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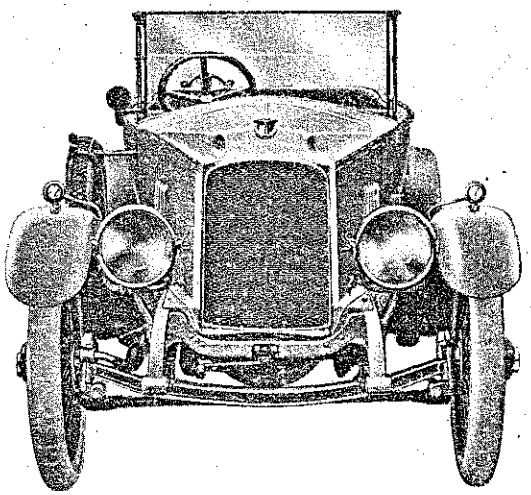

VAUXHALL MOTORS LIMITED

LUTON BEDFORDSHIRE

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Admiralty & War Office Contractors

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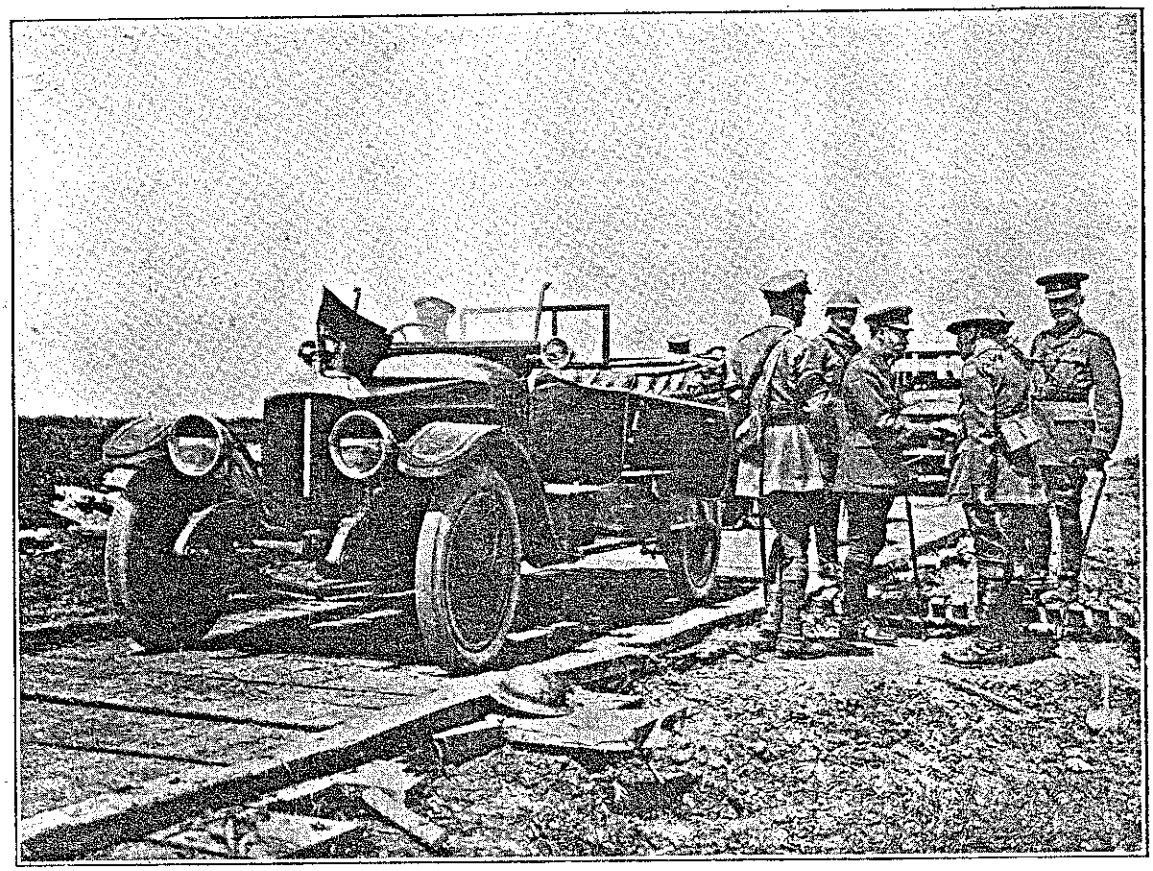
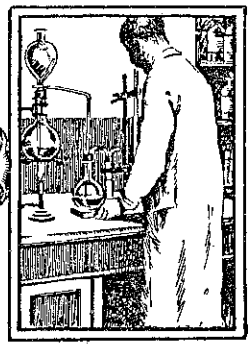


H.M. The King
drives in a
25 H.P. VAUXHALL CAR
to survey the field of
Vimy Ridge

The LINKING OF ENGINEERING AND METALLURGICAL SCIENCE



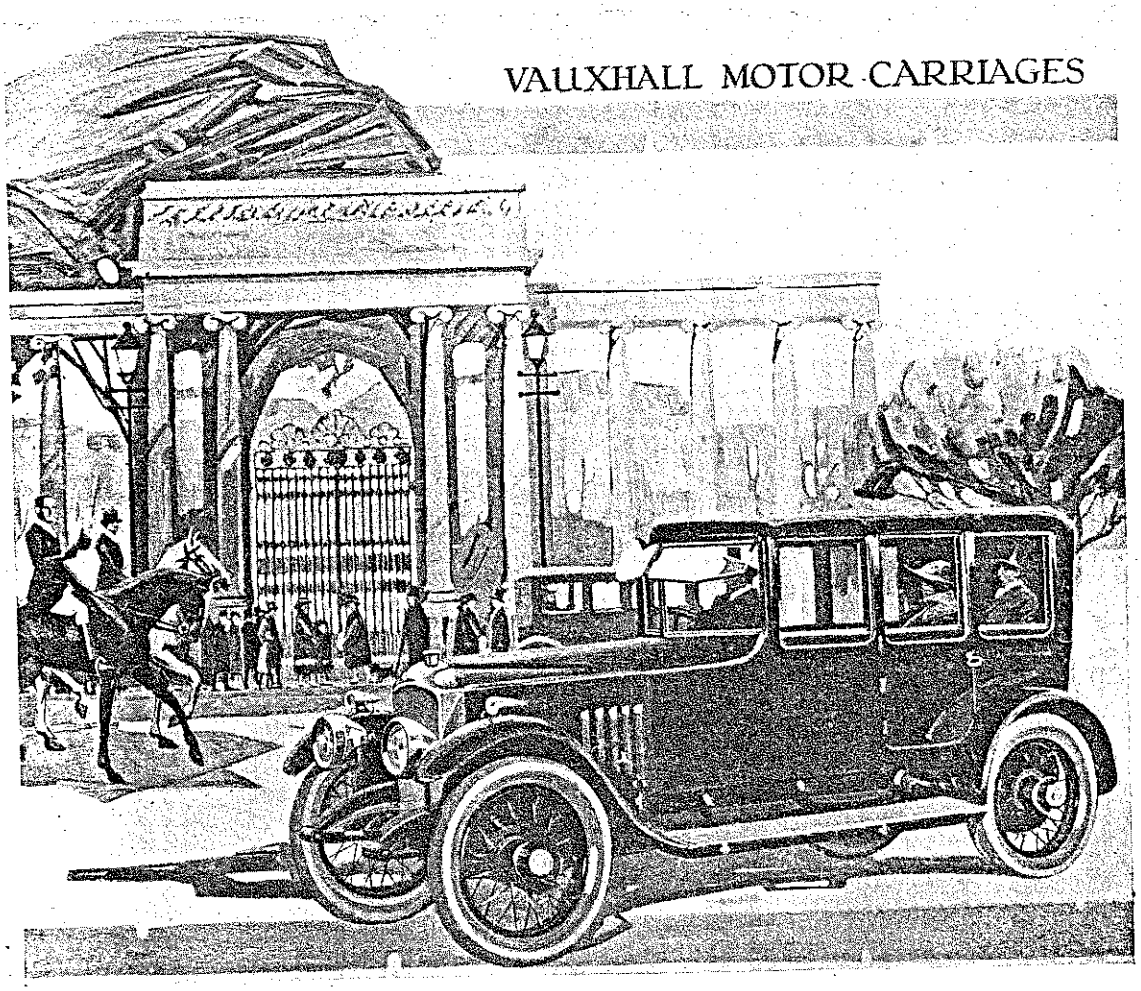
Part I

SALIENT FEATURES *of the* VAUXHALL DESIGN

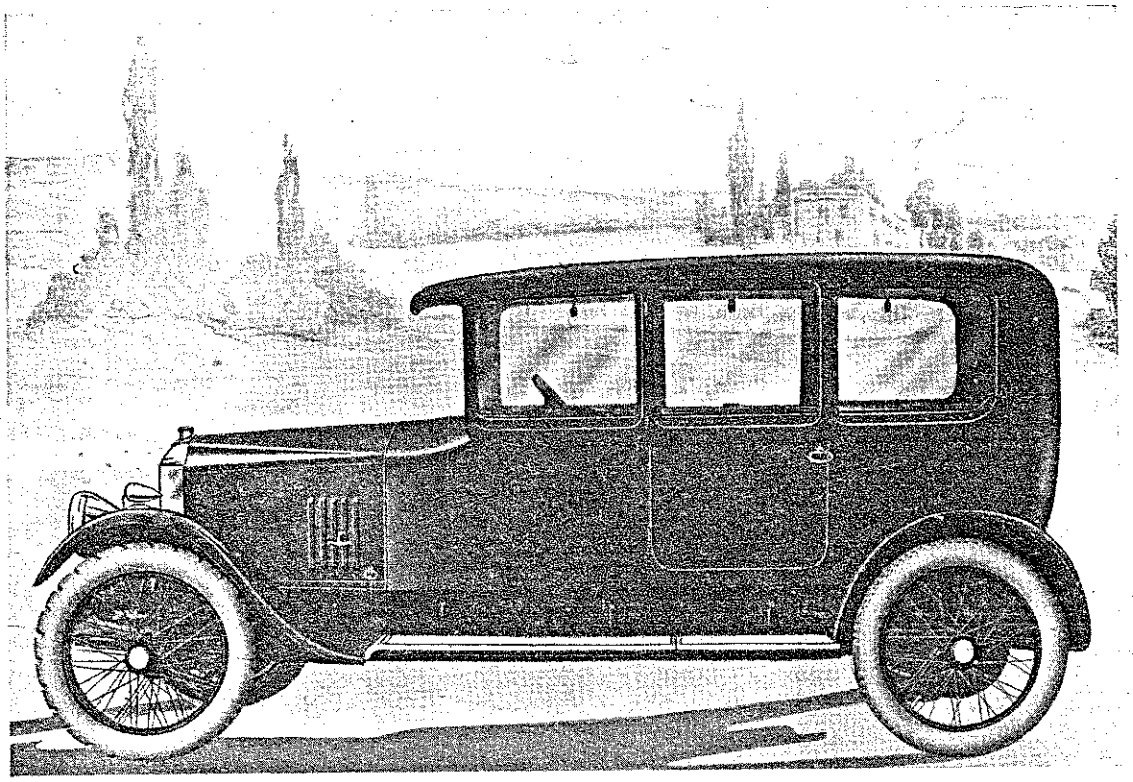
AS will be seen from the following description, the outstanding characteristics of the Vauxhall motor carriage coincide with the notion generally entertained by connoisseurs of the best-class car. They may be summarised under the heads :—robust construction, liveliness, sweetness of running and smooth riding, minimum of attention combined with accessibility, and elegance of appearance.

ROBUSTNESS The strength which is evident in all parts of the Vauxhall chassis has been determined by experience embracing the widest range of conditions and extending over many years. The Vauxhall has always been looked upon as a high-duty car. This reputation was acquired and has been maintained by specialising in high-speed research work, and by systematic participation in reliability trials. The work done by Vauxhall cars in the Overseas Dominions, in Russia, and on the Brooklands Track, has afforded most valuable data relating to the strength needed in the various parts of the chassis to withstand the severest conditions of use: no better corroboration of its value could be cited than the acknowledged pre-eminence of the Vauxhall as a military car.

The whole construction has been considered chiefly from the standpoint of absolute reliability rather than reduction of weight or cost of production. Nevertheless the Vauxhall chassis does not exceed in weight the average for the type. Attention is drawn to the design of the frame, springs, axles and hubs: the user's safety depends upon these cardinal points.



