indiarubber tyres of a width which, under present regulations, are illegal, being less than three inches in width, with a view to noting what was the effect of the tyres on the road surface.

The Club Secretary further suggested that the Club would ascertain and inform the L.G.B. of the weight of an ordinary London omnibus and the width of the iron tyres of such a vehicle. The L.G.B. agreed to these suggestions. The Motor Manufacturing Co., Ltd., kindly placed at the disposal of the Club a wagonette, and on the 2nd inst., Col. Phipps Carey, Chief Engineering Inspector of the L.G.B., and Mr. G. W. Willcocks, Engineering Inspector of the L.G.B., three members of the War Office Committee on Mechanical Transport, the driver and ballast representing the weight of two persons, were driven in this car from the Club to Dashwood Hill and back again. The weight of the car unladen was over a ton, and the width of the indiarubber tyres was $2\frac{1}{8}$ inches.

The Club Secretary has ascertained and has informed the L.G.B. that the weight of a London Road Car Co.'s omnibus, unladen, varies between 33 and 40 cwt. and the width of the tyres (iron) at present used by the Company, is 2 inches.

The Inspectors of the Local Government Board had a striking illustration on Dashwood Hill of the damage done to the road surface by horse-drawn vehicles and motor vehicles respectively.

The motor vehicles skimmed down hill without doing more than raise the dust on the surface of the road.

The Oxford and London coach descended with an enormous shoe on the back wheel which ploughed up the road surface, while its five horses were digging the toes of their iron shoes into the roadway.

Automobile Volunteers.—Mr. E. Shrapnell Smith offers to join with his 3-h.p. Ariel quad.

County Council Demonstrations.—The Club Demonstrations will be held from June 6th to the 8th in the neighbourhood of Richmond, with Sheen House Club as the centre, where the Council delegates will be entertained to luncheon each day. It is hoped that all owners of motor cars will communicate with the Club Secretary, placing at the Club's disposal their vehicles for these very important demonstrations. The work which is being done by the Club has already brought about some enormously successful results, not only in converting the County Councillors, but in bringing the more important portion of the British Press into line in favour of automobilism rather than advocating fresh restrictions upon the industry. Some of the recent articles which have appeared in many of the leading journals, such as the *Times*, *Daily Telegraph*, &c., can hardly be appreciated except by reading them side by side with many of the paragraphs and articles which have appeared in connection with the same subject during the last two or three years. Such a complete revolution in dealing with the subject must be attributed to some cause beyond public opinion. It is undoubtedly largely due to the work done by the Club, and it is satisfactory to note from this unimpeachable evidence throughout the country that the labours of the Club Committee and the efforts of the Club Secretary are fully appreciated. The Manufacturers' Memorial has also brought the subject nearer home to those concerned in the welfare of British industries, and that the crusade inaugurated by the Club is valued by the trade is evidenced by the following communication which has been sent us by Mr. S. F. Edge, writing from 14, Regent Street, in which he says:—

I enclose you a copy of a letter which I have sent to the Secretary of the Automobile Club to-day.

The Automobile Club are spending hundreds and hundreds of pounds on work which, whilst useful to the private user in making his automobile life more easy, at the same time is fostering the industry in this country, in comparison with which the combined efforts of every manufacturing agent in this country are mere pigmy's works alongside that which the Club is doing, and I do hope that the trade as a whole can be made to feel that there is some responsibility on them, and that a strong financial support should be given to the Automobile Club.

It is hardly necessary for me to mention what the Club has done, and is doing, but a few extracts from a recent letter which I have received from the Secretary when asking for information will put the matter forward sufficiently strongly, I think, to gain the support of every deep-thinking man in this motor industry.

They read as follows:—

"If the County Councils had been unopposed it is probable that they would have succeeded in inducing the Local Government Board to alter the speed limit to 10 miles per hour and to insist on the numbering of motor vehicles. The Local Government Board, under the Light Locomotives Act, has power to bring about both these restrictions without reference to Parliament. There is good ground to believe that the Club has entirely routed those who proposed the 10 miles per hour limit. This movement was started by the Highways Committee of the East Suffolk County Council. By means of giving drives to the members of these committees, and of conversing personally with them, the Club has so far succeeded that this committee, although adhering to the numbering proposal, has passed a resolution in favour of the abolition of any speed limit except that affecting other vehicles, viz., that they must not be driven to the common danger."

"The Club has already spent some £300 in this campaign. The printed letter, which was most carefully considered and compiled by the Committee, has been sent to more than 4,000 County Councillors in England and Wales. During the demonstrations which followed to the County Chief Constables, to the East Suffolk County Council, and Warwickshire County Council, and the Worcestershire and Staffordshire County Councils, I had very good evidence that this letter has been carefully perused by County Councillors and has considerably affected their attitude towards automobiles. Not only has this letter had good results from a political point of view, but it and the demonstrations have had the effect of bringing the possibilities of the automobile vehicle practically before a large number of influential men who have seats on County Councils, and should, therefore, tend to spread the use of automobiles."

"To-night I proceed to Lincoln to personally confer with the Highways Committee of the County Council of the Lindsey Division of Lincolnshire. Further demonstrations are to be given during the present month at Gloucester and elsewhere."

"Over 400 County Councillors have accepted the invitations of the Club to demonstrations to be given in London in June. It is estimated that the cost of these demonstrations will bring the total expenditure of the Club on the County Council campaign to over £500. As there have been no funds wherewith to carry on this campaign, the Club Committee have felt it necessary to spend subscriptions of members on

this important work rather than on the provision of further privileges, accommodation, and comforts for members."

(*Enclosure.*)

DEAR SIR,—As a private user of an automobile, and also as one interested in the trade, I have felt for some considerable time that the Automobile Club has been spending large sums of money in fighting legislative restrictions, which, if they had been carried through, would have had the effect of almost entirely crippling the automobile industry in this country.

I feel that the manufacturers and agents in this country do not sufficiently appreciate the work that the Automobile Club has done, and they do not, in my opinion, support the Club in the practical way that should be done. It seems to me that whilst they can do really nothing to repay the number of gentlemen on your various Committees who give an enormous amount of honorary labour, the manufacturers should at any rate support the war fund of the Club and not leave it to the hundreds of private members which the Club at the present time possesses.

Feeling as strongly as I do on the subject I have addressed a letter to the Press with the hope that all manufacturers and agents will realise their responsibility and support the Club financially. On behalf of the Motor Power Company I enclose you a cheque for fifty guineas, and my friend Mr. Paris Singer, of the City and Suburban Electric Carriage Co., has been kind enough to tell me that he will do the same, but what I wish for is for the Club to receive the unanimous pecuniary support of the whole trade.

Yours truly,
S. F. EDGE.

The Secretary,
The Automobile Club.

The Club Committee have accepted the suggestion of Mr. Edge, and thanked him for having initiated this proposal to help the Club in the important work which it has undertaken.

THE LIVERPOOL SELF-PROPELLED TRAFFIC ASSOCIATION.

(Being the Local Centre of the Automobile Club of Great Britain and Ireland.)

President: THE RIGHT HON. THE EARL OF DERBY, K.G., G.C.B.
Chairman of Council: ALFRED L. JONES, Esq., J.P.
Hon. Sec.: E. SHRAPNELL SMITH, Esq.

THE Official Programme of the Heavy Trials, which start on June 3rd, will be issued about the 25th inst. and will contain profiles of the routes, directions as to turning, &c., skeleton plans of all the towns passed through, and descriptions of the competing vehicles. A number of the members of the A.C.G.B.I. propose to tour to Liverpool for the Trials, a start being made on June 1st, members meeting at the Regent Hotel, Leamington, on the evening of that day. From Leamington the route will be *viâ* Coleshill, Lichfield, Rugeley, Stafford, Eccleshall, Nantwich, Tarporley, Chester, and Birkenhead, where arrangements will be made by Mr. Shrapnell Smith for storage of motor vehicles should there be no carriage ferry on their arrival, owners and friends continuing by train to Liverpool. We published the full particulars of the Competition Rules in THE AUTOMOTOR JOURNAL for June, 1900, p. 485. On June 3rd the Trials will open with hill-climbing and manœuvring competitions, the third Trials Dinner being held at the Adelphi Hotel in the evening. On June 4th the first Distance Trial will be held between Liverpool and Manchester, *viâ* Widnes, Warrington, and Eccles. On the 5th the second Trial will take place back to Liverpool, *viâ* Bolton, Hindley, St. Helens, and Prescot. On the 6th the run will be to Blackburn, *viâ* Knowsley, Rookery, Billinge, Wigan, and Chorley, the final Trial being on the 7th back to Liverpool, *viâ* Samlesbury, Preston, and Ormskirk. We give elsewhere the paper which Mr. Shrapnell Smith read upon the subject of these trials before the Liverpool Chamber of Commerce on the 6th inst.

IN the report of the big Paris cab company (Compagnie Générale des Voitures) just issued, the amounts shown as sunk in experimenting with electric motor cabs on the Paris streets towards the end of 1899 is given at £180,000. The causes given for failure are various, and include the cost of maintaining the accumulators, which proved greater than anticipated by the directors, the enormous fares charged by the drivers, &c. For the most part, in consequence of the extortions of the cabmen, the vehicles were idle, except when in use by the visitors at the big hotels and clubs, &c. It is calculated that of the £180,000 sunk, some £60,000 will have to be written off.

MOTOR UNION.

(*Under the auspices of the Automobile Club of Great Britain and Ireland.*)

EXECUTIVE COMMITTEE.

THE rules of the Motor Union provide that there should be on the executive committee of the Union two elected members for every 100 members of the Union on the register of the A.C.G.B.I. All members of the A.C.G.B.I. are members of the Union. The first general meeting of members of the Union was held at the Automobile Club Exhibition, Agricultural Hall, on Wednesday, May 8th, at 5.15 p.m., to elect the 16 members to serve on the executive committee of the Union.

The following members of the Administrative Committee of the A.C.G.B.I. are *ex officio* members of the executive committee of the Union:—Mr. Roger W. Wallace, K.C. (chairman), the Hon. J. S. Montagu, M.P. (vice-chairman), Mr. Mark Mayhew, L.C.C. (vice-chairman), Mr. Paris Singer (hon. treasurer), Mr. C. Harrington Moore (hon. secretary), Mr. W. Worby Beaumont, Mr. Staplee Firth, Mr. Arthur Paget.

The following 16 gentlemen were elected to represent members of the Union on the register of the A.C.G.B.I. on the executive committee of the Union:—Professor C. Vernon Boys, F.R.S., Mr. C. Cordingley, Mr. J. S. Critchley, Colonel R. E. Crompton, Mr. Henry Edmunds, Mr. George Helmore, Lieut.-Colonel H. C. L. Holden, R.A., F.R.S., Mr. J. Ernest Hutton, J.P., Mr. E. Manville, Mr. Percy Northey, Mr. R. E. Phillips, Mr. Lyons Sampson, Mr. Frederick R. Simms, Mr. Stanley Spooner, Mr. Henry Sturmey, Mr. J. Thornycroft, jun.

Some of the affiliated clubs of the A.C.G.B.I. have already selected their *ex officio* representatives on the executive council of the Motor Union as follows:—

Representatives of the Irish Automobile Club:—The chairman, W. G. D. Goff, Esq., J.P.; the hon. secretary, R. J. Mecredy.

Representatives of the Lincolnshire Automobile Club:—Mr. W. R. Pennell, Mr. W. B. Jevons.

Representatives of the Midland Automobile Club:—Mr. Alfred Bird, Mr. J. D. Siddeley.

Representatives of the Manchester Automobile Club:—Mr. J. J. Mann, Mr. Frank Gresham.

The Liverpool Self-Propelled Traffic Association, the Scottish, Yorkshire, and Nottingham Automobile Clubs have not yet decided upon their representatives.

PARTICULARS OF MOTOR UNION.

Functions.—(1) The protection of individual automobilists against unnecessary or vexatious actions at law.

(2) To carry out the work hitherto entrusted to the competitions committee.

(3) To empower and enable the A.C.G.B.I. to set up effective opposition to attempts at unnecessary restrictive legislation.

(4) To empower and enable the A.C.G.B.I. to take such action as may be necessary to uphold and extend the rights and privileges of automobilists generally in the United Kingdom.

(5) To assist the A.C.G.B.I. in carrying out tests, trials, and exhibitions which may be organised from time to time for the advancement of the industry.

(6) To advise and assist the A.C.G.B.I. in the provision of special facilities for automobilists in the United Kingdom, such as the appointment of hotels and repairers and the provision of petroleum spirit depôts.

(7) While maintaining the A.C.G.B.I. in its position as the recognised authority on automobilism in this country, to relieve that body of the burden of the work hitherto carried out by it for the general advancement of automobilism as opposed to the purely social functions of the Club.

Membership.—Any person, lady or gentleman, may become a member of the Motor Union on payment of the subscription, without election, subject to the right of the executive committee to cancel the enrolment of a member at the end of any year.

Subscription.—One guinea per annum, except for members of the A.C.G.B.I. and members of Automobile Clubs in the United Kingdom affiliated to the A.C.G.B.I., who shall *ipso facto* be members of the Motor Union. The executive committee may, subject to the approval of the Club Committee of the A.C.G.B.I., alter the membership subscription of the Union for the ensuing year.

Enrolment.—Membership of the Union may be obtained by enrolment on the registers of the Union which shall be kept at the offices of the A.C.G.B.I., and at the offices of every Automobile Club in the United Kingdom which is affiliated to the A.C.G.B.I.

Privileges of Membership.—(1) Membership of a body which has as its object the advancement of automobilism in the United Kingdom.

(2) Defence: Every member of the Union shall have the privileges at present enjoyed by members of the Motor Vehicle Users' Defence Association (which body the Motor Union has now absorbed), namely, the right to have considered his claim for the necessary financial and legal assistance in respect of proceedings, or actions at law, either civil or criminal, in connection with their motor vehicles.

(3) A free copy of the Automobile Club *Notes and Notices*, the columns of which will be employed as a means of informing members of the Union of the proceedings of the Automobile Club and of the Union, and as the medium of inter-communication between the members of the Union.

(4) The right to apply to the executive committee for advice in connec ion with automobile matters.

(5) The right to wear the badge of the Motor Union.

Income.—The income of the Union shall consist of:—

(*a*) Subscriptions of members of the Union who are not members of the A.C.G.B.I. or its affiliated clubs, less the cost of providing and posting the Automobile Club *Notes and Notices* to such members.

(*b*) 7*s.* 6*d.* to be paid by the A.C.G.B.I. in respect of every member of the A.C.G.B.I.

(*c*) 5*s.* to be paid by the A.C.G.B.I. in respect of every member of affiliated clubs.

(*d*) Voluntary subscriptions by owners of motor vehicles and others.

The income and expenditure of the Union to be controlled by the executive committee of the Union.

The A.C.G.B.I. is not responsible for the finances of the Union.

Administration.—The administration of the Union to be in the hands of the executive committee, which shall be composed as follows:—

(*a*) The Administrative Committee of the A.C.G.B.I. *ex officio.*

(*b*) Two *ex officio* representatives of the committee of every affiliated club.

(*c*) Two elected members for every 100 members of the Union on the register of the A.C.G.B.I. The election of these representatives to take place at the annual general meeting of members of the Union on such a register.

(*a*) One elected representative for every 50 members of the Union on the register of a club affiliated to the A.C.G.B.I. Tne election to take place at the annual general meeting of members of the Union on such a register.

(*e*) The chairman and vice-chairmen for the time being of the A.C.G.B.I. to be *ex officio* chairman and vice-chairmen of the executive committee of the Union.

(*f*) The executive committee of the Union shall have power to delegate portions of its work to sub-committees composed of members of the executive committee.

Appeal.—In the event of any dispute arising between the executive committee of the Union and the Committee of the A.C.G.B.I., the General Council of the A.C.G.B.I. shall arbitrate on the point in dispute, and the decision of the Council shall be final and shall be binding on both parties.

Liability.—The liability of members of the Union shall be limited by registration under the Companies Act to the amount of their subscription.

MOTOR VEHICLES FOR HEAVY TRAFFIC.

