

Section IV.

Methods of Efficiency

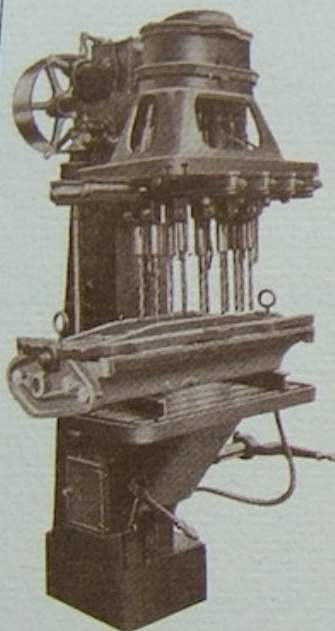
A rapid view of the Vauxhall works



Vauxhall

THE CAR
SUPEREXCELLENT



High Quality the Ruling Consideration*Multi-spindle machine.*

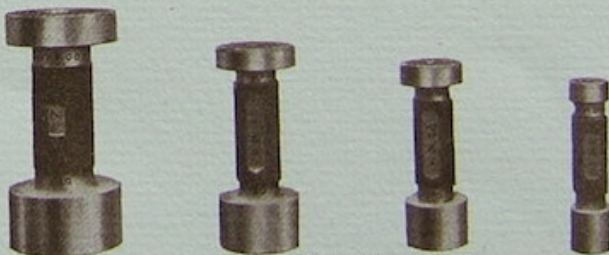
can be presented a fairly adequate notion of what goes on in the Vauxhall works.

All three perhaps could be summed up in the one word exactitude. In the designing room the ideas of the designer are expressed in a series of drawings

IN the manufacture of a high-grade car the aid of the finest machine tools is a *sine qua non*. The employment of up-to-date machinery, consequently, is one great object that is always kept in view in a works where high quality is the ruling consideration. Another is keeping abreast of the discoveries of the metallurgist. A third is mathematical exactitude. These three leading principles afford at least a convenient groundwork on which

extending to the smallest detail, and from the standard thus fixed there is no departure. Faithful adherence to these ideas in the work-shops is ensured by blue prints—i.e., photographic copies of the draughtsman's originals—jigs, and extremely fine gauges. In this way absolute exactitude, coupled with standardisation, is attained, so that each chassis issued complete from the works is exactly what the designer intended, and exactly like any other chassis of the same series.

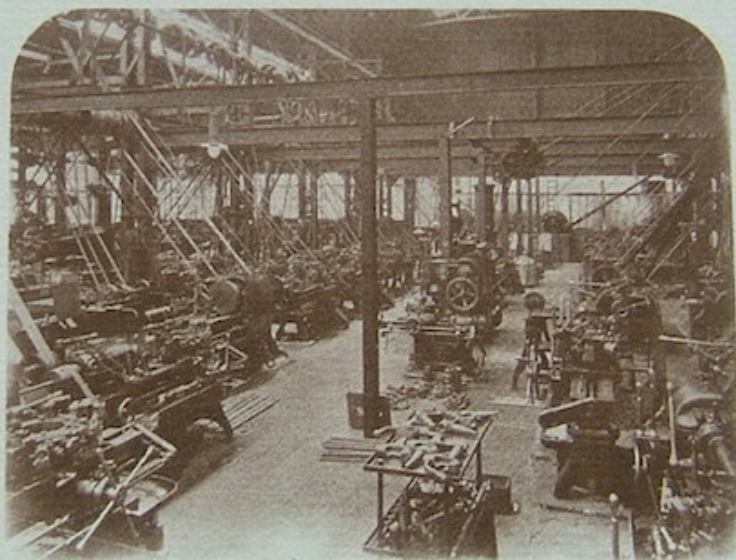
An important feature in such a scheme of production is the tool-shop, in which the highest class jigs and tools are made for use in the machining operations. Excellent specimens of jigs are to be seen in the Vauxhall works, and the high degree of accuracy which is aimed at is further indicated by the

*"Go or Not Go" gauges.*

Some Features of the Machinery Plant

extensive employment, for example, of the "go or not go" gauge, as it is called in the pithy language of the shops. A "go or not go" gauge may measure $\frac{3}{4}$ in. at one end and $\frac{3}{4} + .00075$ in. at the other. The hardly appreciable variation allowed for in such an instrument of measurement speaks for itself. A good illustration of the conspicuous part played by jigs is af-

forded by the boring work in the gear-box. The solid frame of the jig holds the box rock-steady while the shaft-holes are being bored. When the hole for the mainshaft has been finished, without alteration in the position of the box the lay-shaft hole is bored, thus securing perfect alignment

*Main machine shop.*

in each and every box.