"Fit for anything from the stately circuit of the Park in mid-season to endless despatch running"
The Auto

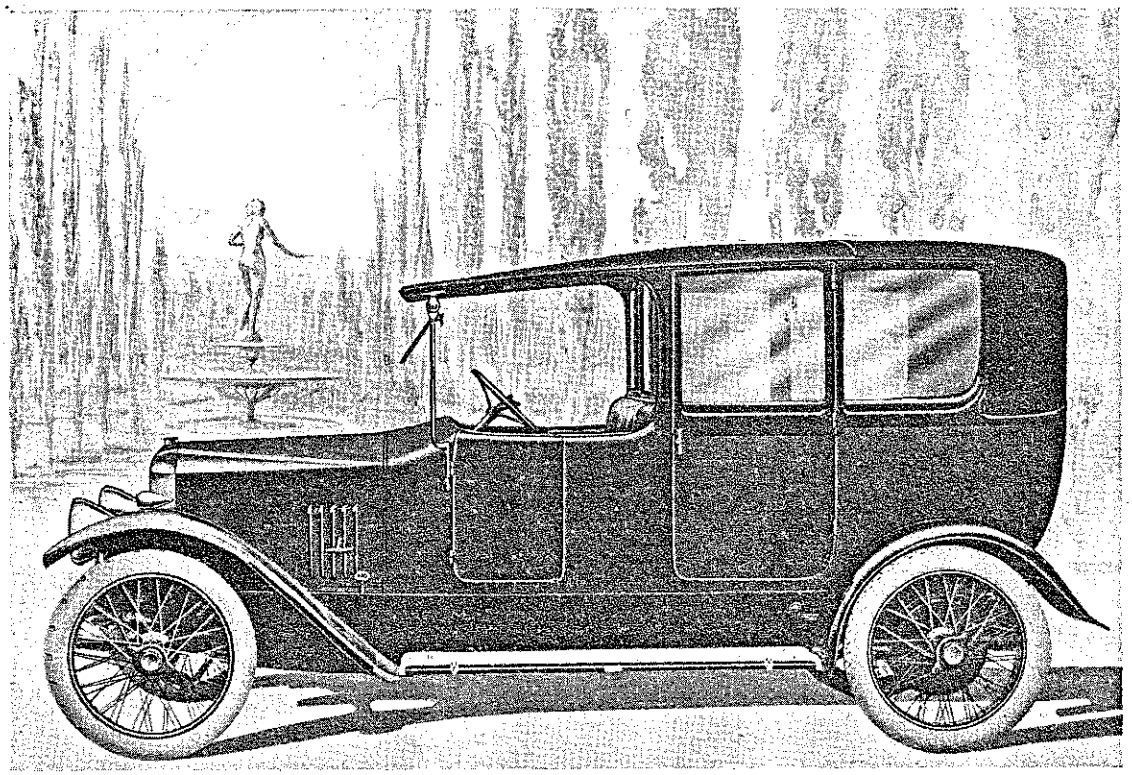


25 H.P. VAUXHALL-WESTMINSTER INTERIOR-DRIVE LIMOUSINE

Salient Features of the Vauxhall Design

LIVELINESS Though the Vauxhall cannot be classified as notably light in weight, its acceleration (or liveliness) is unique. One of the special merits of the car is that this capacity does not arise from the use of an unduly low gear ratio with a large engine. Such a combination makes for discomfort, particularly when the car has a closed body, to say nothing of extravagant fuel and tyre expense. The liveliness that distinguishes the Vauxhall has been achieved by making the best use of the possibilities which experiments have shown to be available in the petrol engine.

In many engines power is suppressed by having recourse to small carburettors, low compressions, etc., owing to the fact that prolonged running at high speed produces in them serious overheating and lubrication defects. In the Vauxhall design great attention has been given to these points, so that the engine can be run at full throttle without causing any apprehension in



25 H.P. VAUXHALL-WARWICK LANDAULETTE

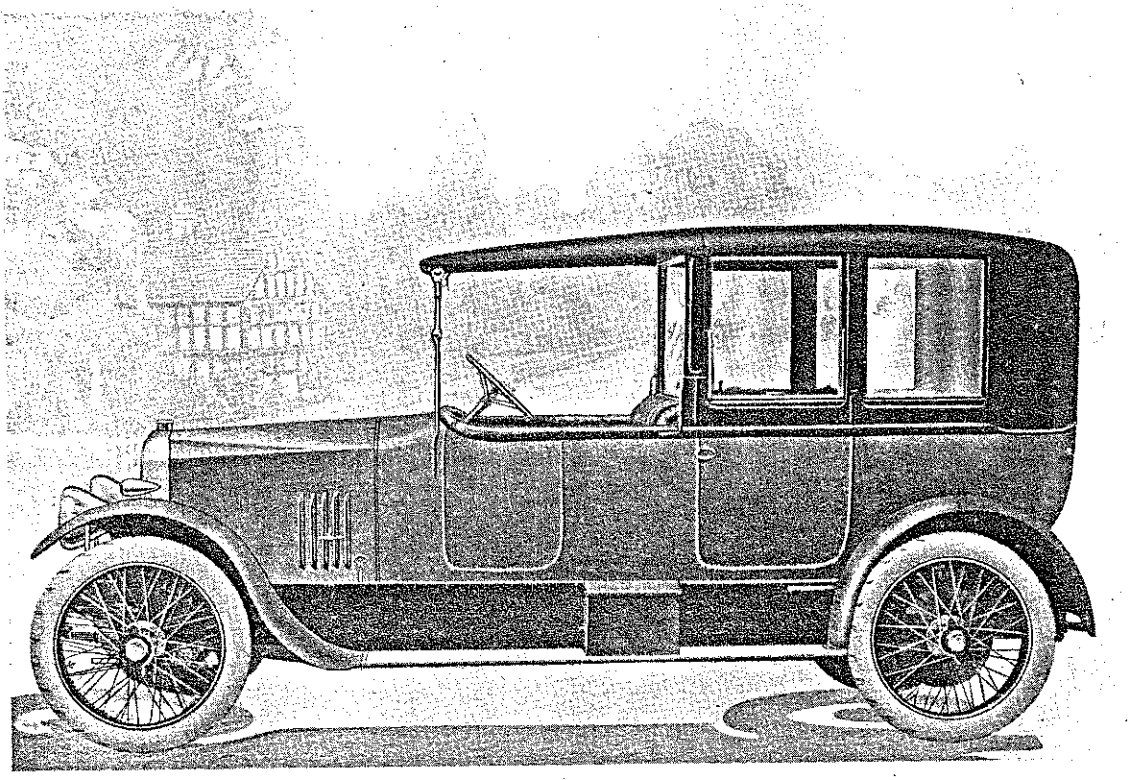
Price £2,025

Salient Features of the Vauxhall Design

the mind of the driver. Further, as a consequence of careful camshaft design and a close study of carburettor proportions, the liveliness of the Vauxhall engine is coupled with an unimpaired capacity for running slowly.

It follows that the ability of the Vauxhall to accelerate without gear changing is pronounced. Its flexibility is in fact developed to the farthest point *consistent with economy of upkeep*, for by ignoring this consideration it is a simple matter to obtain any degree of flexibility—*i.e.*, by means of low gears and a big engine.

The ability of the Vauxhall engine to run at very high speeds if required has an important bearing on hill-climbing. The speed of the Vauxhall car in hill-climbing is exceptional because the pull of the engine is maintained at a very high rate of revolution. The car will climb a hill much faster on third speed than on the direct gear, or on second speed than on third, according to



Price £1,990

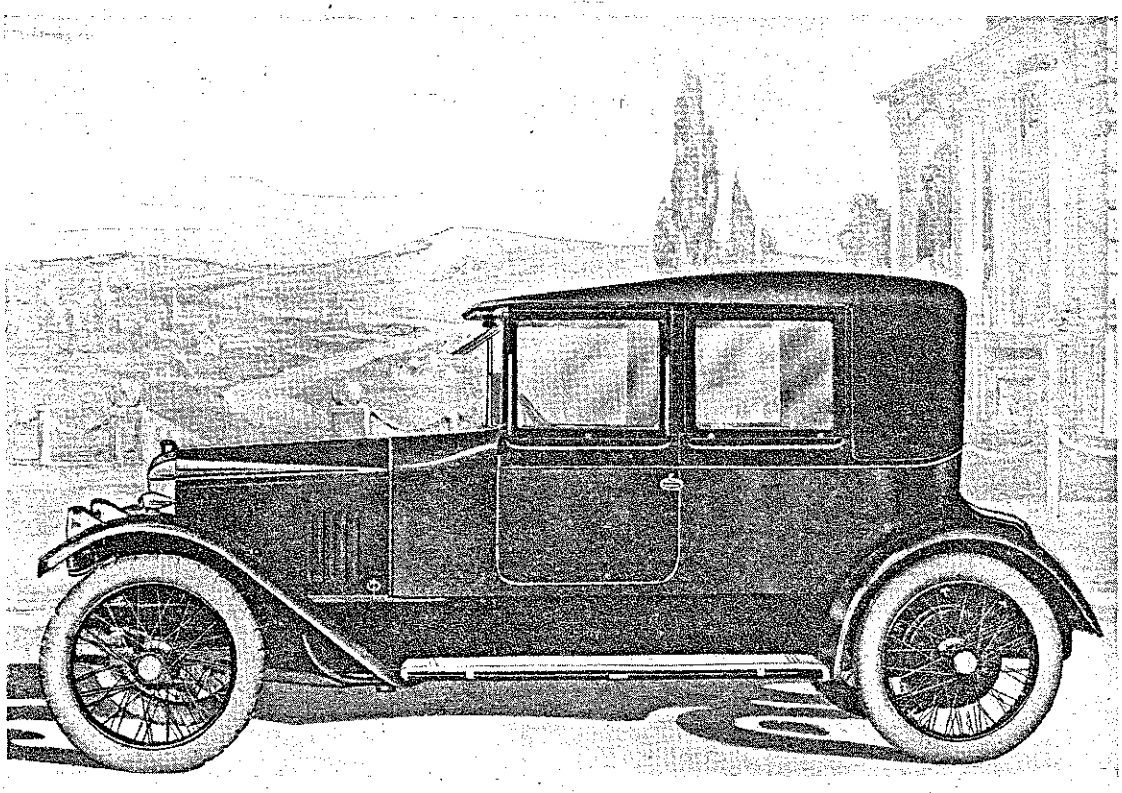
25 H.P. VAUXHALL-SUTHERLAND THREE-QUARTER CABRIOLET

Salient Features of the Vauxhall Design

the gradient. This inherent capacity to maintain its torque at high engine speeds is a distinctive feature of the Vauxhall. In the majority of cars the range of engine speed does not offset the reduced transmissive efficiency of the lower gears. In short, with proper gear-manipulation, which is easy, the Vauxhall has very remarkable hill-climbing powers.

A necessary complement of extreme liveliness is ample stopping power. A great deal of careful thought has been put into the Vauxhall braking system, which is both powerful and smooth. The size of the brakes and the character of the asbestos fabric braking-surface are such that renewal of the brake lining is very seldom needed.