ON the 6th inst., Mr. E. Shrapnell Smith, hon. secretary Liverpool Self-Propelled Traffic Association, delivered an address, under the auspices of the Liverpool Chamber of Commerce, on the subject of "Motor Vehicles for Heavy Traffic." Mr. A. L. Jones presided, and there were present—Professor Hele-Shaw, Messrs. George H. Cox, P. E. J. Hemelryk, E. Darlington, Anthony G. Lyster, Alfred Holt, Joseph Gardner, George Okell, the Postmaster (F. Salisbury), John Marquis, G. Tullock, J. H. Toulmin (Preston), H. Fowler (Derby), J. H. Kean, H. Appleby (Blackburn), T. C. Aveling (Birmingham), F. J. Pilcher, G. H. Ball, Wm. Heap, Wm. Jackson, T. W. Anderson, John Dean, Max Muspratt, J. W. Pickering, N. Macvicar, E. R. Walker, J. Fairclough, A. Bennett (Warrington), W. V. Grainger, T. D. Walker, D. R. Strang, Caleb Smith, J. K. Slater, J. H. Brough, Captain Nowell, George Jager, J. A. Brodie, H. L. Brough, Wm. Edmonds, Arthur Robinson (St. Helens), W. J. Bradbury, A. H. Milne, and Thomas H. Barker (secretary).

The CHAIRMAN said that they were to have the pleasure of hearing Mr. Shrapnell Smith's remarks upon the question of a more economical transit of goods to and from the docks. They were convinced that the scheme was possible, but the great difficulty in the way was the legislative restriction in the tare weight of the vehicles. Mr. Shrapnell Smith was an authority on the question of motors, and knew perhaps as much about the subject as anybody at the present time in Liverpool, and if the motor haulage system came soon they would have a great deal to thank Mr. Smith for.

Mr. SHRAPNELL SMITH then said:—The members of this Chamber were addressed on this subject, at the invitation of your President, Mr. Alfred L. Jones, on September 9th, 1896, by Mr. Worby Beaumont, when the concluding piece of advice given was, "Stick to your horses for the present." That parting sentence is scarcely to be wondered at when one remembers that the Light Locomotives Act had not then come into operation, but since that date, and largely through support provided by some of your members, the Liverpool Self-Propelled Traffic Association has been successful, by means of meetings, addresses, and competitions, in directing public attention to the important future which lies before modern applications of mechanical power to goods haulage on common roads. It is generally well known, I think, how the wheels of the vehicles which competed in the 1898 trials proved structurally defective when subjected to the hammering action of granite sets and cobble-stones, whilst other minor troubles, *e.g.*, with the condensers and in respect of adhesion, justified that "sitting on the fence" which was the policy adopted by our Liverpool teamowners and shipowners, and by Lancashire manufacturers as a whole. The second trials, which took place in 1899 immediately prior to and in conjunction with the Liverpool Show of the Royal Lancashire Agricultural Society, provided satisfactory evidence that the tyre and adhesion difficulties had been overcome, for none of the wheels gave the smallest trouble, and five out of the six competing vehicles successfully climbed, both unladen and laden, Everton Brow, Brow Side, and Rupert Lane, where the inclination varies between 1 in 9 and 1 in 13, the heaviest load taken up and brought down again being 6½ tons. Yet these trials did not satisfy the judges that the time was ripe for any extensive or general adoption of motor wagons, for in their conclusions of December, 1899, they say:—"The difficulties imposed by meeting the limit of 3 tons tare under the Locomotives on Highways Act, 1896, were again serious drawbacks to ideal construction. The strength of frames and working parts, the area of bearing surfaces, the width of wheel-tyres, the available platform area, the stoutness of the platforms and woodwork generally, and the diameters of axles and shafts, were consequently reduced below what is compatible with a satisfactory life in commercial work." This limit of tare is the great drawback to the undertaking of really heavy work, and here again has this Chamber done good service to the cause of automobilism by moving, and securing the adoption of, a resolution at the recent spring conference of the Associated Chambers. As a result, the memorial of the Automobile Club to the President of the Local Government Board will be supported by a second powerful memorial praying for the same modification of the 1896 Act, viz., the substitution of a maximum weight per inch width of tyre per wheel for the rigid and seriously repressive limit of 3 tons as the total tare weight of any vehicle.

In order to see whether manufacturers could improve their designs so as to produce an efficient vehicle under the 3-ton limit of tare, the Association decided to allow an interval of two years between their second and third trials. The result has been that all the vehicles have grown heavier, and there is now another strong argument in favour of the desired increase. As a tentative clause in the Act, that controlling the tare has served its end of forcing manufacturers to put forth their best efforts in design and workmanship, but it is hard to imagine why the tare weight should not have been equal in the first instance to at least that unit of traffic which the motor vehicle replaces, viz., a lurry and three horses weighing, say, 4½ tons. Of course, there was no experience of this type of vehicle in 1896, seeing that only light pleasure carriages of foreign build and traction-engines existed. We have, however, every reason to hope that the Engineer Inspector who will represent the President of the Local Government Board at our forthcoming trials will be clearly satisfied that the extra weight involves no risk and possesses many advantages. In fact, we sincerely feel that our disabilities should be removed before the end of the present Session, and it cannot be gainsaid that an increase is all-important for the future development of road haulage. This means improved internal communication, the improving of land in agricultural districts, and the provision of a light railway to the very door of every farmer in the country. There is no doubt that Liverpool stands to benefit as much as, if not more than, any other city or port in the country, but it is equally certain that the advantages of mechanical transport will gradually be appreciated throughout the United Kingdom. The average daily mileage of a motor wagon, when upon straightforward work, is from

35 to 40 miles, and whilst this distance, measured from many of our ports, brings one into sparsely-populated districts, such range of action opens up great possibilities for Liverpool and a few other ports in particular. We have at hand in the self-propelled lurry an inoffensive means of conveying raw materials or merchandise from point to point without the intervention of any handling or breaking of bulk, in addition to which cartages are absorbed into the one journey, and terminal delays are avoided. No elaborate preliminaries are required; neither Parliamentary powers nor permanent way.

We ask, not unnaturally, at what cost can this service be performed. Well, fortunately, there is now the several years' experience of users in various parts of the country, and to their records I have had free access. The following tables of working costs have been compiled most carefully from actual results, with extra charges to compensate for the bad condition of Lancashire roads in many parts of the county, and it is satisfactory to find that they corroborate the judges' estimates of the previous trials and the curves of costs included in Professor Hele-Shaw's paper on "Road Locomotion" before the Institution of Mechanical Engineers 12 months ago:—

Estimates for Lancashire of the Average Annual Working Cost of Motor Wagons, according to Roads and Loads.

Class of Work.		Weight Capacity.	
Per week { 70 hours under steam. 5½ days. 50 weeks per annum.		Self-contained Motor Wagon, 4 tons.	Motor Wagon and Trailer, 7 tons.
Prime Cost		£600	£675
Interest, at 5 per cent. per annum ...		30·0	33·75
Depreciation, at 15 per cent. per annum...		90·0	101·25
Fuel—Furnace coke, at 15*s.* per ton ...		63·0	94·5
Wages—Driver, at 35*s.* per week... ...		91·0	91·0
Assistant, at 17*s.* 6*d.* per week ...		—	45·5
Repairs and adjustments		75·0	90·0
Water, lubricants, and sundries		20·0	25·0
Insurances		12·0	15·0
Total per annum ...	£	381·0	496·0
Vehicle-miles per annum (280 *days*)—			
(A) On bumpy and badly-paved roads, 30 miles per day.		8,400	8,400
(B) On average granite sets, &c., 35 miles per day.		9,800	9,800
(C) On good macadam, 45 miles per day		12,600	12,600
Net ton-miles per annum—			
A	with full load	33,600	58,600
	,, ¾ ,, ...	25,200	44,100
	,, ½ ,, ...	16,800	29,400
B	,, full ,, ...	39,200	68,600
	,, ¾ ,, ...	29,400	51,450
	,, ½ ,, ...	19,600	34.300
C	,, full ,, ...	50,400	88,200
	,, ¾ ,, ...	37,800	66,150
	,, ½ ,, ...	25,200	44,100
Cost per net ton-mile—			
A	with full load	2·7*d.*	2·0*d.*
	,, ¾ ,, ...	3·6*d.*	2·7*d.*
	,, ½ ,, ...	5·5*d.*	4·0*d.*
B	,, full ,, ...	2·3*d.*	1·7*d.*
	,, ¾ ,, ...	3·1*d.*	2·3*d.*
	,, ½ ,, ...	4·7*d.*	3·5*d.*
C	,, full ,, ...	1·8*d.*	1·3*d.*
	,, ¾ ,, ...	2·4*d.*	1·8*d.*
	,, ½ ,, ...	3·6*d.*	2·7*d.*

These results are to be obtained from a motor capable of dealing with no larger unit than one of 7 tons when fully loaded, *i.e.*, 4 tons on the motor wagon and 3 tons on a trailer, this being the maximum obtainable under the 3-ton limit. Shortly, as will be demonstrated at the forthcoming trials, this weight of freight will be increased to not less than 10 tons, *i.e.*, 6 or 7 tons on the back of the motor wagon and 3 or 4 tons on the single trailer allowed by law. Increased economy of working will result proportionately, and I might here mention in passing that, although the motor wagon deals with small units and has high charges per ton for the driver and attendant, it differs in several important respects from the traction-engine which is capable of hauling as much as 30 or 40 tons of freight in three trucks. I place the principal features of the two systems of haulage side by side, in order that those who are interested may form their own opinions, but have no intention of abusing the traction-engine, which suits many classes of work.

Motor Wagon.	*Traction-Engine.*
Lurry design.	Locomotive design.
Smooth tyres.	Ribbed tyres.
Load, or major portion, carried on platform.	Load hauled on trailing wagons.
Legal speed, 5 miles per hour throughout.	Legal speeds: 4 miles per hour in the country and 2 miles per hour in towns.
One man in charge.	Three men in charge.
No time regulations apply.	Operations hindered by limits upon times of working.
Each 4 or 7 tons has its own motive power and driver.	Clumsiness of distribution at termini.
Economy with a load of 4 tons.	Large trains essential to economy.

Town Haulage.

It is very difficult to give comparative figures for horse-drawn *versus* motor wagon traffic. The costs vary in different parts of the country, and the performance is seldom the same in any two cases. For town work, therefore, I shall content myself by saying that a large number of users have found that one motor wagon will do the work of three two-horse drays. The inclusive cost per annum is that for a service rendered upon average granite sets, and, from the table given earlier in my address, proves to be £381 even if the vehicle travels as much as 35 miles per working day. Hence, the cost per horse, inclusive of depreciation, repairs to lurries and gear, wages, fodder, bedding, veterinary attendance, farriery, stabling and all other charges must not exceed £64 per annum to be as economical.

The Forthcoming Trials in Lancashire.

Passing now to the arrangements for the trials of motor vehicles for heavy traffic which are to be held from June 3rd to 7th, it is satisfactory to find that there will probably be not less than 13 vehicles taking part, against six in 1899 and four in 1898. The classification and entries are as follows:—

CLASS A.—Load, 1½ tons; maximum tare, 2 tons; minimum level platform area, 45 square feet; minimum width of driving tyres, 3 inches; speed, eight miles per hour.

Official No.

A 1. } Geo. F. Milnes and Co. (Limited), Motor Department,
A 2. } "Motoria," 17, Balderton Street, Oxford Street, W.

CLASS B.—Load, 5 tons; maximum tare, 3 tons; minimum level platform area, 75 square feet; minimum width of driving tyres, 5 inches; speed, five miles per hour.

B 1. The Lancashire Steam Motor Company, Leyland, near Preston.
B 2. The Mechanical Transport Company, temporary address, 165, Cromwell Road, S.W.

CLASS C.—Minimum load, 5 tons; no tare limit; minimum level platform area, 95 square feet; minimum width of driving tyres, 6 inches; speed, five miles per hour.

C 1. The Thornycroft Steam Wagon Company (Limited), Chiswick and Basingstoke.
C 2. } C. and A. Musker (Limited), Tue Brook, Liverpool.
C 3. }
C 4. Simpson and Bibby, Pomona Engine Works, Cornbrook, Manchester.

CLASS D.—Minimum load, 4 tons; no tare limit; level platform area not specified; minimum width of driving tyres, 4 inches; speed, five miles per hour.

D 1. The Thornycroft Steam Wagon Company (Limited).
D 2. T. Coulthard and Co. (Limited), Cooper Road, Preston.
D 3. } Mann's Patent Steam Cart and Wagon Company (Limited),
D 4. } Canning Works, Dewsbury Road, Leeds.
D 5. Simpson and Bibby.

The vehicles in Class A are propelled by internal combustion engines using deodorised naphtha, or petroleum spirit, of 0·680 specific gravity; the others are steam-propelled but comprise a great variety of design, including several boilers of the "flash" or instantaneous generation type. Electricity is again unrepresented. Classes C and D are to be watched specially by the Local Government Board, and the Inspector will report upon their working with particular reference to their tare weight.

Judges.

The following gentlemen have accepted their nomination as Judges:—Mr. Everard R. Calthrop, M. Inst. C.E., M. Inst. Mech. E.; Mr. S. B. Cottrell, M. Inst. C.E., M. Inst. Mech. E.; Professor H. S. Hele-Shaw, F.R.S., LL.D., M. Inst. C.E., M. Inst. Mech. E.; Dr. Boverton Redwood, F.R.S.E., F.I.C., F.C.S.; Sir David Salomons, Bart., M.A., Assoc. M. Inst. C.E.; Mr. Henry H. West, M. Inst. C.E., M. Inst. N.A., M. Inst. Mech. E. Mr. Ernest A. Rosenheim, B. Sc., A.I.E.E., will act with me as assistant honorary secretary, and Mr. Henry Fowler, Assoc. M. Inst. C.E., M. Inst. Mech. E., as honorary controller of records.

Visitors.

The trials will be attended by prospective users from all parts of the United Kingdom and abroad. The principal visitors will include representatives of four Government Departments, the High Commissioner for Canada, and five of the Agents-General for the Colonies. The Secretary of State for War has appointed the following six officers:—Colonel C. H. Scott, C.B., R.A.; Lieut.-Colonel F. B. Elmslie, R.A.; Lieut.-Colonel H. C. L. Holden, R.A., F.R.S., Superintendent of the Royal Gun Factory; Lieut.-Colonel R. E. Crompton; Captain F. Lindsay Lloyd, R.E.; Captain C. H. H. Nugent, R.E. The India Office have appointed Colonel Scott, as above, who is Ordnance Consulting Officer for India, and Commander G. T. Wingfield, R.N., Superintendent of the India Store Department. The Postmaster-General has appointed Mr. Francis Salisbury, Postmaster of Liverpool, and the President of the Local Government Board, Mr. G. W. Willcocks, M. Inst. C.E. Lord Strathcona will be represented by the Assistant Canadian Government Agent, Mr. G. H. Mitchell, of Liverpool. The Agents-General who hope to come down are:—Lieut.-General the Hon. Sir Andrew Clarke, R.E., G.C.M.G., C.B., C.I.E. (Victoria and Tasmania); the Hon. Sir John Alexander Cockburn, M.D., K.C.M.G. (South Australia); the Hon. Sir Edward Horne Wittenoom, K.C.M.G. (Western Australia); and Sir Walter Peace, K.C.M.G. (Natal). A number of municipal corporations have also intimated their intention of sending deputations to watch the competition, whilst the pleasure side of automobilism will be well represented by the leading members of the Automobile Club, who have arranged to tour down to Liverpool direct from the Gordon-Bennett race in France. It is hoped by the Association that all the trading and commercial bodies of Liverpool and Lancashire will give close attention to the trials and their results. Further, the co-operation of private owners of light carriages in following the several runs is asked.

Depôts and Routes.