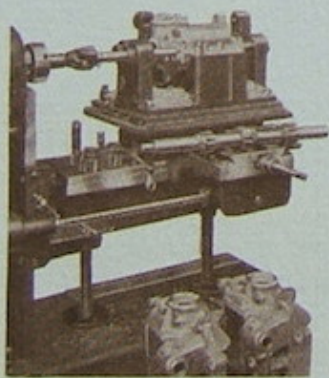
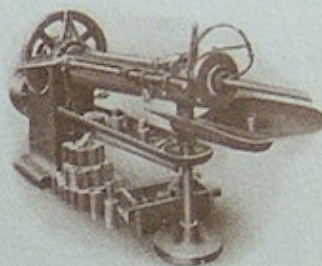
The manufacturer of high-grade cars must resolutely reorganise his plant as the introduction of improved machinery dictates; a comparatively short period will see significant changes in the machine shop of a works where a progressive spirit prevails. In an increasing degree machinery tends to automatism.

Machines replace manual labour; in turn, machines requiring considerable supervision are replaced by others needing very little. Automatic machines are employed with highly satisfactory results in the Vauxhall works. They are extremely interesting pieces of machinery: once set they do their job as

The Trend of Modern Methods

though possessed of intelligence. An automatic lathe, for example, turns a gear-wheel in a series of four distinct operations. The change from one operation to the other is made without human intervention: at exactly the right moment the cutting tool retires, swings round to the new position, and then advances to the job again. One skilled mechanic can take charge of several automatic machines; by comparison with machines which require a man to each there is consequently a great saving of labour.

Instances of this progress in production economy are afforded, of course, by other types of machinery. A four-cylinder block is bored in something like an hour by a four-spindle borer; such an operation took 30 hours a few years back. Gear-wheels are slotted by a broaching machine in a

*Gear-box jig and borer.**Broaching machine.*

fourth of the time previously required. Crank-cases are drilled by a multi-spindle machine, able to drill twelve holes at a time. An internal cylinder grinder replaces the laborious

hand-lapping process. A minor part, such as a connection for the oil-pump, is turned out by a machine that works on four pieces simultaneously.

All this illustrates the trend of modern methods of production. The standard of work constantly rises, the time factor is ever more stringently scrutinised, and machinery of greater is substituted for machinery of lesser labour-saving capacity. The large sums spent in the Vauxhall works on new machinery during the last few months leave no doubt as to the nature of the policy which is steadfastly pursued by the directors, the ultimate effect of which, as concerns the purchaser, is that better value can be given in the car, and that a Vauxhall always

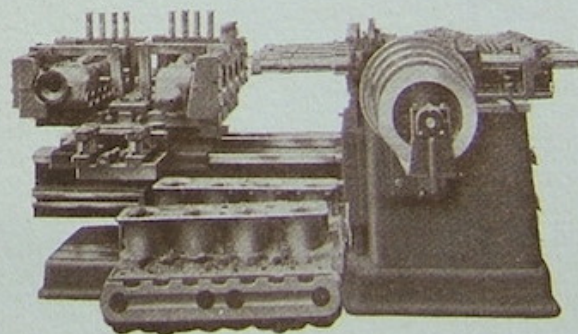
Strict Inspection and Gauging of Work*Blue printing machine.*

typifies "the last word" in motor-car refinement. Notwithstanding the care that is bestowed on it, the work of the machine shop is afterwards subjected to strict inspection. In the view room the various parts are systematically examined and gauged, and by this means the possibility of work getting through that is in any way below the standard is reduced to a minimum.

As for the composition and quality of the metals employed, extremely careful selection is made, and the most severe tests are imposed in regard to strength and wear-resisting properties (see p. 18). Only those materials are used which are of the best quality and scientifically the best adapted to their purpose. The fact that each Vauxhall

chassis is guaranteed for three years is sufficient evidence of the value of this policy to the purchaser. Such a guarantee implies that every Vauxhall car is so built that it will continue to give completely satisfactory service during a long life of usefulness, and this is a consideration not to be overlooked in relation to purchase price.