SWEETNESS OF RUNNING The Vauxhall engine has always been noted for its silent running and absence of periods. It is not proposed to controvert the scientific fact that in any engine periods may occur at

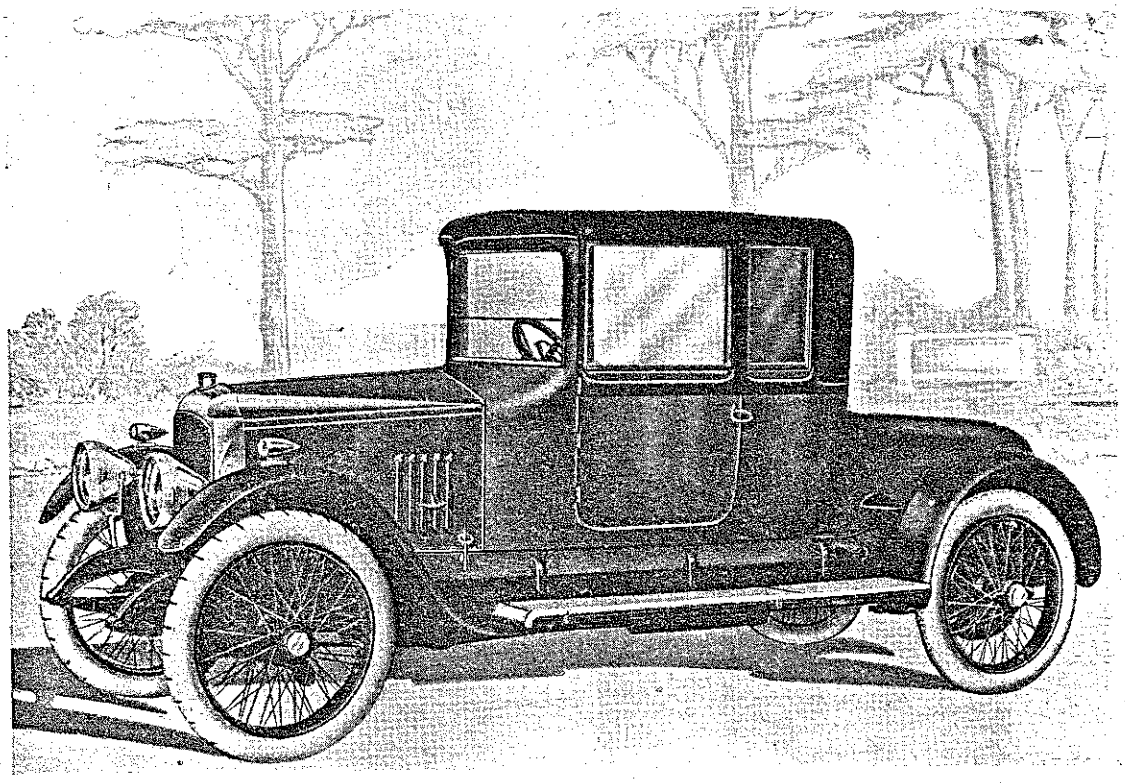


25 H.P. VAUXHALL-ARUNDEL INTERIOR-DRIVE CABRIOLET *Price £1,985 ; with V-front £2,015*

Salient Features of the Vauxhall Design

which the combined effects of gas pressure, inertia forces, and crankshaft deflection are made manifest; but it is asserted that the peculiar rigidity obtained in the Vauxhall design renders them negligible. The cylinders are mono-bloc; the crankcase is of very stout section; the crankshaft is of large diameter and supported on five bearings; the weight of the reciprocating parts is calculated in relation to the compression ratio; and finally, each engine is carefully adjusted for perfect rotary balance with the flywheel and clutch fitted. To engineers there is nothing particularly novel here, so far as principles are concerned, but the assiduous care which is paid to these points in the Vauxhall works explains the sweetness of running of the Vauxhall engine.

This property, moreover, is not merely an engine characteristic. The sweetness of running of the Vauxhall car as a whole is assured by the



Price £1,925

25 H.P. VAUXHALL-CAVENDISH COUPÉ

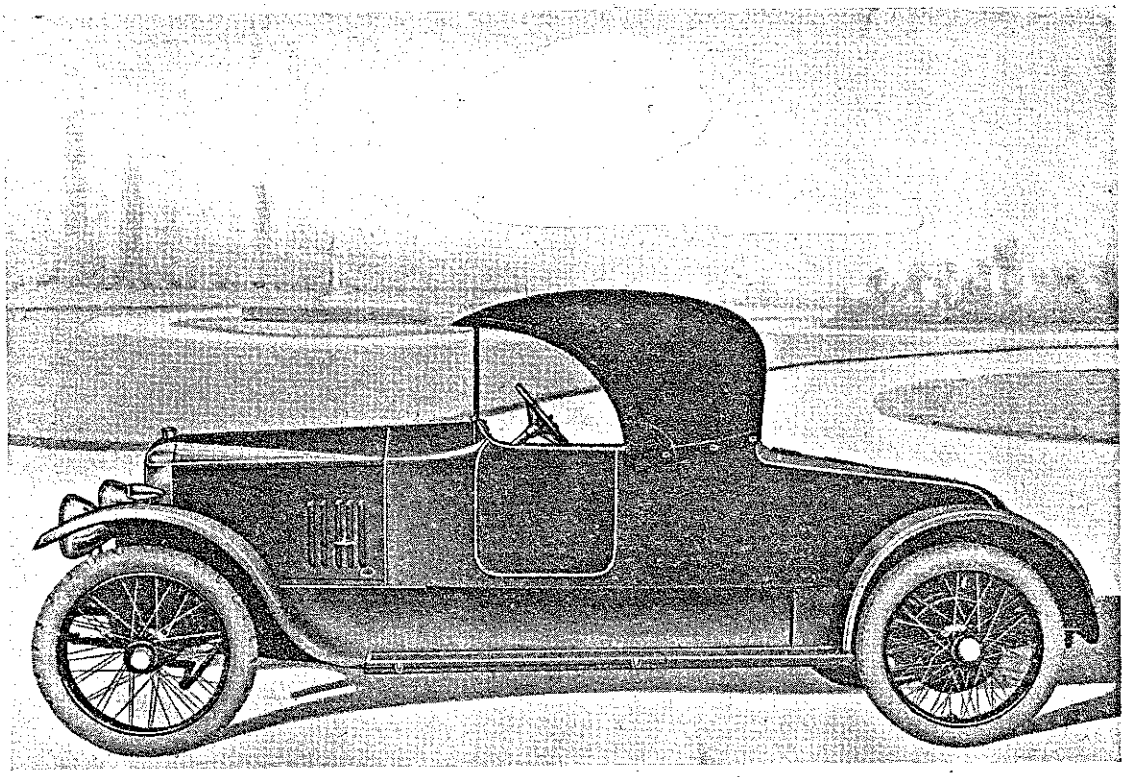
Salient Features of the Vauxhall Design

special attention given to the formation of the gears, the disposition of the propeller shaft, and the spring suspension.

The use of spiral bevels for the back axle reduction gears constitutes one of the most important of recent advances in the design of motor-car transmission. Spiral bevels, while virtually as silent as the worm drive, are free from the disadvantages of the worm, which, if at the bottom of the casing, affects the ground clearance, and if at the top, causes the body to be three or four inches higher from the ground than is necessary.

The gearbox, too, has received special study, and the Vauxhall Company has evolved a form of gear tooth which is more silent than any of the standard forms yet presented to motor car manufacturers.

Incorrect design of the transmission line causes variation in the angular velocity of the rotating parts between the engine and the back wheels, and is



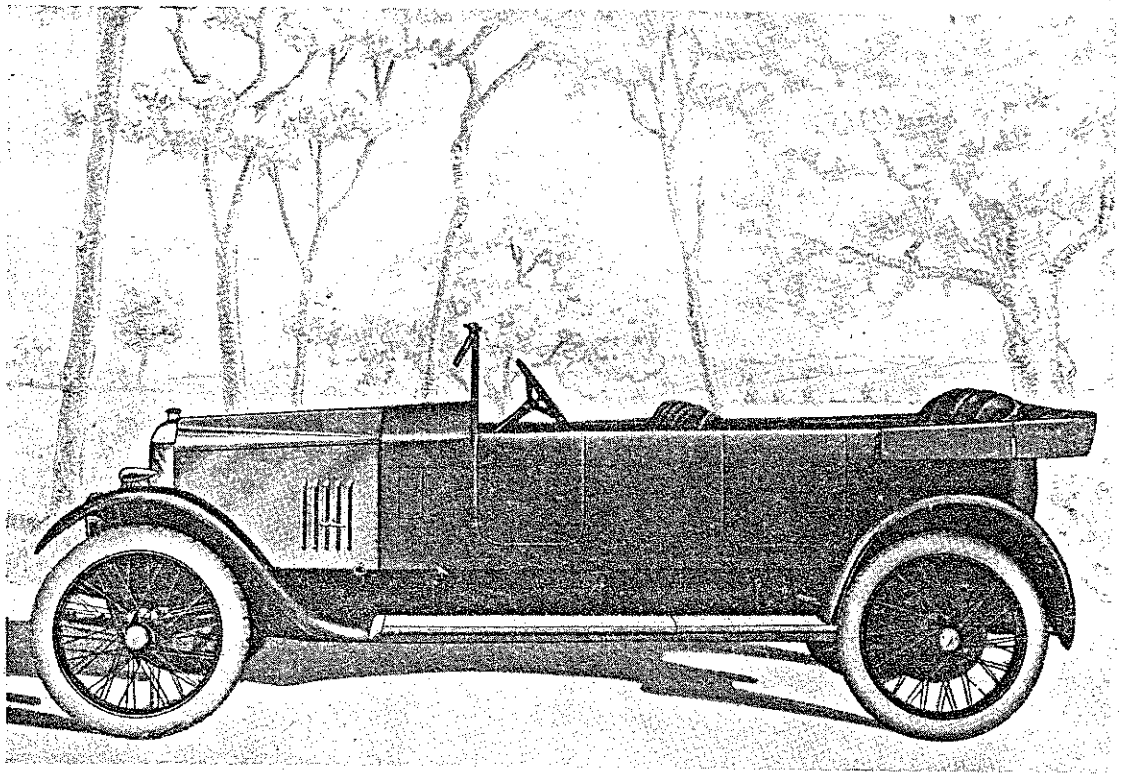
25 H.P. VAUXHALL-DENBIGH TWO-SEATER OPEN CAR

Price £1,750

Salient Features of the Vauxhall Design

capable of producing effects as objectionable as any which might arise from an imperfectly constructed engine. They can become very noticeable when the throttle is opened and the car is over-running, and are in fact, to some extent, unavoidable. In the Vauxhall design, however, a special form of coupling is used in the transmission line to damp out these variations as far as possible.

SMOOTH RIDING All springing systems aim at providing an elastic power that will absorb road shocks without transmitting them to the body, and thence to the occupants, of the car. But when the springs are too flexible, a very unpleasant heaving sensation is experienced every time the car goes round a corner. Semi-elliptic springs, both for the rear axle and the front axle, enable flexibility to be combined with avoidance of heaving in the greatest degree possible. In the Vauxhall design the springs are built up



Price £1,750

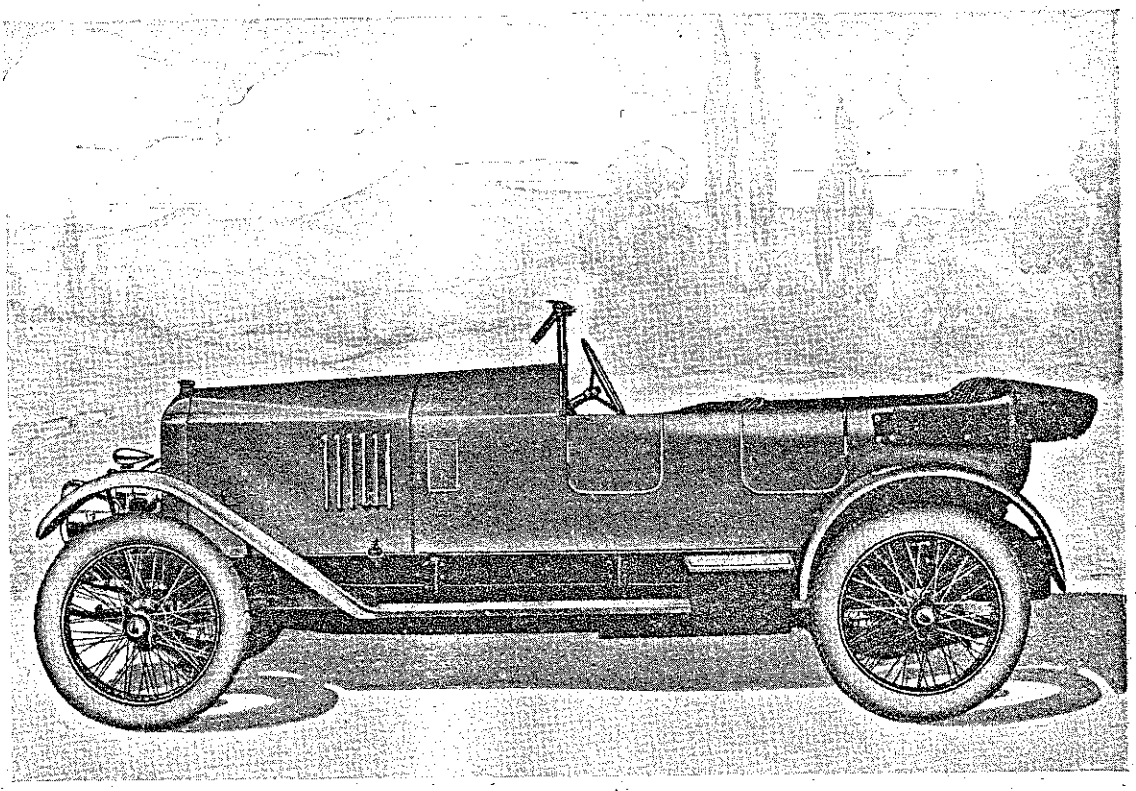
25 H.P. VAUXHALL-KINGTON OPEN CAR

Salient Features of the Vauxhall Design

of many thin plates, whereby great mechanical strength is obtained—that is, the tendency of a plate to fracture is reduced—and a certain degree of internal friction is set up, owing to which the springs act as their own shock absorbers, taking up and at once dissipating sudden blows, notwithstanding conditions of recurring periodicity.