Monday, June 3rd, will be devoted to hill-climbing tests at Everton and manœuvring tests at the docks. The Liverpool depôt, where the vehicles will be on exhibition, is the shed and open space at the west side of the George's Dock. This has been generously placed at the disposal of the Association by the Mersey Docks and Harbour Board. Accommodation for the visiting light carriages will be provided, free of charge, by Messrs. Hooper and Simmons, Slater Street, and Messrs. J. Blake and Company, Beaumont Street (old tramway depôt). Belle Vue has been placed at the disposal of the Association as the Manchester depôt, by the courtesy of Messrs. John Jennison and Co., and the Artillery Barracks, King Street, Blackburn, by the kind permission of Colonel Thom and officers of the Lancashire Artillery Volunteers (third brigade). The routes and approximate time-tables for the four distance trials will be as under:—

Tuesday, June 4th.—Liverpool (George's Dock) depart 9.15 a.m., Widnes (Town Hall) arrive 11.45 a.m., Warrington (Patten Arms Hotel) arrive 1 p.m. Warrington depart 2 p.m., for Manchester *viâ* Hollinfare and Eccles. Manchester (Town Hall) arrive 5.15 p.m., Belle Vue (Longsight entrance), 6 p.m.

Wednesday, June 5th.—Albert Square depart 9.15 a.m., Bolton (Town Hall) arrive 12.15 p.m. Bolton depart 1.30 p.m. for St. Helens *viâ* Atherton, Leigh, Pennington, Newton, and Haydock. St. Helens (Town Hall) arrive 4 p.m., Liverpool (George's Dock) arrive 6.15 p.m.

Thursday, June 6th.—Liverpool (George's Dock) depart 9.15 a.m. for Wigan *viâ* The Horns, Knowsley, Rainford, and Billinge. Wigan (Market Square) arrive 1 p.m. Wigan depart 2 p.m., Chorley (Cattle Market) arrive 3.45 p.m., Blackburn (Artillery Barracks) arrive 6 p.m.

Friday, June 7th.—Blackburn (Artillery Barracks) depart 9.15 a.m., Preston (covered market) arrive 11.30 a.m., Rufford (Hesketh Arms) arrive 1.15 p.m. Rufford depart 2.15 p.m., Ormskirk (Clock Tower) arrive 4 p.m., Liverpool (George's Dock) arrive 6.15 p.m.

Supplies of "Pratt's Motor Car Spirit" will be provided at the terminal depôts by Messrs. the Anglo-American Oil Company (Limited).

Local Committees.

Influential committees have been formed at the nine important towns embraced by the itineraries. The full lists will be included in the official programme, but I may at once state that the Association is receiving most important assistance in the organising of the trials from these committees. It has been sought, and successfully, to secure the co-operation of Lancashire manufacturers who are prospective users of motor wagons and control a large volume of traffic.

Loads.

In the "Particulars of Competition" it states:—"The Association will arrange with Lancashire manufacturers and Liverpool shipowners for the provision of loads of general merchandise, which will be collected, transported, and delivered free of any charge, as a demonstration that the motor wagon is a practical and commercial success." I am pleased to be able to say that the arranging of loads has been the least difficult of the work of organisation, for, contrary to what one might have expected, there appears to be more interest in the matter in East Lancashire even than in Liverpool, but if any members of the Chamber will offer the Association a few loads on one or more of the four days, I shall be pleased to try to arrange for their conveyance. The goods already promised are of the most general character, such as (inwards) cotton, timber, sugar, pig iron, grain, provisions, currants; (outwards) cloth, cased machinery, flour, bales of cotton fabrics, soap.

Future Developments.

The Association has nothing to do with the future commercial development of heavy motor traffic. There are, without doubt, several proposals on foot for motor-wagon haulage companies in different parts of Lancashire, though premature promotions would be most unwise, and are to be condemned. In order to keep the position of the Liverpool Self-Propelled Traffic Association clear, I cannot do better than quote from the Liverpool Press of October 30th, 1900, in the report of a meeting of the Council of the Association:—"Mr. Shrapnell Smith having reported to the Association that propositions for the formation of road-carrying companies were under consideration in Liverpool and Manchester, it was resolved to announce that the Association wished it to be clearly understood and placed on record that, having been formed for the purpose of scientific investigation only, it has no connection whatever with any such undertaking." This disclaimer does not mean that commercial developments will not follow in the near future, but that the Association will have no part in them. I have gathered from the members of the local committees that a large number of orders for vehicles hang upon the results of these trials, and the majority of the gentlemen constituting them are prospective users of wagons for goods haulage of one kind or another. It is also probable that the conveyance of agricultural produce to the large towns, and of coal from the pits to the bunkers, will attract no small measure of attention in the near future. I feel every confidence in predicting a wide adoption of motor vehicles for heavy traffic as the great feature of the next few years, and, in concluding my address, desire to express my thanks to the Chamber for this opportunity of giving an outline of the arrangements for the 1901 trials.

Professor HELE-SHAW remarked that the forthcoming trials could not fail to bring out points of the greatest importance to the users of heavy motor vehicles. These trials did not bring out all the conditions under which motors had to work, for it was not all a question of performing certain tests satisfactorily; there was wear of the machine and other conditions to be taken into consideration. There were not in the whole range of engineering, not even in the case of torpedo boats, cases in which the strain upon the machinery was so great as in motor vehicles. In these they had to compress into a small space very complicated machinery. He would like the figures given in his paper by Mr. Shrapnell Smith relating to the cost of running these vehicles to be studied. They embodied the experience of a large number of firms who during the past three years had largely used the motor vehicles. He also wished to call attention to the fact that motor vehicles had, to his knowledge, gained by visits to manufacturers' works, been immensely improved, not externally, but as regarded better and more economical working, and these trials would show

marvellous improvements. He hoped this would encourage as many gentlemen as possible to be present. It was not intended to hold another series of trials, as it was thought the Association had given the movement a fairly good start, and it now remained for the commercial people to push it on.

The CHAIRMAN said he was very glad that Professor Hele-Shaw called attention to the figures given by Mr. Shrapnell Smith. One could easily understand how very economical these motor wagons would be in bringing coal, say, from the pits of the St. Helens collieries direct to the houses of Liverpool. They had spent a great deal of money in these trials, and this was a movement that Liverpool should be proud of, because this industry was being materially helped on by the aid of the Association. They knew there was no finality in the economical working of machinery, and he was convinced that the motor vehicle was coming into extended use, but they must hurry on, and get the tare fixed upon a better basis.

Mr. AVELING, of Messrs. Aveling and Porter, traction-engine makers, spoke favourably of motor vehicles.

Mr. SHRAPNELL SMITH, in replying, said that with regard to Mr. Alfred Holt's scheme, motor vehicles could be worked upon a small scale, and their numbers gradually increased and their scope enlarged if they were found successful. While the Association had nothing to do with syndicates for promoting the industry, yet he had been approached by one, which proposed to work with a capital of £50,000. There would be no Parliamentary or other expenses, as would be the case with Mr. Holt's scheme. With regard to traction power, the advantage of the motor vehicle was its great handiness. When a motor of any description could not extricate itself from the traffic, a great deal of time must be wasted.

Mr. COX moved a vote of thanks to Mr. Shrapnell Smith. They not only owed him a debt of gratitude for his address that afternoon, but also for the four or five years' hard work he had given to the Association. To a place like Liverpool, which had to a large extent been strangled by the railways, the question of economical haulage was a most vital one indeed. It fell to his lot at the annual conference of the Associated Chambers of Commerce to move the resolution urging the increase of tare to be allowed, and which, he was glad to say, was passed unanimously. Colonel GOFFEY, V.D., seconded.

Mr. SMITH thanked the meeting, and mentioned that a short time ago one Manchester firm which hired a motor saved as much as £14 per week by making the change. The proceedings then terminated.

The Texas Oil Field.—The recent discovery of what appears to be an enormous oil field in Texas, while it is of general importance to the manufacturing community, is of special interest to the industry which we represent, both the lighter steam and explosion engine automobiles being dependent on the products of the oil wells for their motive power. The indications hitherto obtained point to the conclusion that the Texas oil field is an enormous one. Rough estimates, based on the "gushers" that have already been tapped, lead to the supposition that its ultimate output will probably be at least double that of the Pennsylvanian oil fields. An important feature is that the railway connections are so distributed as apparently to prevent the possibility of any monopoly in the transport of the oil arising, while it is situated closer to an open sea than any other oil field of anything like the same extent, or probable output. Its discovery can hardly fail to have the effect of reducing the cost of oil, whether heavy or light, throughout the world, and this certainly ought to benefit the automobile industry. A curious feature of the Texas oil, if it be the case, is that it resembles the Russian oils in chemical composition. Such at least is the statement that has appeared in the daily Press. In a previous article (THE AUTOMOTOR JOURNAL, April, 1900), it was pointed out that while the Pennsylvanian oils are paraffins, the Russian oils, as shown by Markovnikow, belong to the olefine series. This would certainly be rather remarkable, as hitherto oil fields relatively so close together as Texas and Pennsylvania have usually supplied oils of the same general chemical composition.

Roads Improvements Association.—This Association has recently made a new departure in its work, and proposes to initiate a considerable movement for the reform of the existing system of highway administration. The Secretary, Mr. W. Rees Jeffreys, points out that it will be readily seen how a movement of this kind will fit in with and assist the efforts now being made by the Automobile Club to oppose the restrictions upon automobilism proposed by many highway authorities. The Hon. J. Scott Montagu, M.P., and Messrs. W. Worby Beaumont and H. P. Boulnois have been elected representatives of the A.C.G.B.I. upon the council of the Association, Mr. Worby Beaumont being elected Vice-Chairman. The A.C.G.B.I. Committee have voted a grant of £25 towards the expenses of the Association,

RACING AND RECORDS.

Great Britain.

A.C.G.B.I. HILL CLIMBING AND CONSUMPTION TRIALS.—These trials, which took place on the 2nd inst. upon the Uxbridge and High Wycombe Road as far as Dashwood Hill, introduced a novel feature for the purpose of ascertaining the amount of fuel consumption on continuous up gradients. The programme provided for the cars starting from Prince's Road, Holland Park Avenue, and travelling to the foot of Dashwood Hill, High Wycombe, over a course of 31 miles, the quantity of fuel being taken before starting and upon arrival at this point, consumption thus being ascertained over a run of 31 miles. Dashwood Hill, a measured distance of 1,173 yards, with gradients in it of 1 in 9·8 upwards, with an average of 1 in 14·3, had then to be ascended seven times, the engine being stopped at the top each time and the descent made by gravity, the engine being restarted at the bottom and the ascent again made. When the ascents and descents had been thus made the fuel was again measured, thus arriving at the consumption over a run uphill of four miles, representing a total ascent of 1,300 feet, the mean average speed being arrived at by means of the time records of the seven ascents. At the completion of this test the cars were again filled up with fuel, and made a return run back to Prince's Road, over the 31 miles of road, a comparison thus being possible between the consumption on the outward run and the consumption on the homeward run. Amongst the regulations in force it was specified that :—

No vehicle will be admitted to the trial unless its fuel tank be fitted with a tap or other arrangement at the lowest point of the tank by which the contents of the tank may be entirely drawn off in reasonable time.

Speed.—In order to prevent excess in speeds vehicles will not be permitted to pass certain points before the expiration of a certain period from the time of starting plus the total time occupied by stops, from all causes, since the start.

If a vehicle arrive before time at one of these points and has to wait for the expiration of the period, the stop will be counted an involuntary stop and will be thus recorded on the certificate. Detours to avoid arriving before time at a point will be accounted as stops.

If on examination of observers' time records it be found that a vehicle has been driven at excessive speed, the vehicle will be disqualified.

Ten vehicles started in the contests, Lieut.-Colonel Holden and Mr. Worby Beaumont taking charge of the checking of the fuel quantities at Dashwood Hill, whilst the starting upon the hill-climbing trials was in the hands of Mr. R. E. Phillips at the bottom of the hill, and Mr. Claude Johnson at the top of the hill, the times being taken by Mr. Swindley and Mr. Bidlake in the same positions respectively. A Delahaye vehicle was placed at the disposal of the judges by the Automobile Manufacturing Company, of 48, Long Acre, and Mr. T. B. Browne placed himself and his 6-h.p. Panhard at the disposal of the Club for the day; Mr. Browne and Mr. Lyons Sampson superintending the measurement of fuel to the competing vehicles at Prince's Road, Holland Park, for the start and finish. The honorary observers were Messrs. R. B. B. Bruce, C. L. Freestone, R. W. Buttemer, R. Horner Wyeth, the Right Hon. Sir John Macdonald, K.C.B., W. H. Kitto, Edward Seamell, A. Ledger, and — De Wilton. The contests were divided into three trials as follows :—

Trial A.—To run without stop from Notting Hill *viâ* Uxbridge and High Wycombe to the foot of Dashwood Hill, about 31 miles.
Trial B.—The return journey over the same course.
Trial C.—To ascend seven times the steep portion of Dashwood Hill. The seven ascents represent four miles in distance and a total ascent of 1,470 feet. Average gradient = 1 in 14·3. The average speed is arrived at by taking a mean of the time records of the seven ascents.

Note.—No speeds in excess of 12 miles per hour were recorded or recognised.

The results are set out in the table in the next page.

The whole of the cars had pneumatic tyres and electric ignition was used by all the vehicles with the exception of Nos. 1, 2, and 6, which had tube ignition also. The transmission in Nos. 4, 7, and 10 was by gear; Nos. 1, 2, 3, 6, and 9, gear and chain; No. 5, gear and driving axle; and No. 8, gear driven and one belt. In Trials A and B the whole of the vehicles completed the course up to the legal average speed throughout, and with the exceptions noted in the above table, non-stop runs were made. The weather was fine with a slight wind blowing, the surface of Dashwood Hill being dusty and loose.

Entered by	System and Horse-power.	Cylinders.	Stroke.	Revs.	Weight. Light.	Weight. With Passengers.	Consumption. Trial A.	Consumption. Trial B.	Consumption. Trial C (hill).	Remarks.
					cwt. qrs. lbs.	cwt. qrs. lbs.	gals. pasngs.	gals. pasngs.	gals. pasngs.	
1. Hon. J. Scott Montagu, M.P.	24-h.p. Daimler ..	Four 5-inch ..	6-inch ..	720	33 2 0	37 2 0	2·125 3	1·77 3	1·0 2	Trial A, one stop 28 minutes; faulty induction valve.
2. Mr. John R. Hargreaves, J.P.	19 ,, ,, ..	Four 94-mm. ..	130-mm. ..	720	—	—	Entered for Trial C only.		0·875 2	Four seats, but only driver and one carried.
3. Mr. J. A. Holder.. ..	16 ,, Napier ..	Four 4½-inch ..	6-inch ..	700	30 3 0	33 3 0	—	—	—	Abandoned at end of three miles through choked fuel pipe.
4. Motor Car Co. (Ltd.) ..	8½ ,, Décauville ..	Two 4-inch ..	4¼-inch ..	750	12 1 20	15 0 0	1·5 2	1·52 2	0·55 2	Speed on Hill Trial (C), 8·36 m.p.h.
5. New Orleans Motor Co. (Ltd.).	7 ,, New Orleans	Two 3⅝-inch ..	4-inch ..	900	10 3 7	15 1 21	1·03 3	0·875 3	0·33 3	,, ,, 10·36 ,,
6. Daimler Motor Co. (Ltd.)	6½ ,, Daimler ..	Two 90-mm. ..	120-mm. ..	720	21 3 0	27 0 0	1·76 4	1·187 4	0·48 4	,, ,, 7·40 ,,
7. Motor Car Co. (Ltd.) ..	5 ,, Décauville ..	Two 3⅛-inch ..	3¼-inch ..	1,200	7 3 0	10 1 14	*1·37 2	†1·45 2	0·31 2	,, ,, 8·68 ,,
8. Sports Motor Car Co. ..	5 ,, Mayfair ..	One 105-mm. ..	110-mm. ..	1,100	—	—	—	—	—	At end of nine miles, stopped four minutes for heated axle, and at 12th mile stopped seven minutes, and at 13th mile run was abandoned owing to same cause.
9. Wolseley Tool and Motor Car Co. (Ltd.).	5 ,, Wolseley ..	One 4½-inch ..	5-inch ..	750	14 1 0	18 1 0	1·046 3	0·97 3	§0·337 3	Speed on Hill Trial (C), 3·76 m.h.p.
10. Ariel Motor Co. (Ltd.) ..	3 ,, Ariel Quad. ..	One 80-mm. ..	76-mm. ..	1,800	4 3 0	7 2 0	0·58 2	0·43 2	‡0·178 2	,, ,, 10·88 ,,

§ The car stopped twice on first ascent owing to choked fuel pipe. The first ascent occupied, with stops, 31 mins. 51 secs. The car stopped also on the third ascent, occupying 7 mins. 28 secs. The five other ascents were made at an average speed of 9·84 miles per hour.