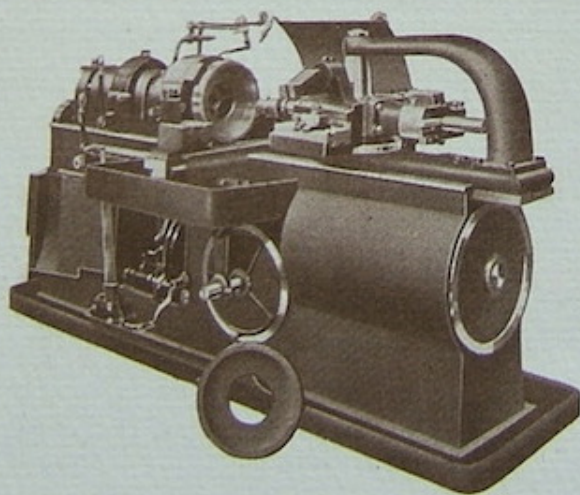
The multifarious processes of the fitting shop and the engine shop are carried out by skilled mechanics, on

*Four-spindle cylinder borer.*

Tests for Power and Refinement of Running

whose ability a great deal depends. The parts are assembled and the engine is built up by a long chain of operations conducted on well-tried lines of subdivision of labour, the principle of which is every man to his job, and every job to a standard.

Then comes a thorough test in the engine-testing shop—a characteristic section of the Vauxhall works. Many engines that have marked a stage in the



An automatic machine.

progress of efficiency, as demonstrated by record performances on the Brooklands track and elsewhere, have here been put through their paces. Each engine, of course, whether destined for a racing machine or for a luxurious carriage, passes through this shop, where its brake horse-power is ascertained. Thereafter it is taken entirely to pieces again, once more minutely examined, and then re-assembled. This is not the only test the complete engine undergoes before being built on to the chassis. As refinement of running is a quality which every Vauxhall engine is required to possess, a special test is made, prior to that on the bench, in order to discover whether or not there is excessive vibration. The engine is mounted on four D-shaped springs and driven at high speed. Careful observations are taken, and if there should be an undue amount of vibration it is remedied by adjusting the balance of the flywheel.

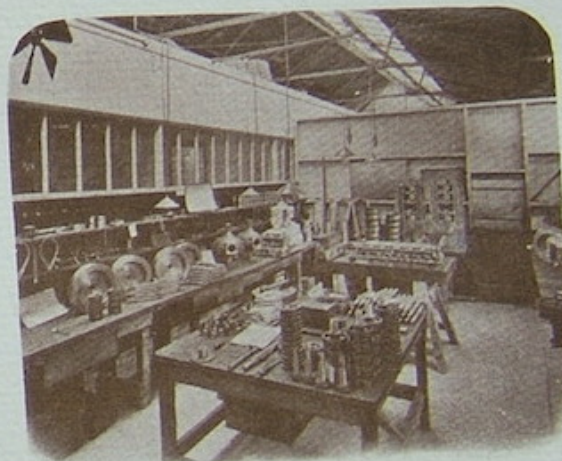
These trials having been completed, the engine is passed to the chassis-erecting shop. There the complete chassis are built up. The next step is the running shop, whence the chassis are taken out for the road-test. On this test the brakes and the

Enlargement of Works and Output

steering-gear are adjusted, and the general behaviour of the machine is alertly watched. Each chassis is ultimately tuned up to a state of perfect readiness for use, and it is worth taking into account that a quite special experience is available for the purpose at the Vauxhall works.

In the carriage shop—an established and successful feature—work is confined to open bodies. The advantage of close association between engineer and coachbuilder has been demonstrated in a remarkable degree in the Vauxhall works, one illustration of which is the great reputation for comfort that has become associated with the Vauxhall motor-carriage. With every provision for fineness of finish, the carriage department turns out the highest-class work.

A point of interest alike to old friends and new enquirers is the healthy growth of the works, the signs of which are an extension of buildings giving approximately 50 per cent. additional floor space, an increase of 20 per cent. in the permanent staff, and a rise of 37 per cent. in the weekly wages bill. The extension is a large, well-arranged building, with plenty of light, affording, among other advantages, much-needed space for a bigger running-shop.



View room for inspection of parts.

One must pass lightly over the system which in various forms keeps order where the task is a somewhat complicated one. The series of cards and sheets, partly for instruction, partly for record, prescribing for every phase of the work going on beneath the Vauxhall factory roof, is considered a notable example of the judicious use of the card system. Its bearing on the better manufacture of

Vauxhall Ideas and Vauxhall Methods

motor-cars may not be apparent at the first glance, but since without it smooth working would give way to haphazard hustling, and from that would proceed the inevitable consequences of muddle, it will be perceived that infinite care in devising the administrative mechanism is essential to success on the part of the manufacturer and to satisfaction on the part of the customer.

To sum up, Vauxhall ideas and Vauxhall methods produce a car which not only is of the highest class, but which has an individuality, in that the marked characteristics which it possesses are felt immediately by the



New running-shop.

expert. The steering, the smooth running, the acceleration and the hill-climbing powers stamp the Vauxhall at once as something far different from the ordinarily good car. The technical resources upon which the firm can draw place it in an exceptionally favourable position. It is therefore not surprising that, as the finest materials and the most up-to-date

methods of production are employed, and as a degree of care certainly above the ordinary is exercised, the outcome should be a car that commands the enthusiastic appreciation of connoisseurs.