In many cars rattles develop in all directions after about twelve months of service. Steps to prevent this have been carried to great lengths in the Vauxhall design, as will be seen on critical examination of the spring leaves and shackles, universal joints, front axle pivots, steering connections, etc.

MINIMUM ATTENTION The chief attention needed by a car is lubrication. A great advantage of the Vauxhall design is the slight demand made on the time and trouble of its owner to keep his car lubricated. The engine oil consumption is very low. The filler is conveniently placed, and the float



30-98 H.P. VAUXHALL-VELOX FOUR-SEATER OPEN CAR

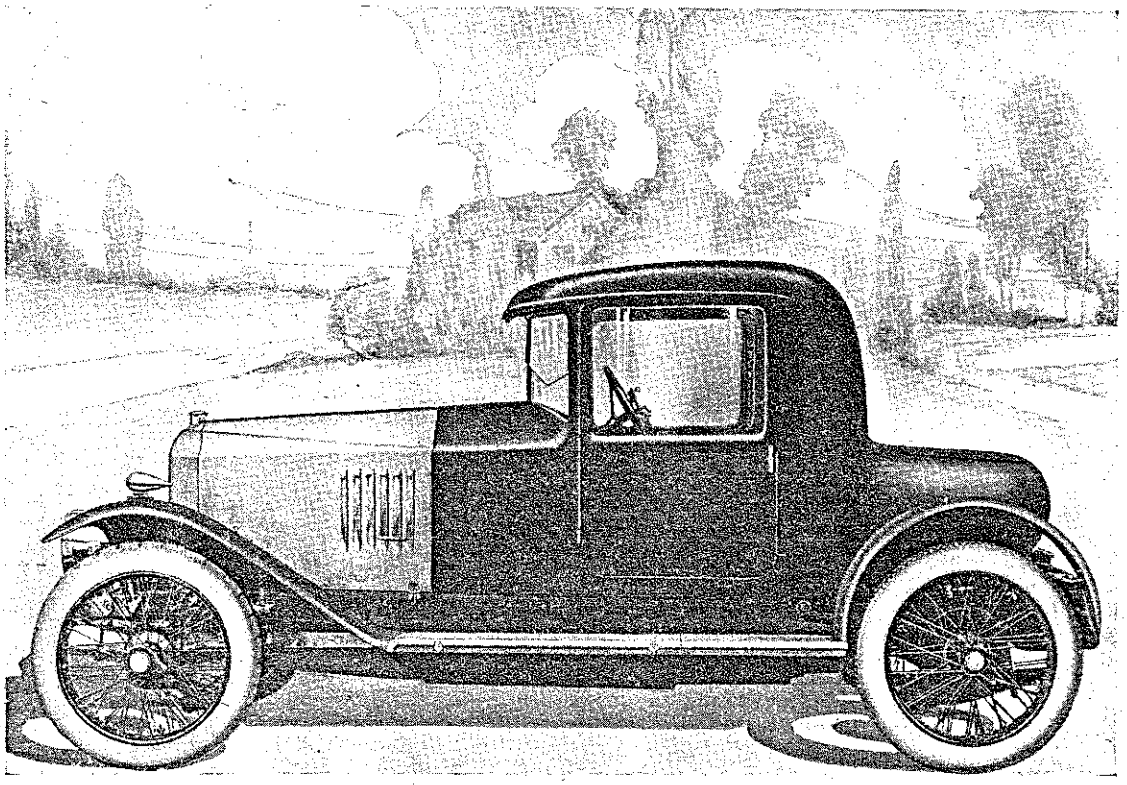
Price £1,960

Salient Features of the Vauxhall Design

indicating the oil level can be watched as the oil is being poured in. A unique feature in petrol engine construction is the Vauxhall detachable oil filter tray, which on account of its form and large surface thoroughly cleanses the oil as it returns from the engine, and is easily removed without the trouble of emptying the oil from the sump.

Oil leakage from the front and the back of the crankcase and from the gear-box, rear universal joint, and back axle, is very fully provided against.

The spring shackles are fitted with a ball oil-retaining valve. The centres of all shackle bolts are drilled out so that a considerable quantity of oil can be retained; consequently the lubrication of these parts gives very little trouble. Throughout the chassis the number of greasers is reduced to the minimum. The petrol tank is at the back of the car. The filler is of such a size that no petrol funnel is required (pour with nozzle of petrol can uppermost).

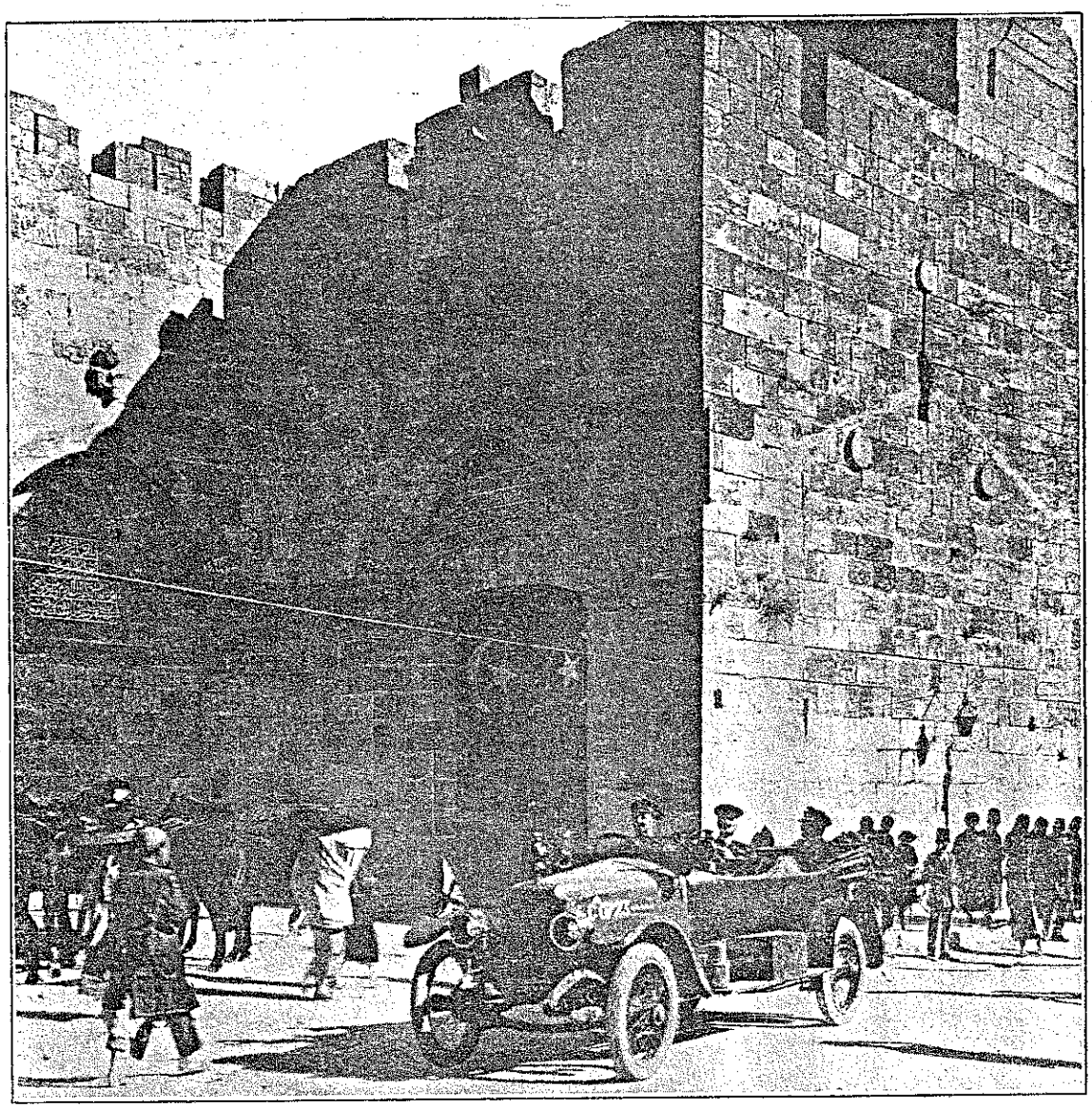


30-98 H.P. VAUXHALL-VELOX COUPÉ

Salient Features of the Vauxhall Design

The air pump pressure feed to the engine obviates the extremely troublesome operation of cleaning an exhaust pressure device, which even at this day is still to be found in some cars. Further, it is free from the deposition of water in the petrol tank through condensation, a drawback which is inseparable from the exhaust pressure system, and causes serious starting and running difficulties. Simplicity of design is observed in all parts of the chassis. It is worth mentioning that consideration has been given even to simplifying the work of washing the car; no mud can accumulate in places whence it cannot be easily removed.

APPEARANCE The shape of the Vauxhall radiator and the lines of the bonnet are everywhere admired. That they have a distinctive appearance admits of no question. The proportions of the chassis allow the body builder the scope needed for the production of fine bodies.



THE JAFFA GATE JERUSALEM

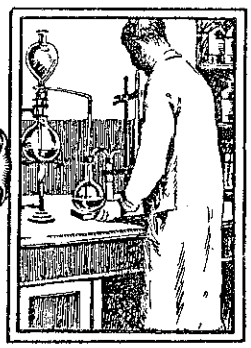
General Sir Edmund Allenby

(now Field-Marshal Lord Allenby)

in his

25 H.P. VAUXHALL CAR

The LINKING OF ENGINEERING AND METALLURGICAL SCIENCE



Part II

THE QUALITY *of* VAUXHALL MATERIAL

FEW motor-car users can have more than a faint idea of the complexity and extent of the metallurgical branch of chassis-building. Its many-sided nature cannot possibly be fully described in the present publication. By taking, however, just one example—namely, steel—of the ferrous metals, and ignoring the non-ferrous metals (brasses, bronzes, bearing alloys, aluminium alloys, and so forth), it is hoped to convey a sufficient notion of the pains which are taken to provide in each and every part of a Vauxhall car the ideally suitable material.

CHEMICAL ANALYSIS AND MICROSCOPIC EXAMINATION Some elements present in the raw material from which steel is made are retained in insistent small quantities in the finished substance—in particular those undesirable aliens, sulphur and phosphorus. The presence of these, though in such relatively small amounts as one part in a thousand parts of steel, would occasion grave defects, and hence the vital importance to the high-grade chassis builder of having the *composition* of his steels determined by analysis in his metallurgical laboratory.

Its *constitution* has also to be brought under survey. Chemical analysis tells us what substances steel is composed of and in what proportions they are present. The constitution of the metal, that is, the manner in which these substances are distributed, is another matter. To investigate the constitution of steel, the aid of the microscope is called in.

The Quality of Vauxhall Material

Besides these processes of chemical analysis and microscopic examination there are subsequently the further processes of heat treatment and certain mechanical tests to be gone through.

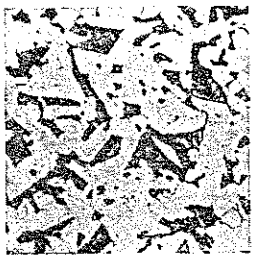


Fig. A

HEAT TREATMENT By way of illustration it will be useful to trace the experiences of a particular piece of steel delivered at the Vauxhall works.

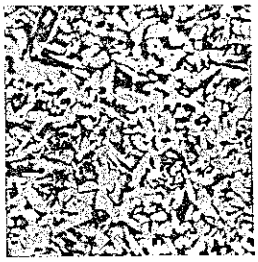


Fig. B

From an ordinary billet of about 0·30 per cent. carbon content, a piece of steel is taken in the shape of a cube of half-inch edge. This is successively filed, rubbed on a series of emery papers of increasing fineness, and finally polished on a rotating disc covered with Selvyt cloth moistened with rouge and water. By pouring on this very brightly polished surface a solution of picric acid in alcohol, the face of the steel is etched.