* 3¾ minutes' stop to pick up battery.
† 19¼ minutes' stop for puncture.
‡ In the seven ascents (four miles) the pedals were used to assist the engine over a total distance of about one-third of a mile.

ON April 27th the English Motor Club held a series of control contests at the Crystal Palace, where a course had been marked out, measuring about two miles, with some very severe gradients, and embracing every form of sharp turning, curves, &c., calculated to test the skill of the drivers in handling their vehicles. There were eight stations of control over the route. For the various classes there were 80 entries, but some 15 of these were entered in duplicate in Class H, for racing cars, and the 200 yards Speed Contest. The majority of the entered vehicles were up to time, although the contests, announced to commence at 2.30, did not start until about 3.15. The results were as follows :—

Class A (motor bicycles).—T. H. Leonard (1¾-h.p. Werner), 6m. 17s.
,, B (motor cycles, free engines barred).—J. W. Stocks (3-h.p. Ariel), 8m. 31⅘s.
,, C (motor cycles, with free engines).—C. Jarrott (2¾-h.p. De Dion), 6m. 23⅘s.
,, D (cars driven by ladies).—No award, as Mrs. Kennard and Mrs. Boyle were both disqualified for overrunning the control marks.
,, E (voiturettes under 6-h.p.).—C. Jarrott (4½-h.p. De Dion), 6m. 26s. ; R. H. Fuller (4½-h.p. De Dion), 6m. 37⅘s. ; G. D. Barnes (4-h.p. Peugeot), 7m. 36s. ; H. Sharp (5-h.p. Mors), 7m. 46⅘s.
,, F (cars, 6-h.p. and under 12-h.p.).—H. du Cros (9-h.p. Napier), 6m. 27s. ; S. H. Pearce (9-h.p. Napier), 6m. 35s. ; W. du Cros (9-h.p. Napier), 7m. 5⅘s. ; Hewetsons (6-h.p. Benz), 7m. 45s.
,, G (cars, 12-h.p. and over).—Hon. C. S. Rolls (24-h.p. Mors), 6m. 13s.
,, H (racing cars).—Hon. C. S. Rolls (24-h.p. Mors), 5m. 51s.
,, I (steam cars).—R. H. S. Abbott (4½-h.p. Locomobile), 5m. 41s. ; W. N. Letts (4½-h.p. Locomobile), 5m. 59⅘s.
,, K (electric cars).—Shippey Bros. (Canadian Electric Vehicle Company), 9m. 36⅘s.

200 *yards Speed Competition* (*Flying Start*)—
C. Jarrott (10-h.p. De Dion tricycle), and Hon. C. S. Rolls (24-h.p. Mors), 13⅗s. ; S. F. Edge (6-h.p. De Dion tricycle), 15s. ; A. W. Ginder (4½-h.p. Locomobile), 15⅖s. ; R. H. S. Abbott (4½-h.p. Locomobile), 15⅘s. ; J. H. Leonard (1½-h.p. Werner bicycle), 18⅕s. ; Hon. C. S. Rolls (4½-h.p. Locomobile, 19⅕s.

In the 200 yards Speed Race the course was quite unsuitable for a flying start, especially for the bigger cars. The officers responsible for the meeting were :—Judges : Messrs. H. L. Clarke, L. Schlentheim, and A. J. Wilson ; Timekeepers : Messrs. F. F. Bidlake, A. V. Ebblewhite, and H. J. Swindley ; Hon. Secretary : Mr. F. W. Baily.

America.

LONG ISLAND AUTOMOBILE CLUB 100 MILES ENDURANCE TEST.—This was held on April 20th in extremely bad weather, the rain coming down almost from the start without intermission, whilst in the latter part of the run it was practically a driving storm ; 15 vehicles out of 25 entries started for the contest ; 10 of these completed the whole of the course in creditable time, in spite of the adverse weather. The course was selected over some of the best macadamised roads on Long Island, commencing and ending at Pettitt's Hotel, Jamaica. The Club had gone to enormous trouble in mapping out and measuring the roads, erecting sign posts and indicating boards for the competitors, &c. The maximum speed allowed in the open country was 15 miles per hour, and eight miles through villages and towns, these being the present legal restrictions in the State. The maximum time limit allowed was 12½ hours for the full course, whilst the original minimum time limit of 8h. 20m. (equal to an average speed of 12 miles) was reduced to 6h. 40m. (equal to an average speed of 15 miles per hour) owing to the general misunderstanding which seems to have arisen between the competitors and timekeepers as to the exact meaning of the 15 miles speed limit rule. In arriving at the percentage of efficiency the Committee used as a basis for the calculation, 500 minutes, corresponding to an average speed of 12 miles per hour for the whole course. On this basis, every five minutes of delay to a vehicle caused a reduction of 1 per cent. in its efficiency, allowances being made for any compulsory stops, &c., as provided by the rules. The course included one severe hill-climbing contest, which it was compulsory for the vehicles to ascend satisfactorily to entitle them to awards. The results were :—

1,000 lbs. Vehicle Class.—5-h.p. De Dion-Bouton, 6h. 58m. (Silver cup and ribbon.)
1,000 to 2,000 lbs. Class.—Electric Vehicle Company, 7h. 26m. (Silver cup and ribbon.)
Over 2,000 lbs. Class.—Holyoke, 6h. 41m. (Silver cup and ribbon.)

Two vehicles of the Automobile Company of America ("Gasmobile") were disqualified for exceeding the maximum speed limit and covering the course in less than the minimum time allowed, whilst three De Dions and one Automobile Company of America received no award, as they did not complete the full 100 miles course. The other ribbon winners included a Darracq, 7h. 5½m.; a "Packard," 7h. 58½m.; Automobile Company of America, 6h. 56m.; Daimler delivery van, 10h. 40m.; Haynes Apperson, 7h. 11m.

Switzerland.

THE Swiss Automobile Club, on the 14th ult., held an automobile meeting at Geneva in spite of a steady downpour of rain during the run. The course was over 99 kiloms. of road. The entries were restricted to voiturettes weighing a maximum of 500 kilogs., with a maximum of 7-h.p.; 22 entries were received, eight started, and four arrived, M. Georges Richard being first in 3h. 57m. 51⅗s.

France.

LA COUPE PROVINCIAL DU SUD-EST (180 kiloms.) was run off on the Salon–Aix-Avignon–Arles–Salon Road on the 14th ult. Although there were seven cars and three voiturettes entered to compete by five clubs for this challenge cup, the holders of which were the Nice Club, it was a "walk over" for the latter, as although the Lyons Moto Club had issued the original challenge, their representative makers, Messrs. Audibert and Lavirotte, declined to compete, Messrs. Schneider and Marge having to be put up in their place, but the former, through an accident, never reached the starting point, and the latter was stated to be too ill to start. M. Chauchard and M. Gondoin, both driving 20-h.p. Panhards, represented the Nice Club, who retain the cup, Chauchard covering the distance in 2h. 45m., giving an average of about 66 kiloms. per hour. The other results were:—

Voiturettes.—Moto Club de Lyons (M. Bullinger), 4h. 47m.
Motor cycles.—A. C. d'Avignon (M. Montillet), 3h. 42m. 59s.

DRAGUIGNAN–HYERES AND BACK (203·468 kiloms.).—The results of this event, held on April 21st and 22nd, were:—

Series A (motor cycles).—1. Marius, 4h. 14m.
Series B (voiturettes).—1. De Stoulzx, 6h. 50m.
Series C (two-seated cars).—1. Gondoin, 5h. 11m.
Series D (four-seated cars).—1. Chauchard, 4h. 9m.

COURSE DU CATALOGUE.—For the second year this competition, organised by *La France Automobile*, and held under the A. C. de France rules, took place on April 28th, in ideal weather, when out of 62 entries, 43 took part, 34 covering the course satisfactorily. The classification was, as before, regulated by the selling price and not by the weight, and was divided into six categories, the 1st (priced under 4,000 francs) and the 6th (electric vehicles) having to cover 77 kiloms., and the other four double the distance, viz., 154 kiloms. The road taken was from Melun and back, *viâ* Nangis, Panfou, Sivry, &c. (77 kiloms.), the route being covered twice to make up the 154 kiloms. The following are the results and net times, after allowing for the neutralised portions of the route:—

1st Category (under 4,000 francs), 77 kiloms.; 24 entries, 21 starters.—1. Gladiator, 1h. 19m. 22⅗s.; 2. Gladiator, 1h. 29m. 48⅗s.; 3. Société des Téléphones, 1h. 36m. 55⅖s.; 4. Veuve Levassor de Boisse, 1h. 46m. 55⅖s.; 5. Hurtu, 1h. 48m. 33⅕s.; 6. Brierre-Cottereau, 1h. 49m. 54s.; 7. Créanche, 1h. 51m. 34s.; 8. Gladiator, 1h. 53m. 54s.; 9. Peugeot, 1h. 54m. 2⅕s.; 10. Brierre-Cottereau, 1h. 55m. 17⅖s.; 11. Brierre-Cottereau, 1h. 55m. 37⅕s.; 12. Darracq, 1h. 57m. 59s.; 13. Darracq, 2h. 1m. 16⅗s.; 14. Vinet, 2h. 1m. 29⅖s.; 15. Georges Richard, 2h. 5m. 10⅕s.; 16. Georges Richard, 2h. 29m.; 17. Hautier, 2h. 38m. 35s.; 18. De Riancey, 2h. 39⅕s.; 19. Boyer, 2h. 43m. 29s.; 20. Vinet, 3h. 4m. 10s.

2nd Category (4,000 to 8,000 francs), 154 kiloms.; 23 entries, 14 starters.—1. Darracq, 2h. 32m. 55⅗s.; 2. Gladiator, 3h. 4m. 12⅖s.; 3. Maison Parisienne, 3h. 13m. 3s.; 4. Serpollet, 3h. 18m. 52s.; 5. Gobron-Brillié, 3h. 28m. 20s.; 6. Boyer, 3h. 35m. 54s.; 7. Panhard-Levassor, 4h. 7m. 2⅕s.; 8. Peugeot, 4h. 41m. 32s.; 9. Lesage, 4h. 45m. 40s.

3rd Category (8,000 to 12,000 francs), 154 kiloms.; 8 entries, 4 starters.—1. Richard, 3h. 27m. 53s.; 2. Gobron-Brillié (alcohol), 4h. 11m. 30s.

4th Category (12,000 to 16,000 francs); 3 entries, no starters.

5th Category (over 16,000 francs), 154 kiloms.; 3 entries and starters.—1. Bolide, 2h. 27m. 27⅕s.; 2. De Diétrich, 2h. 41m. 8⅖s.

Electric Vehicles, 77 kiloms.; 2 entries, 1 starter.—1. Maison Parisienne, B.G.S., 3h. 16m. 20s.

The best time for the 177 kiloms. was that of M. Champrobert (Category 5), on a Bolide, 2h. 27m. 27⅕s.

PARIS–ROUBAIX ALCOHOL TRIALS.—Last month (p. 353) we gave the summarised results of these trials, and we now publish the classification of the vehicles in their order of merit according to the mixture employed:—

50 *per cent. of Alcohol.*

Category A.—Vehicle: Nos. 69, 28, 14.
,, C.—Vehicle: Nos. 51, 55, 56, 59.
,, D.—Vehicle: Nos. 15, 67, 62, 61, 9, 82, 60.
,, E.—Vehicle: Nos. 39, 40, 1, 34, 35, 25, 70, 24, 31.
,, F.—Vehicle: Nos. 47, 41, 33, 65, 42, 19, 26, 48, 71.
,, G.—None entered.

75 *per cent. of Alcohol.*

Category C.—Vehicle: Nos. 2, 53.
,, D.—Vehicle: Nos. 3, 75, 54, 52.
,, F.—Vehicle: No. 57.

Pure Alcohol.

Category D.—Vehicle: No. 36.
,, E.—Vehicle: Nos. 12, 77, 16, 43.

Italy.

THE TOUR D'ITALIE.—Italy is the first foreign country to follow the example of the A.C.G.B.I. in carrying out through Italy a similar tour to our 1,000 Miles Trial. This is due to the enterprise of a newspaper entitled *Corrière della Sera*, and a start was made from the Italian Automobile Club at Turin on April 27th, the tour terminating at Milan on the 11th inst., where the competing vehicles remain on exhibition from the 12th, at the International Show now in progress in that city. Two Staff Officers were ordered by the Italian Minister of War to join the trip and to report as to the best types of machines, as the authorities propose establishing a military motor car service. The daily programme of route was as follows:—

1st day: Turin–Gênes, 176·7 kiloms.; 2nd day: Gênes–Spezia, 409·1 kiloms.; 3rd day: Spezzia–Florence, 165·8 kiloms.; 4th day: Florence–Sienne, 65·3 kiloms.; 5th day: Sienne–Civitavecchia, 208·2 kiloms.; 6th day: Civitavecchia–Rome, 70 kiloms.; 7th day: Rest at Rome; 8th day: Rome–Terni, 98·8 kiloms.; 9th day: Terni–Perugia, 91·8 kiloms.; 10th day: Perugia–Rimini, 169·6 kiloms.; 11th day: Rimini–Boulogne, 112·5 kiloms.; 12th day; Boulogne–Padoue, 122·9 kiloms.; 13th day: Rest at Venice; 14th day: Padoue–Brescia, 148·7 kiloms.; 15th day: Brescia–Milan, 99·4 kiloms.

The entries were in two classes, viz.: Class 1, for vehicles covering the full distance (1,642 kiloms.), and Class 2 covering 1,101 kiloms. between Florence, Rome, and Milan, or 1,071 kiloms., Naples, Rome, and Milan. The classes were subdivided into two categories, viz., those travelling at an average of 20 and 30 kiloms. per hour. Altogether there were 71 entries received, and of these the following 33 (the figures in brackets are the official numbers) started in pelting rain on April 27th, viz.:—

1st Category (20 *kiloms. per hour*).

1.* (4) Frederico Johnson, 10-h.p. Mors.
2. (6) Brigatti Luigi, 5-h.p. Renault.
3.* (8) Isotta Fraschini, 5-h.p. Renault.
4.* (9) A. Fraschini, 5-h.p. Renault.
5. (10) Adelmo, 3½-h.p. Benz.
6. (16) Comtesse Elsa Albrizzi and Comtesse Dada Albrizzi (Bernardi car).
7.* (20) Comte Paolo Camerini.
8.* (30) Maggioni Enrico, 10-h.p. Delahaye.
9.* (32) Attilio Bossi, 8-h.p. Fiat.
10.* (35) Cav. Angelo, 8-h.p. Fiat.
11.* (42) Bianchi (*Corrière della Sera*), 8-h.p. Fiat.
12. (43) Carlo Festa, 7-h.p. Peugeot.
13.* (44) Salvatore Centarini, 4-h.p. De Dion.
14.* (45) Laporte, 7-h.p. Marchand.
15.* (50) Cav. Aristi Olivari, 6-h.p. Daimler.
16.* (54) Député M. de Picenardi, 8-h.p. Fiat.
17. (55) Boasso Antono, 3½-h.p. De Dion.

18.* (65) G. Fraschini, 6½-h.p. Isotta et Fraschini.
19. (68) Faglani Michel, motor bicycle.
20. (69) Michel Lanza, 10-h.p. Lanza.
21. (70) Edouard Menhert, 6-h.p. Panhard et Levassor.

2nd Category (30 *kiloms. per hour*).