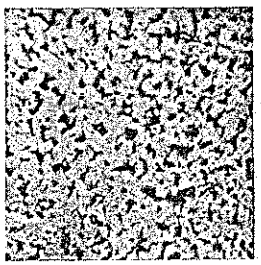


Fig. C

This etched face, when viewed through a microscope, reveals the fact that the steel has two distinct components. The light one is termed ferrite, and the dark one (which contains all the carbon in the steel) pearlite. In the sample illustrated they are distributed somewhat unevenly (Fig. A), denoting a weak condition, for which the remedy is heat treatment.

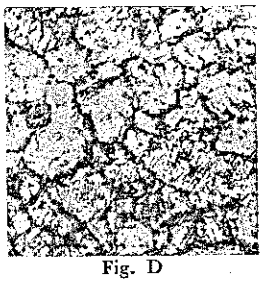


Fig. D

NORMALISED STEEL The piece of steel is carefully heated in a furnace until it reaches a temperature of 900°C., and submitted to a forging operation under a hammer until it becomes just red hot. It is then allowed to cool. Microscopic examination after polishing and etching shows that the pearlite is now more evenly distributed, though still somewhat angular (Fig. B). After a second heating (to 900°C.) and cooling it is found that the best possible distribution of ferrite and pearlite has been secured, and the steel is said to be *normalised* (Fig. C).

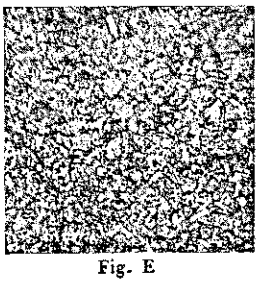


Fig. E

In this condition the steel gives the following results under test:—

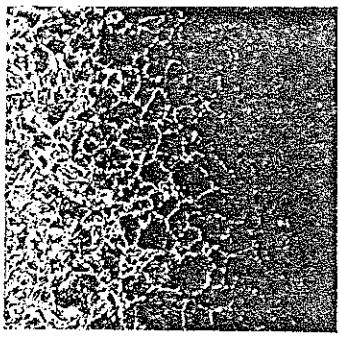


Fig. F

The Quality of Vauxhall Material

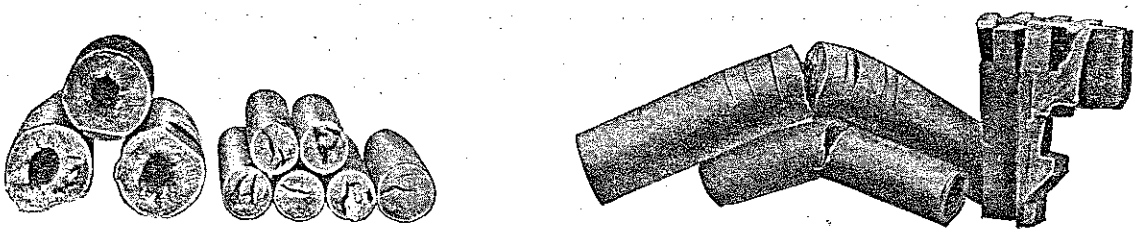
Ultimate strength	-	34 ton in.^{2}
Elastic ratio	-	54 per cent.
Elongation	-	30 ,, ,,
Reduction of area	-	53 ,, ,,
Brinell number	-	146

By again heating up the steel to 900°C., but quenching it in water instead of allowing it to cool freely in air, the formation shown in Fig. D is obtained, in which no pearlite can be seen. The steel is now extremely brittle and hard. The question arises, can we get a judicious mingling of this hardness with the ductility which characterises the structure in Fig. C?

QUENCHED AND TEMPERED STEEL By heating the quenched specimen to 600°C. a tendency to reform the ferrite and the pearlite is set up; but the temperature is not sufficiently high to allow this to be done completely. The effects of this tempering process are shown by Fig. E and the following test results :—

Ultimate strength	-	40 ton in.^{2}
Elastic ratio	-	65 per cent.
Elongation	-	23 ,, ,,
Reduction in area	-	45 ,, ,,
Brinell number	-	207

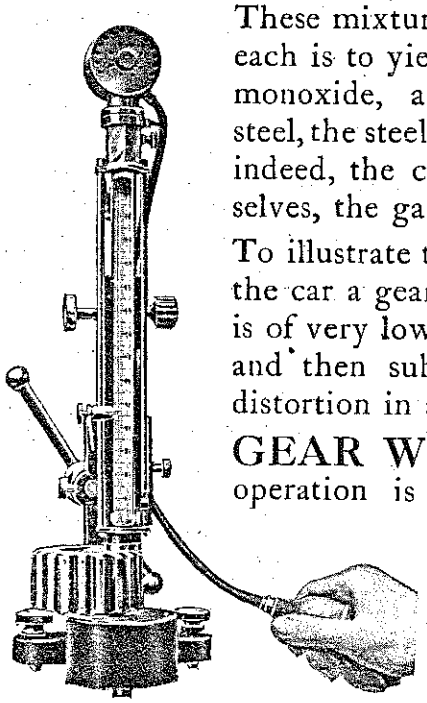
The vast difference between A and E, and again the variation in structure shown by C and E, will be noted. C is in the normalised and E in the quenched and tempered condition; for some purposes the former is desired, and for others the latter. Experiments of the kind described are carried out every day in the Vauxhall works on a much larger scale, and each operation is followed by microscopic check.



SPECIMEN TEST FRACTURES

The Quality of Vauxhall Material

CASE-HARDENING One of the most interesting uses of heat treatment is giving a hard skin to mild steels, thereby producing a substance in which the qualities of high carbon steel and low carbon steel are united. To enable carbon to combine with iron in this way, the mild steel is "cemented" in some mixture that has the power of yielding carbon-containing gases, from which the steel takes into its outer layers the requisite amount of carbon, namely, about 0·90 per cent. to a depth of about 1 mm. These mixtures vary somewhat in composition, but the aim of each is to yield the cementing gas, which is generally carbon monoxide, and which is subsequently decomposed by the steel, the steel retaining the carbon in combination. Sometimes, indeed, the cementation is effected by means of gases themselves, the gases used being generally rich in hydro-carbons.



SCLEROSCOPE FOR TESTING HARDNESS

To illustrate the process in the case of some particular part of the car a gear wheel may be chosen. The stamping, which is of very low carbon content, is normalised, rough-machined, and then subjected to further heat treatment to prevent distortion in subsequent processes.

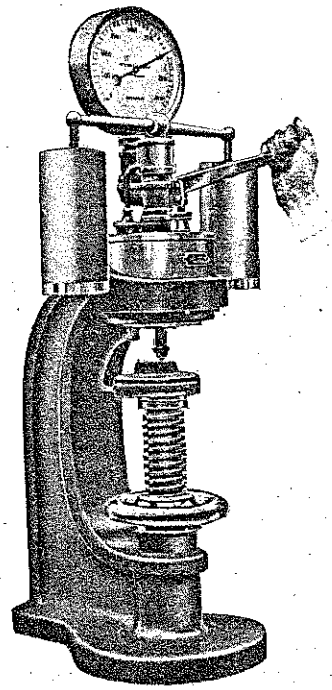
GEAR WHEELS The first step in the case-hardening operation is to pack the wheel in a cementing mixture. The iron box containing the cement and the gear is tightly sealed with fire clay; after the fire clay has dried the box is placed in a furnace the temperature of which (varied according to the particular type of steel) records 900°C. At such a temperature the mild steel has the power of dissolving carbon, and the carbon gradually diffuses into the teeth. The process is so controlled that a case of about 1 mm. is formed.

The gear is now in a soft condition; its external layer contains about 0·90 per cent. of carbon, the composition of its core being substantially the same as it was before cementation. The pearlite distribution, however, is very irregular, somewhat like, in fact, the piece of billet in Fig. A. A photograph, under 50 magnifications, of the case and core is shown in Fig. F. It is therefore necessary to refine this irregularity in the core while hardening the case. The gear is heated up to such a temperature that the pearlite can pass into solid

solution, and when this temperature is attained it is quenched in oil. The extreme mildness of the steel prevents much hardness from being imparted to the core under these circumstances.

OIL TEMPERING If at this stage the gear be broken, the case would be found largely crystalline, showing that although the core had been refined, the case had been heated at too high a temperature. The gear is therefore reheated to a temperature about 150° below its immediately preceding temperature and is again quenched in oil. This operation tempers the core, rendering it more ductile and at the same time produces a very fine structure in the case. The case is now hard, resisting the file, and the core is ductile, able to take up and distribute the sudden stresses imparted to the case when the gear is at work.

Very careful control is needed to prevent too high or too low a degree of carburisation in the case. To take away a little of the brittleness of the case, the gear is subsequently tempered in oil—a drawing process, as it is called—which is found to help the gear considerably during use.



BRINELL MACHINE FOR TESTING MILDNESS

MECHANICAL TESTS The Brinell machine is used for testing the mildness of steel. It enables an indentation to be made on a flat surface of the material with a small steel ball of 10 mm. diameter. The impression that should be made by a given pressure on mild steel of a given carbon content is known ; hence is obtained a measure of the deformation of the steel under load. Gear blanks are subjected to this test. Each must show an impression of a definite diameter, and when any discrepancy is found the stamping is further enquired into, for it is just possible that it is not mild enough for successful case-hardening operations.

For testing the hardness of a body the scleroscope is used. A hammer with a diamond point is allowed to fall through a definite vertical height upon the material under test. The harder the body under test, the higher the hammer rebounds. All case-hardened parts are subjected to this test. Those in

which the height of rebound is not up to a predetermined standard are set aside for enquiry.

A THOROUGH SYSTEM The stringent inspection to which the various finished parts are submitted from an engineering point of view does not come within the province of the laboratory, but may be referred to in passing for the purpose of showing the completeness of the whole supervisory organisation, which is rounded off by the watch kept on the behaviour of the material under working conditions as part of the car. Thus, after scientific investigation and treatment of the material before use, and the view room inspection, comes organised supervision of its subsequent behaviour. The thoroughness of this system of checking cannot fail to be appreciated by users of Vauxhall cars. Everything possible, in short, is done to ensure that the materials used in the construction of Vauxhall cars shall be invariably of the best quality, and the most suitable for resisting wear and securing freedom from breakdown that automobile engineering science can discover.

PARTICULARS OF MATERIALS

Part	Material	Ultimate stress	Elastic limit	Elongation	Scleroscope
		Tons per sq. inch	Tons per sq. inch	On 2"	
Crankshaft	Nickel chrome steel ...	50	40	20%	—
Gear Shafts, Propeller Shaft and Axles	Nickel steel	40	28	30%	—
Gear Wheels	Case-hardened nickel steel :				
	Core after case-hardening	46	36	24·5%	—
	Case after case-hardening	—	—	—	95–100
Front Axles	Axle steel	40	25	30%	—
Stub Axles	Nickel chrome steel ...	50	40	20%	—
Crankshaft Bearings ...	White metal	—	—	—	—
Gudgeon Pin Bushes and Bushes generally ...	Phosphor bronze ...	22	20	2 %	—
Crankcase and Gearbox ...	96% aluminium	13	—	5 %	—
Cylinders	Cast iron	28	14	25%	—
Levers	Mild steel	35	24	26%	—

D TYPE CHASSIS, 25 H.P.

ENGINE Four cylinders, 95 mm. bore by 140 mm. stroke. R.A.C. rating, 22·4 h.p. Cylinder capacity 4 litres. Firing order 1-2-4-3. Crankshaft has five bearings of following dimensions—front and rear 2 inches diameter by 3 inches; second, third and fourth 2 inches diameter by $2\frac{1}{4}$ inches. Pins, 2 inches diameter by $2\frac{1}{4}$ inches.

IGNITION High tension magneto, variable spark.

CARBURETTOR Zenith. An extra air inlet worked by a lever fitted above the steering wheel allows the strength of the mixture to be varied at the will of the driver, who can thus make his choice between maximum power and maximum economy.

LUBRICATION The forced lubrication is on the Vauxhall plunger pump system, and requires no attention whatever.