1.* (2) Comte R. Biscaretti di Ruffia, 12-h.p. Fiat.
2.* (12) Comte Brunetta d'Usseaux, 17-h.p. Panhard et Levassor.
3. (17) Comte Alberto Rignano, 10-h.p. Mors.
4. (22) Comte da Bricherasio, 8-h.p. Fiat.
5.* (25) C. Catti Goria, 7-h.p. Fiat.
6.* (27) De Martino, 8-h.p. Peugeot.
7.* (28) Carlo Festa, 8-h.p. Peugeot.
8.* (29) Georges Berteaux, 12-h.p. Panhard et Levassor.
9.* (31) Attilio Bossi, 8-h.p. Fiat.
10. (59) L. de Predario, 5-h.p. Isotta-Fraschini.
11.* (61) Marcellin, 6-h.p. Darracq.
12. (63) Gianotti Romano, 10-h.p. Fiat.

The vehicles in the second class started from Florence on April 30th, those taking part being :—

1.* (7) M. le Comte Sormani.
2.* (36) Otto Pollack, 3½-h.p. De Dion.
3.* (37) Piero Gruan, Peugeot.
4.* (38) E. Nagliati Ettore, 6-h.p. De Dion.
5.* (66) V. Tonietti.
6.* (49) Adami, 16-h.p. Panhard.
7.* (26) R. Billia, 12-h.p. Fiat.

* Those with an asterisk arrived at Milan.

The programme was carefully adhered to, and the majority of the vehicles successfully finished at Milan on the 11th inst. In some of the towns passed through the automobilists have been quite overwhelmed by the throwing of bouquets of flowers, both from men and admiring women, and the tour appears to have been a huge success, although the weather at times was very bad. Only one serious accident was recorded, no blame even in this case being attached to the driver.

Germany.

Mannheim–Pforzheim–Mannheim (165 kiloms.).—Under the auspices of the Rheinischer Automobil Club this event was run off on the 12th inst., the original intention being that it was to be the German eliminating race for the Gordon-Bennett Cup. The whole of the German makers, however, having retired from taking part in the Gordon-Bennett race, the Benz racer did not think it worth while to run in the present event. M. Tischbein, therefore, for the speed race, "promenaded" over the course in 4h. 2m. with a 35-h.p. Mercedes.

For tourist vehicles the times were: 1. Eugène (7-h.p. Benz), 4h. 31m.; 2. Haguenau, 4h. 42m.; 3. Diétrich I (9-h.p. De Diétrich), 4h. 51m.; 4. Diétrich II (9-h.p. De Diétrich), 5h. 1m.

Light cars: 1. Kirchheim (Decauville-Eisenach), 4h. 20m.; 2. Falke, 4h. 35m.; 3. Ehrhardt (Decauville-Eisenach), 4h. 43m.; 4. Lehmann (8-h.p. Kayser), 4h. 55m.

A Lohner-Porsche electric vehicle on the 12th inst. recorded, in the Exelberg hill-climbing race (4·200 kiloms.), the time of 5m. 39s., beating Gasté's previous record of 6m. 24s.

DOINGS OF PUBLIC COMPANIES.

Edinburgh Autocar Company (Limited). — A general meeting of the shareholders of this Company was held on the 6th inst. at 18, George Street, Edinburgh, for the purpose of receiving from the board of directors an account of the past working and present position of the Company. Mr. John MacDonald presided over a good attendance. In his opening statement the Chairman said that at last meeting the directors had been hopeful of putting the Company on a profit-earning basis, as the cars were doing better in the way of earning then than they had ever done before. The directors estimated that drawings amounting to £120 a week would enable the Company to pay a dividend, and as £100 was then being earned, the directors felt justified in taking such a hopeful view of the situation, and recommended that the Company keep on working. After that meeting the directors made considerable changes in the management and working of the Company. Having made some statements as to the working of the cars, the chairman proceeded to say that the directors had reluctantly come to the conclusion that for various reasons motor cars, as at present constructed, could not be run profitably in the public service. The life of the motor car was not in proportion to the initial cost. In public service cars would not last more than two years, and long before the end of that period the cost of upkeep had become so great as to make them unprofitable. To conduct the business on strictly sound financial lines, they would require to set aside as a sinking fund each year an amount equal to at least 40 per cent. of the initial cost of the present type of car. That fact alone made profitable business impossible. It was now for the shareholders to decide what course they would pursue. The opinion of the board was that they should gradually and carefully wind up the concern, taking time to realise the assets to the best advantage, and endeavouring to dispose of the business as a going concern if possible. With regard to the present liabilities, they were quite able to meet all their ordinary creditors from funds in hand. In reply to a shareholder, the chairman said there were 4,000 debentures. Continuing, he said that when the Company started they were told by experts that the life of a car would be eight years, and that was stated in their prospectus. Their painful experience had been that under two years was the profitable life of a car. After some further discussion, Mr. Reekie moved that an extraordinary general meeting be called with a view of winding up the Company and appointing a liquidator. Mr. Sleigh moved that the Company be carried on. It was also moved that the Company realise the stock with a view to liquidation. Mr. Sleigh withdrew his motion, and a vote was taken on the other two, when the proposal to realise the stock was agreed to, only a couple of shareholders voting for immediate liquidation.

NEW COMPANIES REGISTERED.

[Under this heading we give a full list of new Companies registered which take power to make, deal, or become interested in any manner in automotor vehicles.]

Bowden Brake Company (Limited).—Capital £50,000, in £1 shares. Object, to adopt an agreement with E. Bowden's Patent Syndicate (Limited) to manufacture and deal in the Bowden brake, and any other brakes for velocipedes, cycles, motor cars, &c. The first directors are J. R. Nisbet, J. Dring, and J. E. Young.

Boyes and Co. (Limited), 1, Compton Road, Wolverhampton.—Capital £1,000, in £1 shares. Object, to adopt an agreement between C. F. G. Boyes and T. F. Young of the one part and D. E. Campbell of the other part, for the acquisition of the business of cycle agents and manufacturers carried on by the said parties of the first part at Compton Road, Chapel Ash, Wolverhampton, as Boyes and Co., and to carry on the business of cycle, motor-car, vehicle, and machine makers and agents, &c. No initial public issue.

Electric Railway Omnibus (Limited). — Registered by Morley's, 27, Edgware Road, W. Capital £5,000, in £1 shares. Object, to acquire the business carried on as the Electric Railway Omnibus Company, and to carry on the business of omnibus, cab, and vehicle proprietors, horse dealers, jobmasters, livery-stable keepers, makers of electrical, oil, and other motor vehicles, &c. No initial public issue.

Rutland Yard Riding School and Livery Stables (Limited).—Capital £15,000, in £1 shares. Object, to adopt an agreement with F. W. Giles, H. T. Underwood, T. Richards, and W. E. Woolley for the acquisition of the premises known as Rutland Yard, Knightsbridge, and to carry on the business of jobmasters, cab, automobile, and vehicle proprietors, riding and driving school proprietors, horse breeders, and dealers, &c. No initial public issue. The first directors are H. T. Underwood, T. Richards, W. E. Woolley, and H. C. West.

LAW REPORTS.

Daimler Motor Company (Limited) v. British Motor Traction Company (Limited).——In the Chancery Division, on the 10th inst., Mr. Justice Buckley had before him an action by which the Daimler Motor Company (Limited) sought an injunction to restrain the British Motor Traction Company (Limited) from registering a new Company, which they proposed to form under the name of the Daimler Wagon Company (Limited). The case for the plaintiffs, as opened by

Mr. Astbury, K.C., was that in October, 1893, a syndicate was incorporated under the name of the Daimler Motor Syndicate, and on November 27th, 1895, the assets of that syndicate were sold to the British Motor Syndicate, and the Daimler Syndicate was wound up voluntarily. The British Motor Syndicate, from November, 1895, were the owners of a large number of patents for motors invented by a Mr. Daimler, and not proposing to work the patents themselves they took part in the incorporation of the plaintiff Company, which took place in January, 1896. The British Motor Syndicate were the predecessors of the defendants, and by an agreement made between them and the plaintiffs, the British Motor Syndicate was to grant to the plaintiffs licenses under the Daimler patents. On May 27th those licenses were granted. On August 1st, 1900, the defendant Company was incorporated with the object of carrying into effect an agreement of June 23rd, for the purchase of the assets of the British Motor Company, and the Daimler patents were assigned on November 26th. The defendant Company had not up to the present day manufactured any motors under the Daimler patents. The evidence filed on the motion was to the effect that the Daimler motors in the trade meant machines made by the plaintiff Company, which had a reputation for soundness of work and material, and they had been the only firm that had made Daimler motors under that name in the country since 1896. The plaintiffs thought it was absolutely dishonest for the defendant Company to endeavour to register their Company, which existed for precisely the same objects, under a name that would be confused with the plaintiff Company.—Mr. Critchley said he was one of the directors of the plaintiff Company, and was managing director of the automobile section of the British Electric Traction Company. He had had large experience of the rise and growth of motors in this country. The plaintiffs were known in the market as the Daimler Motor Company or the Daimler Company, and there was no other Company in England which had the word Daimler as part of its title. If the defendant Company was allowed to register under a name of Daimler Wagon Company (Limited) it would seriously affect the plaintiffs' business, and would cause confusion. The word Daimler was well known in the motor car world, and another Company started under that name would have a great advantage.

On the 11th inst. Mr. Finch, works manager of the plaintiffs, in his evidence said the Daimler motors were known in this country before 1897, but there was practically no sale for them. Since that year the industry had advanced by leaps and bounds, and Daimler motors were understood to be those motors which were manufactured by the plaintiff Company.—Mr. Edwards, managing director of the plaintiff Company, said there was no other company in this country which manufactured motors under the Daimler patent to the same extent as the plaintiff Company, which was generally called the Daimler Company. They sold cars at prices varying from 150 guineas to 1,500 guineas.—Mr. Ford having given evidence, Mr. Cordingley gave it as his opinion that no other company than the plaintiffs had the name Daimler as part of its title. The plaintiffs were generally spoken of as the Daimler Company.—Other witnesses for the plaintiffs were Mr. Staplee Firth, Mr. Foster Pedley, and an officer of the Company.

On Monday, the 13th inst., the Hon. John Scott Montagu, M.P., gave evidence in support of the plaintiffs' case, saying that since he had been connected with the movement he had understood the name Daimler to apply only to those cars manufactured by the plaintiff Company. Asked by the Judge what the plaintiffs would call a car made by them on the De Dion system, witness admitted that it would be most confusing if it was called a Daimler car.—Mr. J. A. Williamson, a solicitor of Newcastle-on-Tyne, stated that he had advertised 10 cars for sale, six as Daimlers and four as M.M.C. cars. All the cars were manufactured under the Daimler patents, but he distinguished between those manufactured by the plaintiffs and those made under license.—Mr. Claude Johnson, the secretary of the Automobile Club, also gave evidence.—Mr. Terrell, K.C., for the defendants, submitted that the action should be dismissed, because there was nothing to show that the plaintiffs had the exclusive right to the use of the name Daimler cars.—The evidence for the defence was that of Mr. S. F. Edge, director of the De Dion Dunlop Company; Mr. C. H. Smith, manager of the United Motor Industries (Limited); Mr. E. J. Boult, and Mr. C. B. Turrell, of the Pollock Engineering Company, who gave it as their opinion that the term Daimler did not necessarily mean motor cars manufactured by the plaintiff Company.—Mr. Astbury, in reply, said the predecessors of the defendants were the parents of the plaintiff Company, and they gave them the name of Daimler, under which name they intended them to trade. The defendants were now endeavouring to get for another Company the trade reputation of the plaintiffs.— Mr, Justice Buckley gave judgment. After reviewing the facts of the case, his lordship said the defendants were entitled to the Daimler patents subject to the licenses granted by their predecessors, but those licenses were not for the exclusive use of the patents. The plaintiffs objected to the registration of a Company in which the name Daimler formed part, and their solicitors asked for an undertaking that the Daimler Wagon Company should not be registered. The writ was issued in January. Was the name Daimler Wagon Company calculated to deceive? There were several manufacturers of motors of the Daimler type in this country, and the result of the evidence showed that the word Daimler was used by all those who made them. Daimler was a system, and he did not think the name used in connection with motor cars in this country necessarily conveyed that the goods were those of the plaintiffs. Plaintiff Company did not describe all their cars as Daimlers; some of them were called the Sandringham and Coventry cars, and another was named the Critchley car. The word Daimler had not become so identical with the plaintiff Company as would, in his opinion, lead the public to believe that any machines made by the Daimler Wagon Company were those of the plaintiffs' manufacture. It seemed to him that what the plaintiffs were endeavouring by their action to do was to get the monopoly to the word Daimler in their name as the manufacturers of this class of goods. The plaintiffs had not made out a case that what the defendants proposed to do was likely to deceive, and whether it would deceive depended upon the way the Company, when incorporated, carried on their business. The action failed, and it must be dismissed with costs.

The British Motor Traction Company (Limited) v. J. Vaughan Sherrin.—In the Chancery Division, on the 8th inst., Mr. Justice Kekewich had before him the action brought by the British Motor Traction Company (Limited) for an injunction to restrain Mr. J. Vaughan Sherrin, his servants, and agents from infringing their letters patent No. 16,072 of 1893, No. 19,734 of 1895, and No. 13,671 of 1899, for damages or an account of profits, delivery up for destruction of all apparatus in the defendant's possession or under his control constructed in infringement of the letters patent, costs, and such further and other relief as the circumstances of the case might require. The plaintiffs, in their statement of claim, said they were the registered legal owners of the letters patent No. 16,072* of 1893, granted to Wilhelm Maybach for an invention of "Improvements in the method of producing the explosive mixture in hydrocarbon engines"; No. 19,734 of 1895, granted to Count Albert De Dion and Charles Bouton for an invention of "Improved means or apparatus for electrically igniting and governing petroleum and other like motors"; and of No. 13,671 of 1899, granted to the British Motor Company and Charles Jarrott for an invention of "Improvements in or relating to motor vehicles." The specification of 16,072* was amended on February 27th, 1900. The plaintiffs alleged that the defendant had infringed the patents by importing motor cars into this country made in accordance with the inventions described in the specifications. In particular the plaintiffs complained of the sale, on September 5th, 1900, by the defendant, through Messrs. Morgan and Co., carriage builders, of Long Acre, of a motor car bearing a plate marked "Automobiles De Dion Bouton et Cie. Type E., No. 68, 24, Quai National, Puteaux (Seine)." The defence was that the letters patent were invalid. As to Maybach's patent, defendant said it was not new at the date of the specification, that it was not the proper subject-matter of letters patent, that the specification as amended did not sufficiently distinguish which of the matters and things therein described Maybach claimed to be new, and which of the claims he admitted were old. Defendant set up as prior publication the specification of Edward Butler and Butler's Patent Petrol Cycle Syndicate (Limited), No. 9,203 of 1889, and the specification of Edward Butler, No. 6,990 of 1890. As to the patent No. 19,734 of 1895, granted to Count Albert De Dion and Charles Bouton, defendant contended that it had been anticipated by the specification of Eugene Barsanti and Felix Matteuci, No. 1,655 of 1857; the specification of Charles Sintz and the Sintz Gas Engine Company, No. 23,735* of 1893; and the specification of Edward William Evans, No. 2,788 of 1893. Defendant also said that Count De Dion and Charles Bouton pointed out and claimed no sufficient improvement on the then state of public knowledge to make their alleged invention good subject-matter for letters patent, and that the invention was not useful. As to the patent No. 13,671 of 1899, granted to the plaintiffs and Charles Jarrott, defendant submitted that the first three claims were at variance with the provisional specification, and that the patent contained no good subject-matter. The plaintiffs joined issue with the defendants on these points.

Mr. J. Fletcher Moulton, K.C., Mr. A. J. Walter, and Mr. G. H. Hume were counsel for the plaintiffs; and Mr. Pitt-Lewis, K.C., and Mr. R. M. Stephenson represented the defendant. Solicitors for the plaintiffs: Messrs. J. B. and F. Purchase; for the defendant: Mr. W. T. Hick.