COOLING The Vauxhall fan and pump combination, successfully employed since 1912. The same belt drives the pump and the fan, and the size of the water connections ensures adequate cooling by thermo-syphon action should the fan belt be removed, which may be done in winter. Experience on practically all cars demonstrates that the belt is the only satisfactory method of driving a fan, on account of the very large effort required to accelerate the fan when the engine throttle is opened. This effort will break chains and ordinary gear teeth, but no such trouble occurs with the belt, as it can slip slightly. Bearing in mind that the horse-power required to drive the pump at an engine speed of, say, 1,500 revs. per minute, is about one-fortieth of that required to drive the fan, it is obviously unnecessary to use a gear drive of the size usually fitted for working the pump. Moreover, if during frosty weather the impeller freezes to the casing of the pump, a breakdown of the pump driving gear is caused when the engine is started. In the Vauxhall design the belt merely slips on its pulley and no damage is done. The arrangement of the belt renders adjustment very rarely necessary; when required, it can easily be made, as the belt pulley on the fan spindle is of the adjustable cone type. Capacity of cooling system, 6 gallons.

FRONT AXLE The front axle has inclined steering pivots, which are completely encased and lubricated with oil. The steering connections are so disposed that no shocks are transmitted through the steering wheel.

Specifications

D TYPE CHASSIS, 25 H.P.

STEERING Worm and wheel type. The Vauxhall steering gear is noted for being exceedingly light in operation and for its automatic stability. Steering wheel 17 inches diameter.

CLUTCH Vauxhall multi-disc with dry plates running in graphite. The power is taken up with perfect smoothness, and there is no end thrust from the crankshaft when the clutch is engaged. The Vauxhall clutch is particularly light in operation.

GEARBOX Four speeds and reverse. The top speed is direct, and just as its ratio is that which is considered to be the most suitable for top gear purposes, so the first speed is sufficiently low to tackle the most trying conditions. Vauxhall special form of gear teeth.

FOOT BRAKE The foot brake is placed at the rear of the gearbox, and is easily adjustable. Asbestos fabric lined.

BACK AXLE The back axle is of orthodox design, with straight tooth differential gear and spiral bevels. The road wheels are carried on sleeves, so that the axle is of the full floating type.

REAR BRAKE 16 in. diameter. Internal (expanding), asbestos fabric lined.

SPRINGING The springs are semi-elliptic, made of silico-manganese steel. Front 36 inches by 2 inches ; back 48 inches by $2\frac{1}{4}$ inches.

PETROL SUPPLY Tank at rear with air-pump feed. Tank holds 12 galls.

WHEELS Detachable wire, 880 mm. by 120 mm.

FINISH Nickel.

EQUIPMENT Complete Vauxhall cars supplied by the Company have a standard equipment (known as the VM equipment) of electric starting and lighting (6 lamps), aluminium instrument board fitted with speedometer, clock, lamp, switchboard and gauges, five detachable wire wheels and five Dunlop Magnum tyres, bulb horn and electric horn, full tool kit, and number plates. When a chassis only is delivered, the equipment included in the chassis price is the same minus number plates.

D TYPE CHASSIS, 25 H.P.

VARIATIONS OF STEERING RAKE AND SPRINGS The "D" type chassis is built for three types of body :

(1) Open body with torpedo steering rake and open car type springs. *Order—Chassis D open.*

(2) Closed body to be driven by chauffeur, with upright steering, and closed car type springs. *Order—Chassis D chauffeur closed.*

(3) Closed body to be driven by owner, with torpedo steering rake, and closed car type springs. *Order—Chassis D owner closed.*

The following particulars of standard open body dimensions will be found useful:—

Width of front door opening 19 inches.	Leg room, front seats to pedals 23 inches.
Width of rear door opening 20½ inches.	Leg room, rear seats to footboards 25 inches.

WITH THIS MODEL A GUARANTEE FOR THREE YEARS IS GIVEN

D (EXPORT TYPE) CHASSIS, 25 H.P.

This model is of the same design as the 25 h.p. model described in the foregoing pages, and therefore possesses the great structural strength and general reliability which are necessary for constant use on bad roads, and travelling long distances in countries where assistance is seldom within easy reach.

COOLING The adequacy of the Vauxhall cooling system, described on page 21, is attested by wide experience, including hill-climbing of the severest kind in the Balkans and among the Italian Alps.

GEAR RATIOS The gear ratios enable the car to cope with the most trying conditions, whether of road surface or gradient, or the two combined.

ACCESSIBILITY All parts requiring attention are easily got at and are so designed that they give the least possible trouble.

SPRINGING The springs are specially adapted for overseas use, the leaves being thicker, more in number, and slightly cambered.

CLEARANCE About 9 inches under the rear axle. It may be mentioned that Vauxhall cars with this clearance made the record runs :

Melbourne—Adelaide (580 miles). Melbourne—Sydney (575 miles). Brisbane—Sydney (650 miles).

GUARANTEE As some indication of the confidence with which the manufacturers are able to recommend the 25 h.p. EXPORT TYPE Vauxhall to overseas motorists, it is pointed out that, as with the English model,

WITH THIS MODEL A GUARANTEE FOR THREE YEARS IS GIVEN

Specifications

E TYPE CHASSIS, 30-98 H.P.

THE VAUXHALL FAST LIGHT TOURING CAR

ENGINE Four cylinders, 98 mm. bore by 150 mm. stroke, developing on the bench 100 b.h.p. R.A.C. rating, 23·8 h.p. Cylinder capacity 4·5 litres.

IGNITION High tension magneto, variable spark.

CARBURETTOR Zenith aero type 48 RA.

LUBRICATION Vauxhall plunger-pump system.

COOLING Vauxhall fan and pump combination. Honeycomb radiator.

CLUTCH Vauxhall multi-disc.

GEARBOX Four speeds and reverse. Direct on top.

BACK AXLE Semi-floating type. Bevel drive and bevel differential.

BRAKES Foot brake on propeller shaft; hand brake on rear axle hubs, diameter 12 inches.

SUSPENSION Semi-elliptic springs, with Derihon shock absorbers throughout.

WHEELS Detachable wire, 820 mm. by 120 mm.

PETROL SUPPLY Tank at rear with air-pump pressure feed. Tank holds 12 gallons.

BODY A specially light body—the Vauxhall-Velox—is built by the Company. See remarks on weight, page 26.

FINISH Nickel.

ORIGIN & DESIGN OF THE VAUXHALL FAST TOURING CAR

THE study of the fast touring car as a special type has engaged the attention of Vauxhall Motors Limited for many years. They are admittedly pioneers in this field.

In 1907 the Company produced an engine which made a considerable stir in the motoring world. Its success in the hill climbs, the Scottish Trial and the R.A.C. 2000 miles International Reliability Trial of 1908 was extraordinary. In this car was the germ of the Vauxhall fast light touring car. During 1908, 1909, and 1910, the Vauxhall engine made many notable performances. Attaining in October 1910 a speed of 100 m.p.h., the Vauxhall was the first machine of its relatively small size—namely,

ORIGIN & DESIGN OF THE VAUXHALL FAST TOURING CAR

4 cylinders, 90 mm. bore by 118 mm. stroke—to achieve this distinction, and in beating, in 1912, the 50 miles world's record, with a speed of 97·15 m.p.h., it was the first 3-litres engine to get into world's record class for this distance. Later the size of the engine was increased, and in August 1913 world's records (only beaten by a much larger machine) were obtained by a Vauxhall car with a 4-cylindered engine of 95 mm. by 140 mm. This feat comprised all records from 2 hours to 9 hours and from 150 miles to 700 miles (average speed, 87·74 m.p.h.).

The ability of these engines to give satisfaction in fast cars to be used on the road having been placed beyond doubt, the Company began in 1911 to build a fast light touring car as a regular model, and from that time became known as the one company producing exceedingly fast cars in quantities—cars which on being tested invariably demonstrated their capacity to run at the speed claimed for them.

The 30-98 h.p. Vauxhall fast touring car is the latest outcome of the special experience in high-speed research which has been indicated in the foregoing remarks. Extremely fast—approximating in speed to the fastest racing cars in the world—it is at the same time remarkable for refinement, silence and economy.

The petrol consumption at high touring speeds can be well under a gallon to twenty miles. A tyre life of 6,000 miles is by no means unusual.

The engine retains the sweetness of running characteristic of Vauxhall machines, and the car is very considerably easier to handle at low speeds than the ordinary touring car of other makes.

The best indication that can be given of the speed and power of the 30-98 h.p. Vauxhall is that a car of this type, with 'four up,' climbed Shelsley Walsh Hill from a standing start in 55·2 seconds, average speed, 42 m.p.h. The hill has a double bend in the middle, is 1133 yds. long, and the average gradient is 1 in 9·35. A guarantee can be given that with a single-seated body the 30-98 h.p. Vauxhall will attain 100 m.p.h. on the track. Clients should bear in mind that a car intended for track racing will have a higher gear ratio than one to be used simply as a fast roadster. It may also be well to point out that much depends on road conditions and wind direction. In practice there

ORIGIN & DESIGN OF THE VAUXHALL FAST TOURING CAR

is bound to be a certain variation of performance according to the circumstances ; but the guarantees given above make clear that the speed capabilities of this model are exceptional, particularly when considered in conjunction with its silence, economy, and ease of handling.

Among many distinctions gained by the few 30-98 h.p. machines which had appeared before the outbreak of war caused the production of this type to be suspended are the following hill-climbing records :—

Aston Hill. Record for the fastest time held by A. J. Hancock, 24th May, 1913. 30-98 h.p. model. Time, 48 2/5th seconds. Length of hill 1,300 yards.

Shelsley Walsh. Record for fastest time held by Joseph Higginson, 7th June, 1913. 30-98 h.p. model. Time, 55·2 seconds.

Caerphilly. Record for the fastest time held by A. J. Hancock, 19th June, 1913. 30-98 h.p. model. Time, 1 minute 4 3/5th seconds.

These hill-climbs are the chief and the most keenly-contested of such competitions in England.

Points in the design of the chassis generally to which attention may be drawn are :—

The low frame, which is an important factor in ensuring the stability of the car when taking corners at high speed.

Simplicity of construction.

Grease cups are practically eliminated and are replaced by ball-valve oil lubricators for all shackle pins, pivots, pins, &c.

The care paid to the method of lubricating essential parts, such as the gearbox, universal joints, back axle, &c., which only need attention at long intervals.

SUSPENSION The problem of suspension in the fast car is distinct from that of the ordinary touring car. Experience with very fast cars has shown semi-elliptic springs to be the best form of suspension for machines of this type. Other forms, such as the cantilever and three-quarter elliptic, have too great a tendency to occasion rolling when the car is going at high speed round a corner, and furthermore the slow periodicity of these springs is unfavourable to fast travelling on rough roads. The semi-elliptic springs used on the 30-98 h.p. model are of adequate length and quite flat. They are, moreover, mounted above the axle, because thereby the rolling tendency, compared with springs mounted below the axle, is lessened.

WEIGHT The weight of the 30-98 h.p. chassis with VM equipment and tanks full, is 23¾ cwt. The complete Vauxhall-Velox four-seater car weighs 26¾ cwt., and the Vauxhall-Velox coupé 28¼ cwt. Customers intending to have a body built by their own coachbuilder are notified that the *maximum* body weight for this chassis is 5 cwt.

In a manner not quite attained by any other car the 30-98 h.p. Vauxhall appeals to the sporting instinct. It offers in the skilful handling of a refined powerful machine that exhilarating pleasure which is the essence of sport. Its performance is a constant source of delight to those who have a predilection for mechanical ingenuity. This interest, the fascination of swift, silent motion, and the zest of road mastery, make driving a pure joy, with which perhaps there is nothing comparable in any other open-air pursuit.

THE 25 H.P. VAUXHALL-KINGTON TOURING CAR

WITH ENGINE STARTER AND ELECTRIC LIGHTING

The design of this body has been carefully thought out in every detail. The shape is such that wind resistance is reduced to the minimum ; though the body does not look specially broad, it will in fact take three persons on the rear seat.

Best quality well-seasoned ash is used for the framework, and the hand-beaten panels are of lead coated steel.

The near-side running board is kept quite clear, and most of the off-side board is also unencumbered. The battery box is under the body, on one side of the propeller shaft. The spare wheel is carried on the off-side board, but well forward, and behind it is placed a special box for jack and tyre pump.

The workmanship and finish are of the highest grade. The seats are covered with first quality hand-finished hide, and are most comfortably sprung, upholstered and dimensioned. The 'Vauxhall saddlebag' upholstery is distinctive and elegant and does away with the numerous little pockets in which dust is apt to lodge.

The hood is of the one-man type, with a tubular steel frame. A cover is provided, and as a result of the special care which has been given to this point, the folded hood is exceptionally neat and shapely, and in keeping with the fine appearance of the body.

The front windscreen has a hinged top panel, and is built snugly against the scuttle and brought close to the steering wheel.

A handsomely finished flush-fitted aluminium instrument board carries the clock, speedometer, switchboard, lamp, and gauges. The front floor-boards are of aluminium.

For colour a choice is recommended from either grey with blue or grey leather and black wings, valances, and frame ; light Vauxhall brown (all over) with brown antique leather; Vauxhall blue with blue or grey leather; or flatted black (all over, but the bonnet of polished aluminium) with grey leather. The polished aluminium bonnet can be had whatever the colour of the body.

The VM equipment as detailed on page 22 is included in the price, and the car is delivered with ten gallons of petrol in the tank.

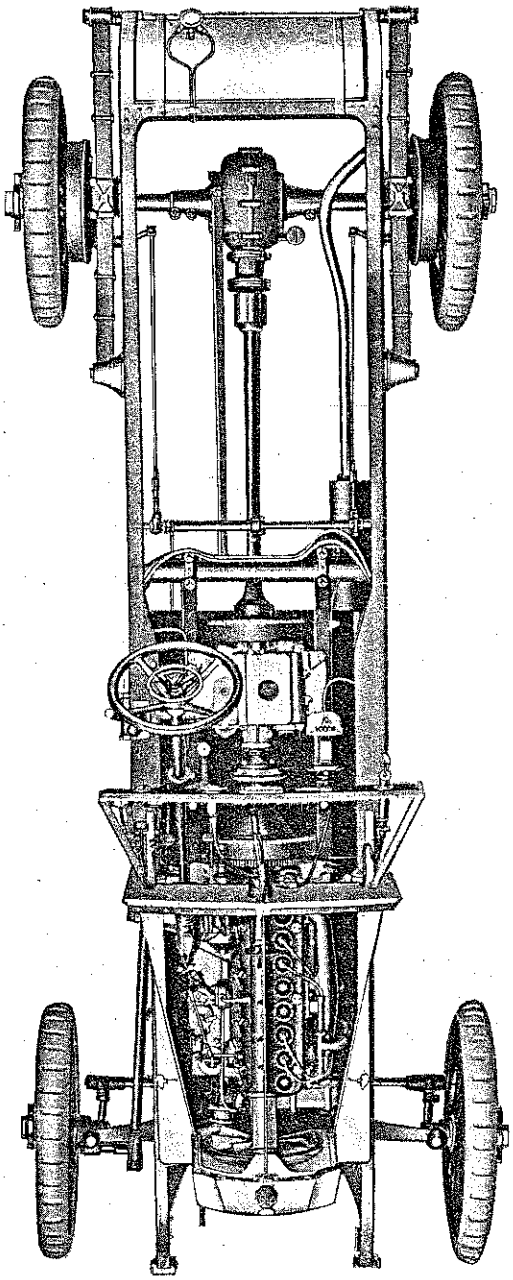
PRICE OF THE COMPLETE CAR £1,750

LEADING DIMENSIONS GEARING AND DETAILS

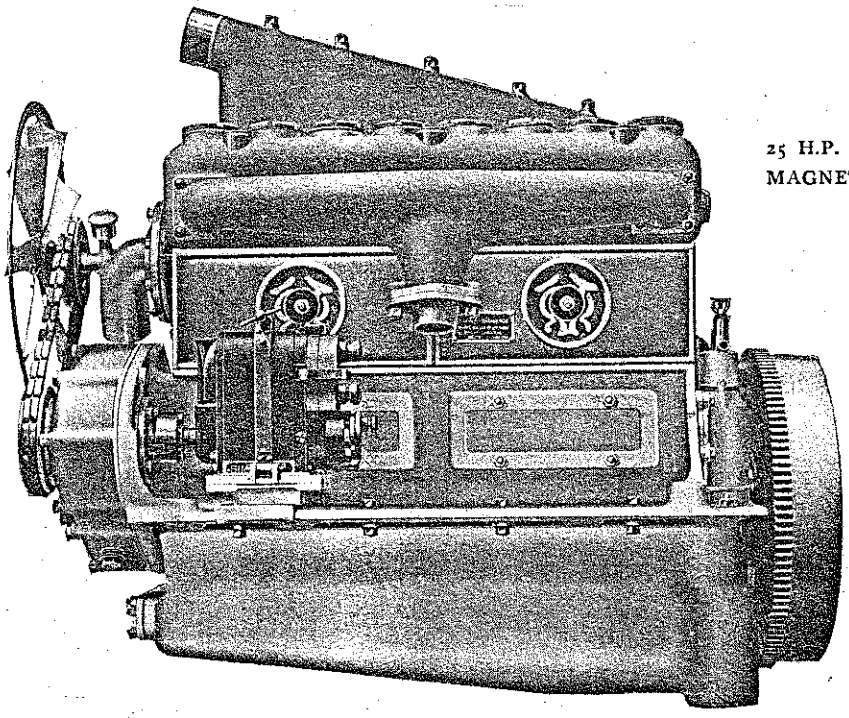
(For variations of D type steering rake and springs—see p. 23)

	D Type	E Type
Horse-power	25	30–98
R.A.C. rating	22·4	23·8
No. of cylinders	4	4
Bore and stroke	95 mm. × 140 mm. 3¾ ins. × 5½ ins.	98 mm. × 150 mm. 3⅞ ins. × 5⅞ ins.
Transmission	Four speeds, live axle	Four speeds, live axle
Speeds (in miles per hour) at 1000 r.p.m.	1st 7·5 / 2nd 12 / 3rd 19 / 4th Direct 28·5	1st 8·7 / 2nd 13·7 / 3rd 20·8 / 4th Direct 32
Gear ratio on direct drive	3·6 : 1	3 : 1
Wheelbase	10 ft. 10 ins.	9 ft. 6 ins.
Distance from dash to centre of back wheel	7 ft. 9¼ ins.	6 ft. 4 ins.
Length from dash (body space)	8 ft. 8 ins.	7 ft. 1 in.
Length over all	14 ft. 6 ins.	13 ft. 4 ins.
Length of car over all (hood down)	15 ft.	13 ft. 10 ins.
Track	4 ft. 8 ins.	4 ft. 6 ins.
Width of frame	35 ins.	34 ins.
Width over all	5 ft. 8 ins.	5 ft. 6 ins.
Size of standard tyres	880 × 120‡	820 × 120
Weight of chassis	26 cwt.*	23¾ cwt.*
Price of chassis	With VM equipment £1,300 Delivery at works	With VM equipment £1,500 Delivery at works
Tax	£6 6	£6 6

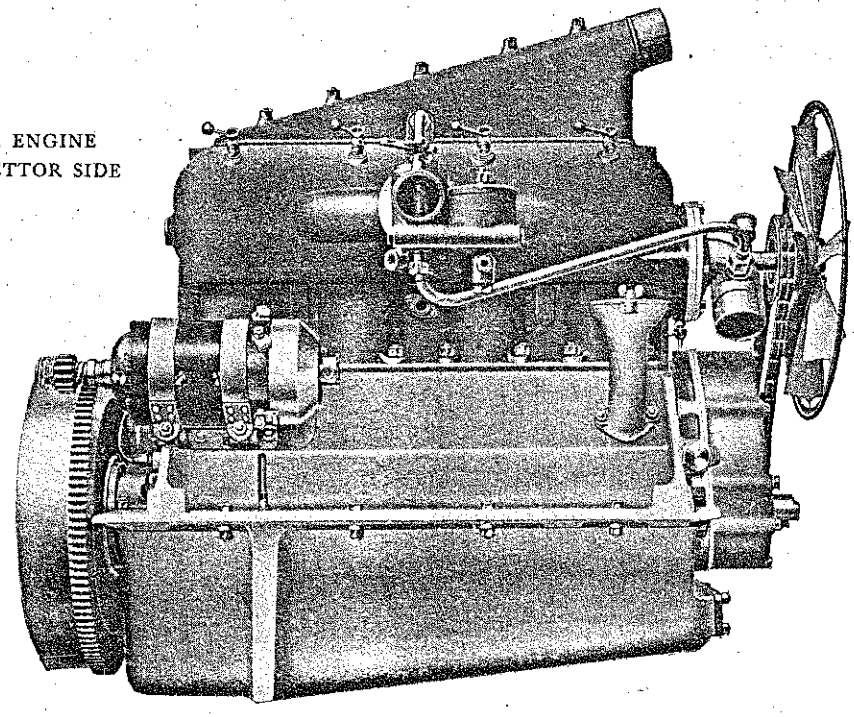
* Including starting and lighting installation with lamps, instrument board with fittings, spare wheel and tyre, horns, tool kit, and water in radiator. ‡ Larger wheels and tyres (895 × 135) are recommended for closed cars, in order to secure the greatest comfort and tyre economy. The extra charge when these wheels are fitted is £10, on the basis of present price lists.



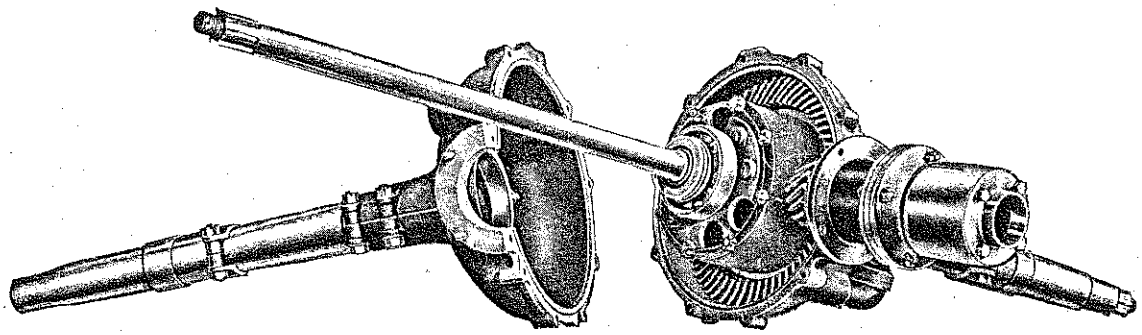
25 H.P. (D TYPE) VAUXHALL CHASSIS
PLAN VIEW