Mr. Moulton, in opening the case, said the patents related to

the arrangement used in one of the most successful of motor cars, the De Dion, and the things that were patented had been actually taken by the defendant and used in exactly the same way as they were used by the owners of the patent. The defendant admitted infringement, so that the whole point at issue was whether the plaintiffs' patents were valid. These motor cars were driven by the vapour of petroleum or a spray of petroleum. The piston of the engine sucked in air which passed over the top of a pipe to which the petroleum was always supplied under very regular circumstances. That suck brought a little of the petroleum out of the pipe, but at such a velocity and in such a rapid current of air that it got split up, and it behaved as an explosive, just as if it was a vapour mixed with air. That passed into the cylinder, was exploded, and made a stroke of the engine. The process was repeated, and thus the engine was driven. The carburettor was the arrangement which supplied the proper quantities of petroleum to the engine, and the first patent was for a special form of carburettor. The next patent was for a very different thing. When they got vapour into the cylinder they must explode it, and in this type of car it was exploded by means of an electric spark. Although the general idea of electric ignition was old it had given very great trouble, because they must get that perfectly regular and under command. The particular form of apparatus which caused the spark, and caused it exactly at the right moment, was the subject of the second patent. The third patent was for a variety of arrangements, such as speed gear, the starting mechanism, and the break mechanism. Infringement was admitted on all three patents, the validity of all three patents was denied, but as regarded the third patent novelty was not denied, and the only issue on it was whe her it was the proper subject-matter for a patent.—Mr. Justice Kekewich said he would try the questions raised on the patents one at a time.—Mr. Moulton proceeded to open the case on the Maybach patent. He said the downward draught of air caused by the movement of the piston opened a little valve, and the air came into a little annular passage. There was a curved tube filled with petroleum, which was always kept at a particular level, and the air, rushing round the mouth of the tube, sucked in a certain quantity of petroleum which mixed with the air. If the petroleum in the tube was not always kept at the same level they would get unequal charges of petroleum. If the engine was going slowly the air would be sucked with less violence but for a longer time, and if it was going quickly, it would be very short. It had been found that with Maybach's carburettor they could keep the level so near to the top of the tube and so uniform that whether going fast or slow exactly the same charge was put into the engine at every stroke. The level was kept by this arrangement. There was a hollow float in the petroleum, and above it was fixed a little needle which went into a hole in a pipe supplying the petroleum from a reservoir a little higher up. When the petroleum got above a certain level the float closed the op-ning above by means of the needle and no more petroleum came in. As the petroleum was used the float sank, and in doing so opened the hole at the top and petroleum came down until the proper level was reached. That kept the level of the petroleum in the pipe to which suction went absolutely uniform, and the carburettor was found to be successful and practical. In fact, although there had been immense trouble with carburettors, no difficulty arose with the one under notice. Fig. 2 of the specification consisted of substantially the same arrangement, with an additional power of letting in a little air by a valve with a hook at the bottom. The air mixed with the carburetted air and so diluted it. Fig. 3 was another variation. Its chief characteristic was that the passages were so arranged that the heated products of combustion in the last stroke passed round the tube in which the new vapour was coming; they heated the new vapour, and therefore it vaporised more p rfectly. The carburettor was most successful in practice, and he could not understand on what grounds it was suggested that it was not good subject matter for a patent.

Mr. Dugald Clerk, examined by Mr. Walter, said he had devoted special attention to the subject of gas and oil engines, and had written a book on the subject. It was very important, especially when change of speed was required, that the proportions of the mixture of air and oil should be constant. One of the difficulties in oil-engines was when you had adjusted your oil charge exactly to the proportion of air you had an explosive mixture, yo kept that explosive mixture in narrow proportions and the difficulty wa if the speed was changed the proportion changed again. The invention he found in Maybach's specification was one intended to produce a charge of oil in a vaporised or sprayed condition and to produce that charge in a definite proportion, which proportion was practically invariable during the change of speed of the engine. In a motor car it was important to be able to change the speed of the engine without having to stop it. In old arrangements one might get the proper proportion to, say, 300 revs., and if the speed was changed the proportion would be destroyed, and either too much or too little oil would be sucked in. If too much oil was sucked in, ignition would be missed. The invention arranged in a very simple way that the oil admitted should be in a constant proportion to the air admitted. Witness explained the nature of Maybach's idea to his lordship, and said the invention ended with the supply to the cylinder of the mixture of oil and air. The invention worked very well in practice and was very useful, and previous to its adoption there were great difficulties in regard to the efficient carburetting of air for oil-engines. He did not find Maybach's invention contained in the two specifications of Butler.—Mr. Walter: It is suggested that no invention was required to do what Maybach has done?—Witness: In my view the arrangement shows great knowledge of the difficulties and considerable ingenuity in overcoming those difficulties.—Cross-examined by Mr. Pitt-Lewis: The proportions of oil to air were not mentioned in the specification, but the difficulty was not in getting the proportion of one adjustment but to get the proportion constant to all adjustments. Butler used a float, but he made provision which prevented him getting the charge uniform. He had his float placed a long way below the point of discharge, the effect of which was to give a long column which had to move from the oil below up to the jet. The time of moving that column depended upon the suction, and the consequence was you could never get the proper proportion of oil into the cylinder except at one adjusted speed without altering the adjustments every time. The improvement of Maybach over Butler was that Maybach was the first to appreciate that the level of the liquid in the oil reservoir must be very near the level of the discharging nozzle. Maybach mentioned what the levels were to be all through the specification. The apparatus of opening and closing the valve by means of a float and liquid was quite old.—Mr. Justice Kekewich asked witness, as he was the principal witness for the plaintiffs, to state exactly how Maybach's invention differed from Butler's.—Mr. Dugald Clerk said Butler used a float in a reservoir to keep his oil constant, but he had a very tall column, the oil reservoir was far below the point where he desired mixture of the oil with the air, and the result was that when suction came on the oil had to rise to an enormous height before it reached the discharging arrangements. That was a very vital difference. By that arrangement, notwithstanding that the level of the oil was kept constant in the reservoir, Maybach's effect was not produced because any change of speed would reduce the suction in such a way that after a very limited charge the oil might not reach it from the reservoir to the point where it started. Butler's engine would only work at one speed. Further, Butler had not a jet discharged into the annulus with the air rushing round it. He had a sort of ejector contrivance where the oil was put in an annulus. That would invariably cause difficulty in altering the proportions. Those were the two main differences, and they were the differences which caused Butler's want of success and Maybach's success.—By Mr. Pitt-Lewis: If the Maybach engine was dropped from 1,200 revs. to 100 there might be a danger of stopping, but if Butler's was changed from 800 revs. to 400 he was certain the charge would be all wrong. That meant that with a Maybach engine a car could travel up a steeper incline than a car fitted with a Butler engine. A range of from 1,000 revs. to 400 was quite easily obtained by Maybach.—Re-examined: He thought Butler's apparatus was not practical as it would only work at one speed, and he was of opinion that Butler's invention was certainly not the same as that contained in Maybach's specification.

Mr. S. F. Edge, the managing director of the British Motor Traction Company, was the next witness.—Examined by Mr. Walter, Mr. Edge said he had very large experience of the use of the Maybach carburettor and he had used it many thousands of miles on the road during the last few years. Difficulties existed with regard to the proper carburetting of the air for use in the old form of engines; they got a varying mixture, with the result that there were miss-fires. So far as he had had to do with it, the Maybach carburettor worked absolutely accurately, and an engine fitted with it would run from 400 revs. up to 3,000. That was the efficient practical range which any oil-engine had.—Cross examined: He had not seen the Butler working, but Butler did not design his engine for a motor.

This closed the evidence for the plaintiffs, and

Mr. Pitt-Lewis called Mr. John Vaughan Sherrin, the defendant, who said he was an engineer, and for 20 years he had been engaged in motor vehicle experiments and construction. The suction produced by the engine was the same in the Butler and the Maybach. The float feed was the same, both were stopped by a valve, and the principle was the same in both. In the Butler patent, the oil was led into a small annular space between the casing and the interior cone, and in the Maybach the oil was squirted through a small nozzle at the top of the pipe. In effect that was the same thing. The column in the Butler was too long, and the range of Butler would not be so large as the Maybach. He had never seen the Butler working, but he was quite sure it would work very well indeed. It was never brought into use because the law before 1896 prevented its coming into use as a motor carriage. The hot exhaust pipe and the inspirator were the same in

both engines.—Cross-examined: He did not know the float feed used by him was Maybach's at the time he used it. It worked beautifully, and he thought it was almost universally used at the present day. Butler's was not a commercial success, but he certainly thought it was an anticipation of Maybach.

Mr. Pitt-Lewis called no other witnesses, and the learned counsel submitted that for all practical purposes the thing they could do with a Maybach they could also do with a Butler, and, looking at the whole of the so-called invention, he considered that it was a mere application of very well-known principles. To apply a cock and ball tap to a motor is nothing new, nor was it new to apply suction. He could not say that the mode was not different, but he argued that that in itself was not sufficient to form the proper subject of an invention. He asked his lordship to say that the plaintiffs had failed to establish the validity of the patent.

JUDGMENT.

Mr. Justice Kekewich proceeded to give judgment without calling on plaintiffs' counsel to reply. His lordship said Mr. Maybach described in clear, plain language that his object was as follows: "The object of my improvements is to produce a mixture of never-varying composition, irrespective of the speed of the engine, as well as of that of the piston in different parts of the path of this latter." He told them that if they could only effect that, then by the means which he described he could get over the difficulties which they had heard from Mr. Dugald Clerk were in the way of motor engines. One of the points on which the patentee strongly insisted was keeping the petroleum at the same height, not only in the vessel which contained it originally, or where it had been fed from the reservoir, keeping that level and the level in the pipe really for practical purposes the same. The inventor having told the world in language about which there was no doubt or difficulty, the suggestion was that he had not disclosed in the specification that the keeping of the liquid at the same height in the different places was of the utmost importance. The inventor intended that those reading his specification would understand that it was a matter of the greatest importance. By his machine he was to produce a mixture of never-varying composition, and in order to do that he must keep the liquid at the same height in the vessel from which it proceeds and at the nozzle substantially the same. If Fig. 1 of the specification was straight, sound, and valid, the other two figures were variations which could not be attacked. The patentee described a method, and he did not say that he had invented every part of the engine, or, indeed, any part, and he did not say that any one part of it was new. The method of producing an explosive mixture in the engine was what Maybach invented. The mere fact that all the elements and all the materials were old did not prevent the method from being new. He had heard from Mr. Dugald Clerk, who had not been contradicted, but, on the contrary, was supported by Mr. Sherrin, that there were very great difficulties in the way of those who desired to produce motor-engines. Maybach's method got over those difficulties. Of course there would be improvements by-and-bye, and he dared say there would be defects found out in Maybach, but for the present it might be taken to be as perfect as anyone could at present devise. Butler's specifications were really paper specifications. Mr. Sherrin was certain the Butler engine would work, but it had not been worked to the knowledge of anyone. Butler's first specification was dated 1889 and his second 1890. Ten years had elapsed, and he thought he could take notice of the common knowledge that motor-engines have been greatly in demand, and yet, from 1889 or 1890, Butler's engine was not worked. The only answer to that was that up to 1896 there were restrictions in this country on the use of these engines which made it impossible to really turn them to commercial advantage. If that was so the ten years sank to four years, but he might venture to know that the removal of the restrictions had produced a very great impetus, a very active trade in these things, and if there had been anything in Butler's patent of a practical character the fair inference from the evidence was that engines would have been made and worked before now. He could not help inferring that the reasons why the Butler engines had not been worked was because they could not be worked. Mr. Clerk had pointed out exactly what would happen, and he did not think Mr. Sherrin doubted it, that they would not work when there was a necessary variation of speed. There must be variations of speed, such as in climbing or descending hills, and Butler did not meet that difficulty. If that stood alone it might be wrong to go so far as to infer that Butler's was useless, but they went a great deal further than that. They knew that Maybach's method was used very largely. He could not resist the inference that that which was in use and answered the purpose very well was not the same thing as that which was not in use, and, as far as anyone knew to the contrary, did not answer the purpose. It seemed to him that the reasoning was quite unanswerable. All he could do with regard to the Maybach patent was to find a verdict for the plaintiffs.

Mr. Walter then opened the case on the De Dion patent, No. 19,734 of 1895, which related to the device for firing the mixture. The learned counsel referred to the mechanical method of firing used in Otto gas-engines. In the Daimler method there was an opening at the end of the cylinder, on which there was a platinum cup, into which the gas and air were forced. That cup was heated on the outside, and when the compressed gas and air reached it there was an explosion. Then there was an electric firing, and the patent related to this. Running at high speeds, at which motor-engines had to run, sometimes 2,000 or 3,000 revs. a minute, it was of the utmost importance that there should be no doubt about the ignition. At the same time it was of advantage to arrange that the firing should not take place when above a certain speed was reached. The De Dion apparatus performed both those functions. There was a source of electricity, which might be a battery; there was a coil of a body of wires forming a magnet, a cover was wound round that, and the two terminals were connected with the two poles of the battery. There was a broken circuit, a vibrating arm making and breaking the current. Outside the first coil of wire was another coil of wire, which was of smaller size, and which, on the principle of the induction coil, gave them the current, not of the same volume, but at a much higher pressure, and it gave a spark which would travel across a far greater distance. To express it in the jargon of the art, they had less amperes, but far higher voltage. Owing to certain self-inducted effects in the wires they got a hotter spark, and if they could arrange that there was vibration and got a series of little vibrations, so as to get a lot of makes and breaks, they did not depend upon one small spark, but they got several small sparks instantaneously, and thus the possibility of a miss-fire was prevented. The learned counsel explained the invention by means of a diagram, and said that if a wheel was going too fast the vibrating arm jumped and no contact was made. Thus there was no spark, the gas and air were not exploded, and the engine dropped its speed. That, again, was an invention which the defendant had done the plaintiffs the honour of taking.

Mr. Dugald Clerk was again called. He stated that the plaintiffs' invention was a method of operating the contact-breaker mechanically. In ordinary induction coils used before the date of this patent for existing gas-engines the contact-breaker was operated mechanically, the contact-breaker having a piece of metal attached to it which was attracted to a core in an induction coil when the current was passing. The current made the core a magnet. It would make or break contact 20 or 30 times a second. There were uncertainties about it, because when they put in the current they had to depend on magnetic attraction. Mr. De Dion conceived the idea of operating the contact-maker by a cam so that when he wanted the contact-breaker to make the current the cam dropped into position and the spark was obtained as wanted. There was also an apparatus for governing and the engine was stopped at a safe limit by preventing the passage of the electric current. He had read the specifications of Barsanti, Sintz, and Evans, but he was of opinion that those specifications did not anticipate De Dion. The specification of De Dion was very clearly described, the discovery was very ingenious and it was very largely used.—Cross-examined by Mr. Pitt-Lewis: He knew of nothing like the De Dion igniter before the date of the specification, but he knew of plenty of cases where the contact was made by a cam.

Mr. Sherrin was called, and stated that Barsanti's patent was practically the same as De Dion's, and Sintz's was practically the same.—Cross-examined, witness admitted that the De Dion was a very good igniter and was very largely in use.

Mr. Pitt-Lewis said the plaintiffs were not entitled to claim that De Dion had a patent because he took a well-known electrical design to produce a spark made by the make and break of the battery, and then added to it a mechanical device for making a vibration. The patentee used two well-known means in combination with a mechanical device of a well-known character. He asked his lordship to say that that was not enough to constitute invention.

JUDGMENT.

Mr. Justice Kekewich said the particulars of objection raised one or two different issues. The first was an issue of novelty, and treating that as an independent issue he had no evidence whatever to support it, and he had no evidence to show that the alleged invention was not new. He had evidence to show that a great many other things were not new. Then there was a plea that the invention was not useful, but he had the evidence of the defendant himself that it was useful. Another plea was that "the patentees in their specification pointed out and claimed no sufficient improvement on the then state of public knowledge to make their alleged invention good subject matter for letters patent." So far as that was a good plea it was entirely negatived by Mr. Dugald Clerk's evidence. He had shown that this had met a difficulty in the application of public knowledge at the date of the patent, and the admission of the defendant that it was useful, showed

that that had been done. There was no doubt that it must be the subject matter of a patent. The case was reduced simply to a question whether the three specifications relied upon in the witness-box were anticipations. The defendant admitted that there were essential distinctions, distinctions of detail, but distinctions at the same time which prevented the inventions of those patentees being the same as that of the patentees under the patent of 1895. He thought there was no doubt at all but that the patent must stand.

Mr. Walter then proceeded to open the case on the patent of the British Motor Company (Limited) and Charles Jarrott, No. 13,671 of 1899. The learned counsel said the only objection taken to the patent was want of subject matter. There were included in the specification a large number of most beautiful inventions regarding the different parts of a motor car which the witnesses would say were full of ingenuity. It related first of all to the speed gear, to that arrangement by which the speed could be altered from fast to slow.

Mr. Pitt-Lewis said he would not put his friend to prove all the items claimed, but the defendant would contend that the wheels, frames, and the spring were all things which were common. The mountings were also common as was also the brake lever. The steering was the old form of steering used as long ago as the old style of bicycles.

Mr. Walter said all the claims were for combinations.

Mr. Justice Kekewich said the defendant could not attack a part of a combination. That was elementary law.

Mr. Pitt-Lewis: Then I cannot attack the patent.

Mr. Walter: It is really too bad. It has cost us an enormous sum to get ready for this case. We have had models and drawings of every single part of this apparatus.

Mr. Justice Kekewich said he would give the plaintiffs a certificate as to validity.

Mr. Dugald Clerk was called to prove that ingenuity was displayed in the combinations. The witness said that the speed gear was one of the most ingenions pieces of apparatus in a motor car that he had seen.

Mr Pitt-Lewis then formally withdrew.

Mr. Walter asked for an injunction with regard to each of the three letters patent, and for a certificate of the validity of each. He would take an enquiry as to damages on each of the patents, delivery up of any infringing articles in the defendant's possession, and costs.

Mr. Justice Kekewich: Yes.

Order accordingly.

De Dion Bouton (British and Colonial Syndicate) (Limited) v. C. Manning and Son (Limited).—A motion in this action came before Mr. Justice Cozens Hardy, in the Chancery Division, on the 2nd inst. The plaintiffs asked for an injunction to restrain the defendants from using the names of De Dion Bouton, or either of them, in connection with the sale of motor vehicles or motor cars not manufactured and sold by the plaintiffs, from infringing the plaint ffs' registered copyright, and from issuing circulars similar to or only colourably differing from the circulars of the plaintiffs.—Mr. A. J. Walter represented the plaintiffs, and Mr. S. O. Buckmaster appeared for the defendants.—Mr. Walter informed his Lordship that it had been arranged that the defendants should give a perpetual undertaking not to infringe the plaintiffs' copyright in the circular complained of, and that the defendants should keep an account until the trial of the action of all motor vehicles and motors sold by them under the title of De Dion and Bouton or either of them. On those undertakings he asked that the motion might be ordered to stand over till the trial of the action.—Mr. Justice Cozens Hardy made the order as asked.

A "Furious Driving" Appeal.—Mr. Charles Augustus Smith was summoned before the Kingston Bench for having driven a motor tricycle in High Street, Esher, on November 20th last, at an excessive rate of speed. The summons was issued under the section of the Locomotives on Highways Act of 1896, which provided that "every person driving or in charge of a light locomotive when used on any highway shall not drive the light locomotive at any speed greater than is reasonable and proper, having regard to the traffic on the highway, and so as to endanger the life or limb of any person, or to the common danger of passengers." The evidence for the police was that Mr. Smith was travelling at a pace of from 18 to 20 miles an hour, but Mr. Smith said he was not going at more than eight miles an hour. The Justices convicted, and fined the defendant £5, but they stated a case for the decision of the High Court upon a point raised by the defendant that it was not proved that any vehicle or person using the highway was interrupted, interfered with, incommoded, or affected by reason of the speed at which the motor tricycle was driven.

A Divisional Court, composed of the Lord Chief Justice and Mr. Justice Lawrence, had the matter before them in the King's Bench Division on the 3rd inst., when Mr. Roger Wallace, K.C., and Mr. Samuel Fleming appeared for Mr. Smith, but the police were not represented. It was argued that the Justices having found as a fact that the defendant had travelled at from 18 to 20 miles an hour through High Street, Esher, the conviction might have been right if the summons had been taken out under the section which provided that a person should not under any circumstances drive a light locomotive at a greater speed than 12 miles an hour. But the police had elected to proceed on the section which provided that a person should not travel at a speed which was a danger to users of the highway, and accordingly they must prove that the highway was being used by other than the defendant at the time he was charged.—The Lord Chief Justice, in giving judgment, said if Mr. Smith's contention was right, there must be a risk of accident or an actual accident before a conviction could be obtained. The words of the regulation, "having regard to the traffic on the highway," must mean traffic on the road, and not that which was within a few yards of the motor tricycle of the defendant. The Justices had found that the defendant was proceeding at from 18 to 20 miles an hour, and in High Street, Esher, that was an excessive speed considering the traffic on that road. He considered that the conviction must be upheld.—Mr. Justice Lawrence agreed, and the appeal was dismi-sed with costs.

Cancelling an Agency Agreement.—Mr. Justice Bruce, in the King's Bench Division, on the 22nd and 23rd ult., had before him the action of Baron *v.* Thornycroft's Steam Wagon Company, by which the plaintiff, Mr. Francis Edward Baron, a consulting engineer, sought to recover damages for the alleged breach of an agency agreement. The case was tried before a special jury.—Mr. Hugo Young, K.C., and Mr. Montagu Lush represented the plaintiff, and Mr. A. T. Lawrance, K.C., and Mr. Willes Chitty appeared for the defendant. —According to the opening statement of Counsel, Mr. Baron, in February, 1899, was interested in the Motor Haulage Company, of Bolton. Its object was to supply motor wagons for heavy traffic on roads, but it did not do a large amount of business. Messrs. King and Co., of Bollington, were calico printers, and they were desirous of substituting motor lurries for horses and wagons. The Motor Haulage Company, in July, 1899, supplied Messrs. King one of their lurries for a week's trial. The firm was satisfied with the trial, and wished to adopt the system. but the Motor Haulage Company could not supply them with a sufficient number of motors for the whole of the traffic and find men to work them and keep them in repair as they desired. Messrs. Thornycroft, of Chiswick, had been highly successful at certain trials at Liverpool, and they, with two other motor manufacturers, were asked to tender for the supply of wagons to Messrs. King. Thornycroft's tender was accepted, and subsequently plaintiff got into negotiation with the defendant Company and entered into an agreement to be their agent in Lancashire, Derbyshire, and Warwickshire, at a commission of 7½ per cent. and £100 a year for office expenses. On his part the plaintiff agreed to sell at least five of the defendants' steam lurries during the first year, ten in the second year, and ten in the third year, the agreement to be determined by three months' notice on either side. The defendants failed to supply the motors they had contracted to supply to Messrs. King and, after a good deal of correspondence, put an end to the agreement. Plaintiff had taken offices and had gone to the expense of engaging a practical man to look after the motors. The cost of the motors was £652 each, and if the plaintiff had been allowed to carry out his part of the agreement by selling the number of machines agreed on, his commission would have amounted to £1,221. A considerable number of orders would have been obtained if the defendants had supplied motors to Messrs. King to their satisfaction.—The plaintiff in his evidence said he had endeavoured to carry out his part of the agreement. In cross-examination witness said he was agent for the Daimler Motor Company from October, 1899, to January, 1900, but he only got one order in that period. He was formerly connected with the Blackpool Motor Company and the Great Horseless Carriage Company.—For the defence it was stated that the plaintiff introduced the business with Messrs. King as being himself the manager of the Motor Haulage Company, and saying that he had a number of men under his control who could manage motor wagons. The plaintiff said he was going to supervise the running of three wagons ordered by Messrs. King, but when there was delay it was suggested that one vehicle only should be sent as a stop-gap until the three were ready to be delivered. The stop-gap wagon was allowed to get into such a deplorable condition that it would not run, and King's cancelled their order. The

defendants said that the plaintiff, by not performing his duty, had put an end to the agency agreement. Plaintiff never obtained a single order, and by his course of conduct, Counsel affirmed, he had ruined defendants' trade in the district.—Mr. J. E. Thornycroft and Mr. A. J. King having given evidence, the jury found for the plaintiff, damages £340, with costs. Judgment accordingly.

BANKRUPTCY AND LIQUIDATION PROCEEDINGS.

Crowdus Accumulator Company (Limited) (in liquidation).—A meeting of the creditors of this Company was held at the office of Mr. Claud Scott, 32, Victoria Street, S.W., on the 15th ult., when a statement was made that by the order of the Court the sale of the Company's property had been made and had realised £650, the whole of which goes to the debenture holders, whose claims figure in the liabilities for £6,000. We understand there is no likelihood of any dividend for the ordinary creditors.

Electrical Vehicle Syndicate (Limited).—Creditors of this Syndicate are asked to send particulars of debts, &c., to Mr. A. Holmes, Portland Road, Newcastle-on-Tyne, liquidator, by the 31st inst.

London Motor Van and Wagon Company (Limited) (in liquidation).—Notice to creditors having claims upon the assets of this Company is given to send in particulars of their debts, &c., to Messrs. S. St. J. Steadman and Walter Dangerfield (liquidators), 23, Old Broad Street, E.C., on or before the 31st inst.

Hiram S. Maxim Electrical Corporation (Limited) (in voluntary liquidation).—Notice is given to creditors that particulars of debts or claims against the Company are required not later than May 25th. Mr. M. Devenish, Warnford Court, London, E.C., is liquidator. The business has been acquired by the Sir Hiram Maxim Electrical and Engineering Company (Limited).

POLICE COURT PROCEEDINGS.

Storing Petroleum for "Private Use."—IMPORTANT DECISION AS TO LICENSE.—At Southwark Police Court, on April 24th, before Mr. Paul Taylor, Montague Stanley Napier, mechanical engineer, of Vine Street, York Road, Waterloo Road, upon whose behalf Mr. Minton Senhouse, barrister, appeared, was summoned for storing petroleum without having taken out a license. In this case a 20-gallon tank was found half full of petroleum, and there were also 2 gallons in a drum, besides a number of empty drums, showing a considerable use of the spirit. The inspector was told that it was only used to test motor cars manufactured by the defendant, who considered that it was a matter of private use not requiring a license.—Mr. Godfrey, however, elicited the fact that there were dozens of such places which were licensed.—Mr. Senhouse submitted that the summons was totally misconceived. The defendant was not liable, and could not take out a license under the Petroleum Act of 1871, because the petroleum was kept and used entirely for the purpose of testing motor cars, and when the Light Locomotives Act of 1896 was passed it expressly excepted petroleum so used. Section 5 of the latter Act provided that "the keeping and use of petroleum or any other inflammable liquid or fuel shall be subject to regulations by a Secretary of State, and the regulations so made shall have effect, nothwithstanding anything in the Petroleum Acts." The London County Council had issued a notification that "petroleum spirit for use for motor cars may be kept without a license, if the restrictions laid down by the Secretary of State are strictly observed." The Council had no right to have put in that condition, because they had nothing to do with the matter.—The Magistrate: Your argument leaves me unconvinced that no offence has been committed. Do you say the regulations have been observed and kept?—Mr. Senhouse: Yes; as a matter of fact my client has applied for a license, but I have advised him that it cannot be granted.—The Magistrate: The regulations would apply to your keeping it in your own house. It is different in the case of a manufactory.—Mr. Senhouse: No, because it is not used in the manufacture; it is only used to run them.—The Magistrate: But before they can become manufactured articles for sale they must be tested.—Mr. Senhouse: That is not part of the manufacture.—The Magistrate: Surely it is part of the process of manufacture. I suppose that is your point, Mr. Godfrey. You say the regulations only apply to individuals?—Mr. Godfrey: To individuals where it is kept for private use. As a matter of fact the defendant has entirely ignored these regulations.—The Magistrate: Never mind that point for a moment. You say the regulations were only intended to apply to a private user; that it was not considered necessary for anyone who chose to buy a motor car to take out a license.—Mr. Senhouse: That is not the point. It is a different class of license.—Mr. Godfrey: The Council can attach any conditions they think proper to the license.—The Magistrate: The point is whether these regulations, made under the Act of 1896, were not simply regulations meant to meet the convenience of the public user. But this gentleman is a large manufacturer, and it becomes necessary apparently that he should store petroleum in considerable quantities.—Mr. Senhouse: No, only 20 gallons, although under the Act of 1896 you may store 60 gallons.—Mr. Godfrey: But in a safer manner.—The Magistrate: Do the regulations say that?—Mr. Senhouse: Yes, it must be kept in 2-gallon cans, but that has nothing to do with this case, whether or not we have obeyed the regulations. The summons is for not taking out a license, which we could not get.—The Magistrate: You say licenses do not apply to where the regulations apply?—Mr. Senhouse: The Act of 1871 was not dealing with movable petroleum, and so the Act of 1896 expressly excepted the keeping and using of petroleum for that purpose.—The Magistrate: Supposing a person is on a motor car and goes into the country, is it the case, since the use of these cars became so general, that a number of petroleum stores are found in small country towns?—Mr. Senhouse: Each motor car could take 60 gallons, in 2-gallon drums.—The Magistrate: What I wanted to know was whether there are a number of small stores which are allowed to keep 60 gallons, without a license, for the purpose of supplying the passing motors?—Mr. Senhouse: That is so.—The Magistrate: I should like to know if that is really the case?—Mr. Godfrey: I think if anyone kept it they would have to take out a license.—The Magistrate: I want to know if there are such people, and if they are licensed.—Inspector Ross (London County Council): Yes, there are a number of such people, and they are all licensed.—Mr. Senhouse: They are only licensed for the sale. The Act of 1896 does not protect that at all, but only the keeping and using.—Mr. Godfrey: They are licensed to keep it.—Mr. Senhouse: If they were only keeping and using it they would come under the Act of 1896. If they are selling it they come under the Act of 1871.—The Magistrate: Why do you make the selling an essential point for the necessity for the license? The words "keeping and using" don't exclude selling, do they?—Mr. Senhouse: I should think they would.—The Magistrate: Then don't you sell it when you use it to test a motor car? Is it not part of the cost of production?—Mr. Senhouse: Oh, no.—The Magistrate: Are not the testing of the motor and the sale of the spirit included in the cost of the car?—Mr. Senhouse: Oh, no.—The Magistrate: It is not a specific quantity?—Mr. Senhouse: No.—Mr. Godfrey: I maintain you don't keep it for private use.—The Magistrate: Do the words "private use" occur in the regulations?—Mr. Godfrey: No, but I may call your attention to the second paragraph of the regulations, which says that "Save as herein provided, the provisions of the Petroleum Acts shall apply to all petroleum kept for the purpose."—The Magistrate: It is quite clear that does not protect them.—Mr. Godfrey: There is a regulation as to keeping the spirit in 2-gallon drums, and here we have a 20-gallon tank. Then under paragraph 5 they are bound to give notice every year.—Mr. Senhouse: If it is kept within 20 feet of any building, but there is no evidence of that.—Mr. Godfrey: Because you are not within these regulations, but outside them. You have utterly ignored them.—The Magistrate: How much petroleum do these light locomotives carry?—Mr. Senhouse: They are entitled to carry 60 gallons.—Mr. Godfrey: They usually carry about 5 gallons.—The Defendant: They can run 25 miles with 1 gallon.—The Magistrate: Is it possible to carry 60 gallons?—The Defendant: Certainly, on a large racing car, to go 200 or 300 miles; but it is not usual in England.—After some further discussion, in the course of which it was stated that this was a novel case, the Magistrate observed that he need not consider whether or not the defendant had conformed to the regulations of the Secretary of State, because that question was not before the Court. He had come to the conclusion that the Petroleum Acts did not apply to the case. It was quite clear that up to 1896 no legislation had taken place which contemplated the existence of motor cars, and it was in consequence of their coming into use that the Act of 1896 was passed, and regulations were made regarding them. He saw no reason to restrict the application of those regulations to cases of private use, and held that they included use for trade purposes. He dismissed the summons, with 10 guineas costs against the Council, but was willing to state a case, which was granted on the 29th ult. upon the application of Mr. Godfrey on behalf of the London County Council.