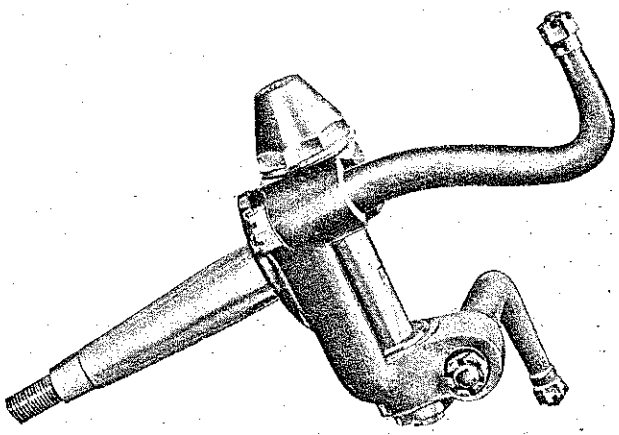
25 H.P. ENGINE
MAGNETO SIDE



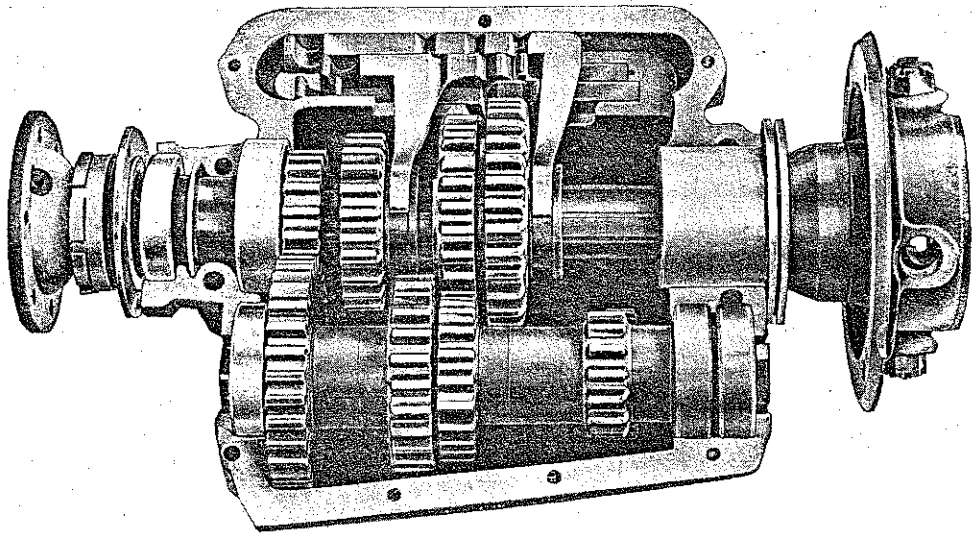
25 H.P. ENGINE
CARBURETTOR SIDE



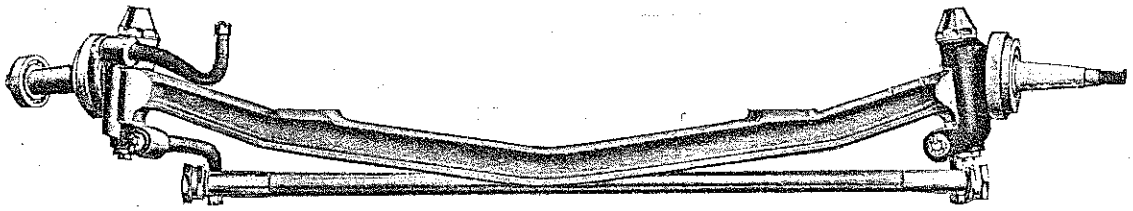
25 H.P. BACK AXLE COMPONENTS



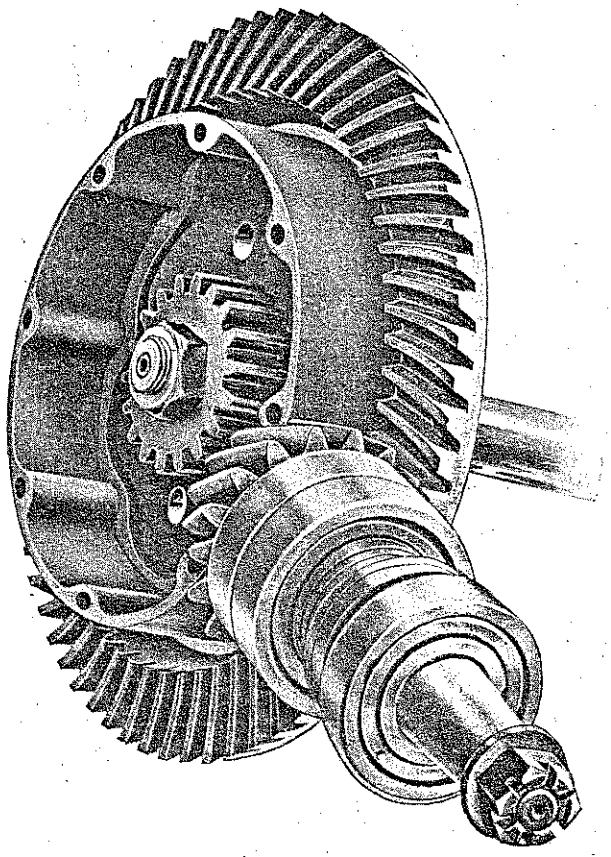
STUB AXLE SHOWING BALL VALVE OIL-LUBRICATOR



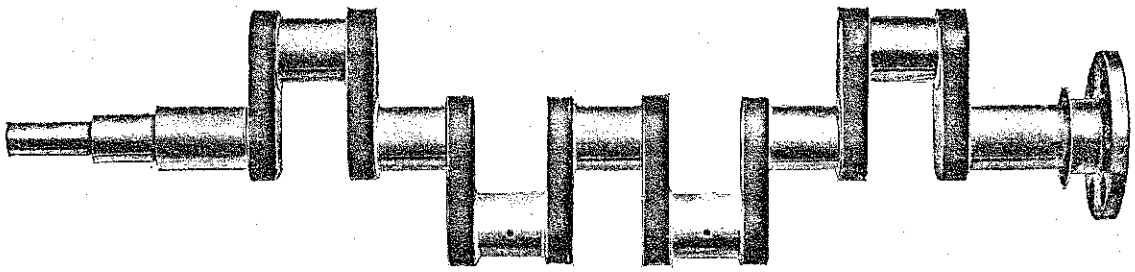
25 H.P. FOUR-SPEED GEARBOX



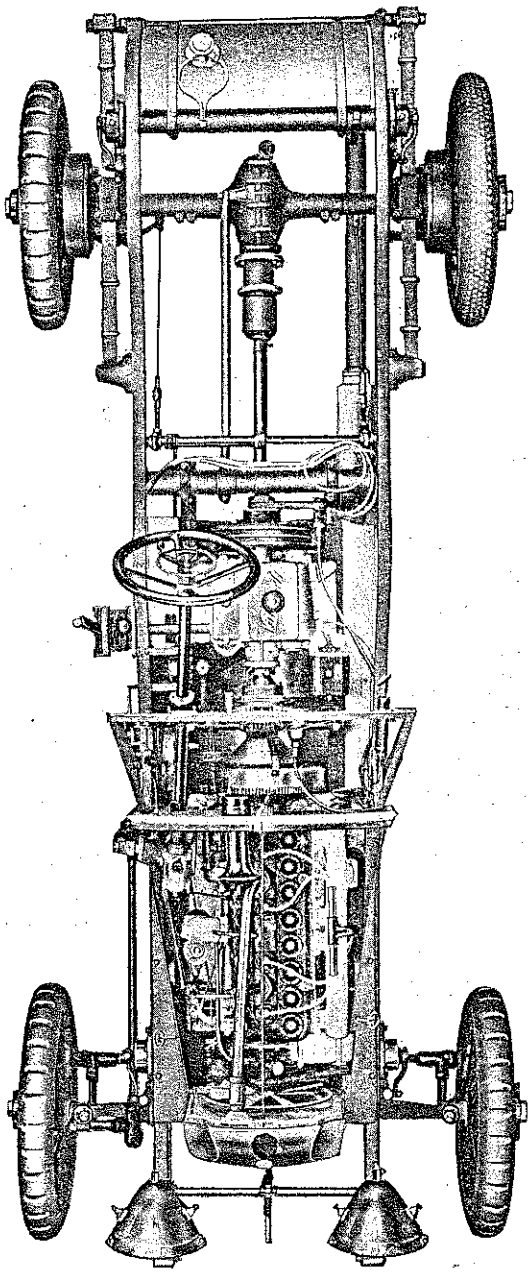
FRONT AXLE WITH INCLINED STEERING PIVOTS COMPLETELY ENCASED



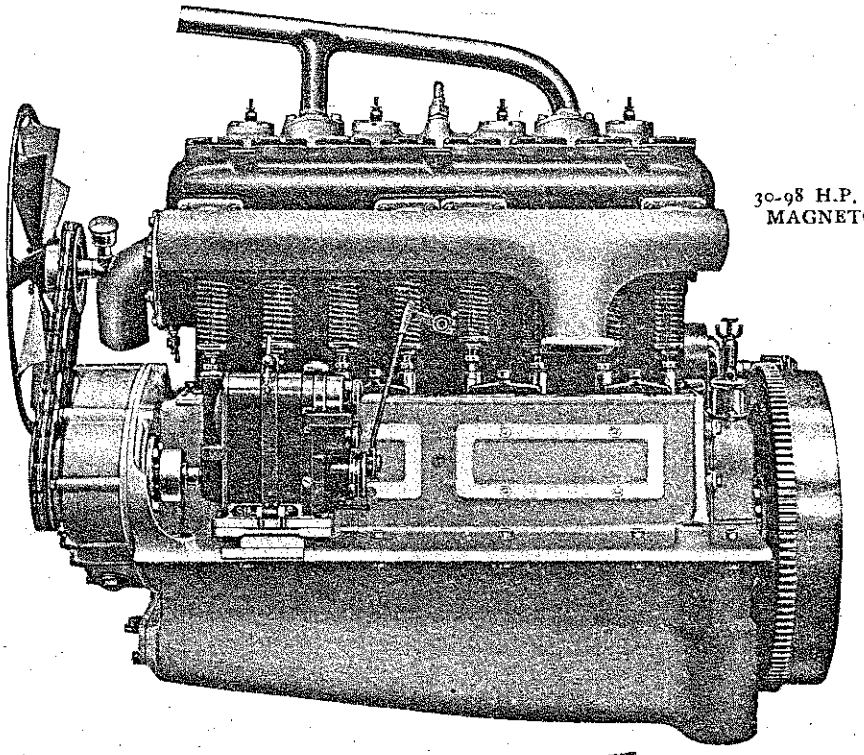
BACK AXLE OF 25 H.P. CHASSIS—SPIRAL BEVEL DRIVE



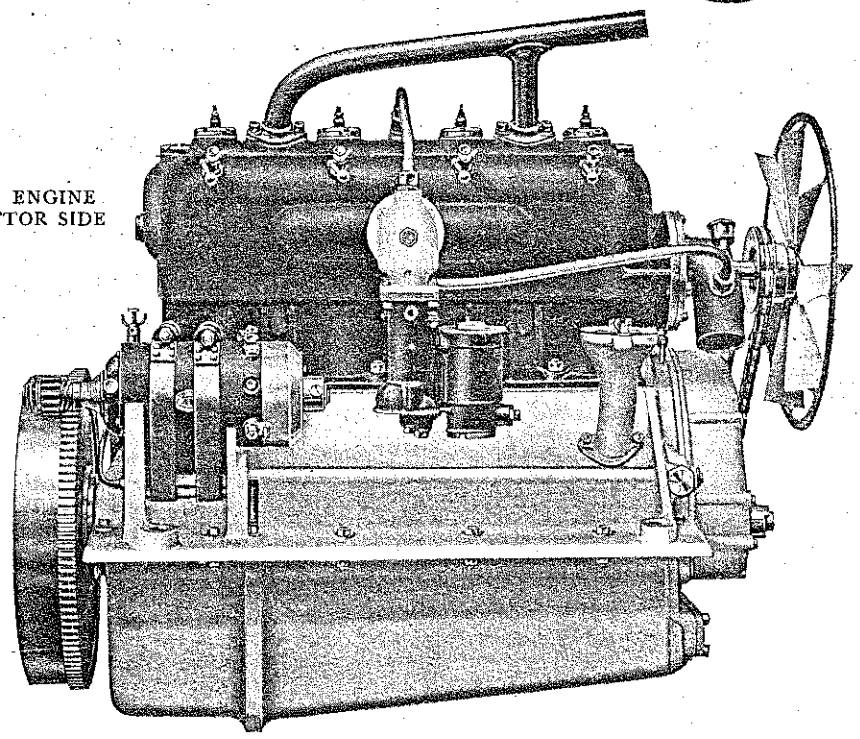
FIVE-BEARING CRANKSHAFT



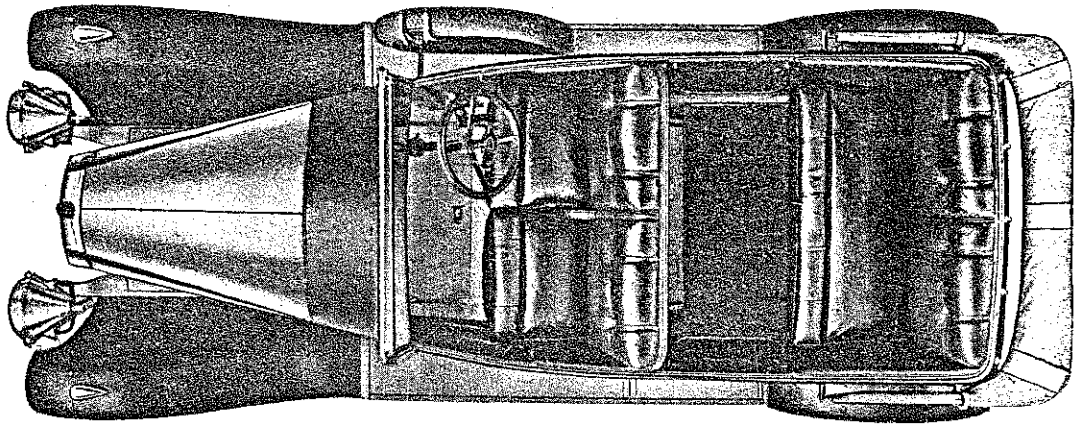
30-98 H.P. (E TYPE) VAUXHALL CHASSIS
PLAN VIEW



30-98 H.P. ENGINE
MAGNETO SIDE



30-98 H.P. ENGINE
CARBURETTOR SIDE



PLAN VIEW OF THE 25 H.P. VAUXHALL - KINGTON OPEN CAR
Note its roominess, 'Vauxhall saddlebag' upholstery, clear running boards, and neat hood

DRIVING COMPARTMENT
A particularly smart and finished appearance is secured by the aluminium instrument board and the aluminium floor boards