Motor Cars when "at Rest" Require no Attendant.—For some time past the City Justices have interpreted the words "there shall be in charge of a light locomotive when used on any highway, a person competent to control and direct its use and movement," to mean that the motor car should not be left in the roadway by its occupant, unless he leaves a competent driver in charge of it. Mr. W. C. Bersey was summoned for leaving his motor car opposite Winchester House in Old Broad Street, the only precaution which he took being to ask an old man who was selling newspapers to keep his eye on it; but before leaving it, he had stopped the engine, and taken out the contact plug, and put it in his pocket.—Mr. Staplee Firth defended Mr. Bersey, and argued that the motor car at the time was not being used on the highway within the meaning of Article 2, Sub-Article 8 of the Local Government Board Regulations set out above, and he pointed out to the Court that as the engine was stopped the car was inanimate and could not move, and that it was very different to having a horse or horses standing unattended because the horse could move of his own volition and, notwithstanding this, very often a small boy was left in charge of two horses, and this was sufficient to comply with the requirements of the law. It was, therefore, obviously unnecessary to leave anybody in charge of a motor car. Mr. Firth also pointed out in favour of this argument that Article 4, Sub-Article 4 of the Regulations, said, *inter alia*, "he shall not quit the light locomotive, without having taken due precautions against its being started in his absence, or allow the light locomotive or a vehicle drawn thereby, to stand on such highway, so as to be a cause of any unnecessary obstruction thereof."—Mr. Alderman Green, who heard this case, stated to Mr. Firth in Court that he had taken very great interest in the argument, and while sympathising with the same, the Justices had held a contrary view, and always convicted; and that he did not feel disposed to take the responsibility of introducing a fresh decision.—Mr. Firth applied for a special case, with a view to taking the decision of the Court of Appeal upon it, and the Committee of the A.C.G.B.I. voted a sum of £30 towards the expenses of this appeal.—Subsequently another summons was issued against a gentleman for leaving his motor car unattended, but he had removed the contact plug, and on his consulting Mr. Firth on the matter, he advised him to ask the Justices to let the matter stand over until the opinion of the Court of Appeal had been obtained, or to treat the case on the lines indicated above. Since then the City Justices have reconsidered the matter, and Mr. Firth has been in communication with them. They have now decided to accept his interpretation of the law, and to instruct the police that the Local Government Board Regulations do not require a competent person to be in charge of a light locomotive while at rest, provided that sufficient precautions have been taken against its being started in the absence of its driver. This decision does not affect the case of a car causing an obstruction.

"Necessary Obstruction" not "Wilful Obstruction."—Mr. W. C. Bersey was last week summoned at the Marlborough Street Police Court "for that he did by means of a motor car wilfully cause an obstruction." The evidence for the prosecution was given by a police constable, who stated that at one o'clock on April 15th he was in Piccadilly, that a motor car was standing outside certain premises there situate, causing considerable obstruction, and that the motor car was the property of the defendant.—Mr. Staplee Firth, who defended, asked the officer if he had any other witness, and upon receiving a reply in the negative, Mr. Firth stated he should not cross-examine him.—The Magistrate asked Mr. Firth if he intended to call evidence for the defence.—Mr. Firth stated that he did not propose to call evidence to defend a case that had never been made out; upon which the magistrate quickly intimated that he considered the case was made out. A long argument followed, and ultimately the magistrate stated that he would adjourn the case for seven days to consider the law, and the arguments raised. This deliberation has taken place, and we are glad to say that the magistrate, Mr. Fenwick, has decided to dismiss the summons.—Mr. Firth argued that any carriage stopping at any place on the side of a public road when there is traffic must cause *some* obstruction, and that it was clear the Legislature contemplated that motor cars stopping on the roadside would cause obstruction; they therefore enacted the regulation to the effect that the light locomotive should not be left so as to cause any *unnecessary* obstruction, aud although in the above case Mr. Bersey was accused of *wilful* obstruction under an old statute of II and III Victoria, there was no evidence to prove wilful obstruction, and, in fact, there was no evidence at all of obstruction. The police constable stated that Mr. Bersey was causing obstruction, instead of giving evidence of some act or acts done or omitted to be done, which in themselves were sufficient for the Court to find that obstruction had been caused. The result of this decision and the decision given above, that a light locomotive need not be left in charge of a competent engineer, are important gains in favour of automobilists. The practical results of the two decisions are that a motor car may be left at any place of call, and it need not be attended by any person at all; and, moreover, it is allowed to cause *necessary* obstruction, and the only cases in which the driver or owner will be held to be responsible will be those cases where they cause *unnecessary or wilful obstruction.*

Unattended Horses and Motor Cars.—On April 30th, at the Town Hall, Alton, Hants, George Brownjohn, of Bentley, was summoned for leaving a horse and cart unattended on the main road between Farnham and Alton on April 4th. The prosecution was undertaken by the county police at the instance of Earl Russell, who was the principal witness. It appeared from the evidence that a baker's cart was left without an attendant by the roadside, and that Earl Russell, who was driving his car on his way to Winchester, where he was joining the A.C.G.B.I. Easter Tour, had to pull up short to avoid a collision, as the horse showed signs of bolting. Fortunately, the *mécanicien* was able to jump down before the car had stopped, and catch the horse's head, avoiding what might have been a complete smash up of the cart. The owner of the cart was discovered after a considerable interval in a cottage 30 yards away, and then said that "his horse could never stick motor cars." The Chairman of the Bench, in convicting, said that motor cars were entitled to use the roads, and drivers must understand that it was contrary to the regulations to leave their horses and carts unattended, and the defendant was therefore fined 5*s*.

CORRESPONDENCE.

*** *We do not hold ourselves responsible for opinions expressed by our Correspondents.*

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

*** *Correspondents are particularly requested to write on one side of the paper* ONLY, *to place the subject of their letters as a headline at the top of the sheet, and their names and addresses at the foot. Attention to these matters saves much time and ensures the insertion of the letter.*

THE ENGLISH MOTOR CLUB CONTROL CONTESTS.

To the Editor of THE AUTOMOTOR JOURNAL.

SIR,—While at the Crystal Palace competitions last Saturday I was puzzled, on studying the programme and making inquiries, to find out the utility of competitions such as those of Class G, Class H, and the 200 yards speed contest. I should like to ask what it is intended to prove by such competitions?

In Class G I noticed there were the following entries:—12, 16, and 24-h.p.

In Class H, 12, 20, 24, and 10-h.p.

In the speed contest, 1¼, 10, 3½, 6, 4½, 4, 8, and 9-h.p.

Now these vehicles, each of different horse-power, unequal in construction, and carrying different weights, were placed in equal competition, and I could not find that any system of handicapping had been arranged. I have had some experience in racing competitions, but this is about the first time that I have ever seen such a mixture put together upon an equal basis.

If this is the form in which motor carriage competitions are to be run, I should strongly recommend that they be severely left alone by every owner or manufacturer of a motor carriage.—Yours faithfully,

JOHN H. GRETTON.

The Motor Manufacturing Co. (Limited),
47, Holborn Viaduct, E.C., *May 1st*, 1901.

THE Rubber Tyre Company requiring for their own use a more extensive place of business, the Clipper Pneumatic Tyre Company, who have hitherto occupied a portion of their premises in Aston Cross, have been obliged to move their head office and factory. The Clipper Tyre Company have, therefore, acquired new premises in Alma Street, Coventry, lately occupied by the Dunlop Pneumatic Tyre Company, which will be their head office in future. They are, however, still retaining a portion of the Aston Cross building as the Birmingham depôt for their tyres.

NEW INVENTIONS.

Claiming particularly to apply directly or indirectly to Motor Vehicles, &c.

Compiled for "THE AUTOMOTOR AND HORSELESS VEHICLE JOURNAL" by HERBERT HADDAN and Co., Registered Patent Agents, of 18, Buckingham Street, Strand, London, W.C.

PATENTS APPLIED FOR.

Abbreviations:—Impts., Improvements in; Relg., Relating to.

1901.

April 1. 6,824. J. H. LANCASTER. Combustion engines for motor vehicles.
" 2. 6,852. C. T. SANGSTER. Impts. motor-driven vehicles.
" 2. 6,941. W. L. ALLCROFT. Impts. steering appliances for motor cars.
" 2. 6,945. A. HARDT. Impts. relg. motor cars.
" 3. 6,980. L. PERKINS and another. Impts. motor-driven vehicles.
" 3. 6,987. J. BROOKS and another. Impts. back rests for motor cycles, &c.
" 4. 7,096. T. H. PARKER. Impts. propulsion of motor cars, &c.
" 5. 7,192. K. MURRAY. Clutch gear for free-wheel cycles, motor cars, &c.
" 9. 7,295. P. WINSOR and another. Impts. speed-changing mechanism.
" 10. 7,401. A. DUFAUX and another. Impts. motor velocipedes.
" 11. 7,468. C. CASTIN. Steam engine for motor cars.
" 11. 7,493. H. H. LAKE. Impts. relg. motor vehicles.
" 11. 7,498. L. MELANOWSKI. Impts. b akes for motor cars, &c.
" 12. 7,509. E. J. WEST. Impts. joints for steering gear of motor cars.
" 15. 7,666. A. KING. Impts. driving mechanism for motor cars, &c.
" 15. 7,673. G. E. BENNET. Improved brake mechanism for cycles, motor cars, &c.
" 15. 7,739. F. W. LANCHESTER. Impts. relg. motor cars.
" 16. 7,759. J. HIRCOCK. Impts. brakes applicable to motor cars, &c.
" 16. 7,761. W. STARLEY. Impts. relg. cycles and motor cars.
" 16. 7,780. H. PARTRIDGE and others. Impts. motor vehicles.
" 16. 7,853. H. J. HADDAN. Impts. metallic bodies for automobiles.
" 18. 7,978. J. HALFORD. Impts. machinery for propulsion of motor cars.
" 23. 8,336. A. OSBORN. Impts. automobile vehicles.
" 27. 8,723. W. KLIEMT and another. Impts. relg. axles of motor cars.
" 29. 8,763. W. KELLNER. Umbrella or screen for motor carriages, &c.
" 29. 8,779. F. STALLINGS. Impts. gearing for automobiles.

SPECIFICATIONS PUBLISHED.

THE following is a List of Specifications recently published, and obtainable at the Patent Office, 25, Southampton Buildings, London, W.C., at the uniform charge of *8d.* per copy. The dates of the month are the days when the Specifications are published. Owing to the enormous pressure upon our columns it has been found impossible to deal in any other form with the accumulation of patents now being taken out in connection with automobilism. As far as possible, a selection for special mention is made by the Editor from the more prominent inventions:—

1900.

March 23rd.

6,651. J. W. BROWN, Field House, Northowram, Halifax, Yorks. Variable speed and reversing gear.
8,356. E. HEIRMAN, Mont-sur-Marchiennes, Belgium. Variable speed gear.
8,407. H. GARBE, 1, Amalienpark, Pankow, near Berlin. Water-tube boilers.
11,097. H. WOODWARD, 12, Elgin Avenue, Maida Vale, London. Electrical accumulators.
21,393. C. E. SARGENT, 2,560, North Winchester Avenue, Chicago, Cook Co., Ills., U.S.A. Valves.
22,138. J. SHILHAN, Railway Station, Szckesfegar, Hungary. Fluid pressure motor.
23,892. F. STURM, 78, Forststrasse, Stuttgart, Germany. Magneto-electric ignition device.

March 30th.

4,449. T. CLARKSON and others, Deverell Street, Great Dover Street, Surrey. Burning of liquid hydrocarbons.
4,800. R. E. PHILLIPS, 70, Chancery Lane (W. O. Worth and others, Chicago, Illinois, U.S.A.). Hydraulic motors or pumps and reversing gear.
5,714. W. EARP, 35, Brixton Road, and H. F. HARDING, 303, Brixton Road, London. Driving gear of motor cycles.
8,657. G. L. V. CHAUVEAU, 29, Rue des Belles-Feuilles, Paris. Balancing engines or motors.
9,970. J. IMRAY (Société Industrielle des Telephones, 25, Rue du Quartre Septembre, Paris). Motor cars.
20,501. B. POYNTON, 696, Coventry Road, Birmingham, and E. JONES, Castle Square, Carnarvon, Wales. Wheels and brakes.
22,042. H. L. ARNOLD, 738, East Thirty-second Street, Brooklyn, New York, U.S.A. Motor vehicles.

April 6th.

6,201. G. B. PETTER, Nautilus Works, Yeovil, and E. W. PETTER, 73, Queen Victoria Street, E.C. Igniting apparatus.
7,062. C. RICCI, 68, Shorrolds Road, Fulham. Variable speed gear.
7,372. A. TRIBELHORN, Olten, Switzerland. Electrodes for secondary batteries.
8,168. C. COULTHARD and others, Cooper Road, Preston, Lancs. Regulators for controlling the supply of oil to oil burners.
8,658. G. L. V. CHAUVEAU, 29, Rue des Belles-Feuilles, Paris. Engine or motor.
8,693. A. BARR, 250, Byres Road, Glasgow. Internal combustion engines.
8,827. H. W. BUTLER, 4, Great Winchester Street, London. Electrical batteries.
9,062. J. O. O'BRIEN, 6, Bank Street, Manchester (J. Carrier and L. Touroude, 59, Rue de Paris, Saint-Ouen, Seine). Reversing and speed gear.
11,038. E. KÖRTING, Körtingsdorf, near Hanover, Germany. Internal combustion engines.
14,924. H. ROSE and others, Maidenhead, Berks. Accumulators.
18,872. COUNT A. DE HEEREN, 10, Avenue Hoche, Paris. Variable speed gear.
22,234. C. KANDÓ, 19, Bubyovszky-útcza, Budapest, Hungary. Pneumatic brakes.

April 13th.

5,509. C. CAPEL, 204, Amhurst Road, Hackney, and J. A. PEIRCE, 168, Dalston Lane (executors of H. C. Capel, late of 168, Dalston Lane). Motor road vehicles.
6,413. H. J. TOOGOOD, 1, James Place, Ledgers' Lane, Upton-cum-Chalvey, Bucks. Friction clutch.
7,768. E. W. JUNGNER, 1, Brahegatan, Stockholm, Sweden. Negative accumulator electrode.
7,909. F. W. LANCHESTER, Ladywood Road, Birmingham. Power-propelled road vehicles.
9,055. C. E. DAWSON, Hogarth Works, Chiswick. Internal combustion engines.
9,083. T. ARCHER, 11, Regent Terrace, Gateshead-on-Tyne, Durham. Steam generators.
9,091. A. G. S. LYFORD, Loftus Works, Loftus Road, Shepherd's Bush, London, W. Variable speed mechanism.
9,364. H. H. LAKE, 45, Southampton Buildings (Société des Établissements Georges Richard, 23, Avenue de la Grande Armée, Paris, France). Carburettors.
10,511. ELECTRICAL POWER STORAGE COMPANY (Limited), and others, 4, Great Winchester Street, London. Manufacture of negative for secondary batteries.
13,760. A. J. BOULT, 111, Hatton Garden (R. H. White, 56, Kilburn Avenue, Cleveland, Ohio, U.S.A.). Steam generators.
14,619. C. E. DURYEA, Reading, Berks, Penns., U.S.A. Internal combustion engines.
18,160. L. LINON, Ensival-lez-Verviers, Belgium. Hydrocarbon motors.
21,390. C. E. SARGEANT, 2560, N. Winchester Avenue, Chicago, Illinois, U.S.A. Internal combustion engines.
22,763. C. OSBORN, and others, 40, Holborn Viaduct, London. Friction clutches.
23,127. T. F. MORRIN, 48, Brinkerhoff Street, Jersey City, Hudson County, U.S.A. Steam generators.
23,128. T. F. MORRIN, 48, Brinkerhoff Street, Jersey City, Hudson County, U.S.A. Steam generators.
23,571. J. S. HIGHFIELD, Windle House, St. Helen's, Lancashire, and S. BEETON, Green Bank, Bowdon, Chester. Speed-recording apparatus for electric vehicles.

April 20th.

5,569. W. P. THOMPSON, 322, High Holborn (E. A. Sperry, 855, Case Avenue, Cleveland, Ohio, U.S.A.). Storage batteries.
5,751. E. A. SPERRY, 855, Case Avenue, Cleveland, Ohio, U.S.A. Storage batteries.
5,947. C. MUSKER and others, Tue Brook, Liverpool. Generation of steam for "power" purposes.
6,267. F. W. JONES, 332, Dashwood House, London, E.C. Clutches.