RELIABILITY TRIALS—HILL-CLIMBING

Everyone who knows how keenly distinction is striven for in the important motoring competitions must be impressed by the extraordinary aggregate of successes standing to the credit of the Vauxhall. Both in England and the Colonies its success is

continuous and convincing. The past year, in which 70 *firsts* have been won, has been especially notable for fine performances in tests of reliability, hill-climbing, and fuel-economy, and for the large proportion of wins with Vauxhalls by amateurs

RELIABILITY TRIALS.

R.A.C. 2,000 Miles' Trial, 1908.

Silver cup for non-stop run throughout, without penalty. No replenishment of water or lubricating oil. The finest performance in the trial, and a feat unparalleled in the history of motoring.

Russian (Czar's Cup) Trial, 1911.

First prize in class 5 without penalty.

Russian (Czar's Cup) Trial, 1912.

Gold medal.

Swedish Winter Trophy Trial, 1912.

Perfect score.

Scottish A.C. Trial, 1908.

Gold medal for non-stop run throughout; fastest time in all five hill-climbs.

1909—Efficiency gold medal, medal for highest marks for hill-climbing, class F, and special medal, class E. Each Vauxhall gained highest marks in its class for petrol consumption.

Irish Automobile Club Trial, 1909—Goff gold cup, for most efficient performance; gold medal in class E for absolute non-stop runs on all six days.

"Prince Henry Trophy" Trial, 1910—Two Vauxhalls made non-stop runs throughout, winning "Prince Henry" plaquettes.

Canterbury (N.Z.) A.A. Trial, 1908.—Prizes for highest marks, reliability and hill-climbing. Trophy for fastest hill-climb, gold medal for non-stop run.

Canterbury (N.Z.) A.A. Meeting, 1910—Vauxhall won half-mile (standing start), sprint race and petrol consumption test.

Canterbury (N.Z.) A.A. Trial, 1912.—First in open class; first prize for petrol consumption, irrespective of class.

Canterbury (N.Z.) A.A. Trial, 1913.—First in open class; petrol consumption prize irrespective of class.

Manchester A.C. Trial, 1909.—Silver cup for most meritorious performance, and first in hill-climb.

1911—Vauxhall the only car to score maximum marks, 2,000 out of 2,000.

1912—Three Vauxhall cars each first in its class. In addition, the two cups for best performances by amateur and trade drivers were won.

1913—Eight first prizes out of ten, including fuel economy prize; not competing for other two.

A.C. of Australia Trial, 1910.

Highest aggregate marks for reliability, petrol consumption and hill-climbing.

1912—Vauxhall tied for first place.

In hill-climb first four fastest times were made by Vauxhall cars.

1913—Two Vauxhalls secured full marks in reliability section.

1913—Petrol Consumption Test. First.

A.C. of Australia—Trophy for best aggregate in 1912 won by Vauxhall owner.

Lancs. A.C. Trial, 1912.

One day. First in class 3, and won President's cup. Two days. First in class 3, and won Eddleston cup.

Lancs. A.C. Trial, 1913.

Both cups again won, first in 3 classes, and hill-climb.

HILL-CLIMBS.

Gaillon, 1908.

Fastest and first on formula in class.

A.C. of Australia, 1910.

First and second.

1911—First.

1912—First.

1912 (2nd meeting)—First on formula, and fastest time.

1913—First, third, fourth. Fastest time of the day.

Transvaal A.C. Hill-climb, 1910.

First.

1911—First on formula, and fastest time.

1913—First on formula, and fastest time.

Midland A.C. (Shelsley Walsh), 1908.

First on formula, efficiency record.

Midland A.C. (Shelsley Walsh)—*contd.*

1909—First and second in open handicap.

1910—Second, third, and fifth.

1911—First on formula, beating the efficiency record of 1909.

1913—First and second, closed event; third, open event. Record for speed beaten and now held by Vauxhall owner.

Lancs. A.C. (Rivington Pike), 1908.

Fastest time, beating all competitors in classes C, D, and E.

1909—Silver cup and gold medal for best performance. Second best performance made also by a Vauxhall.

1913 (Waddington Fells)—Fastest time of the day; silver cup, class 3, second class A.

Herts. C.A.C. (Aston Hill), 1908.

Fastest time in class 2 by 15 secs.

1909—Edwards Challenge Cup. Two silver cups for best performances in classes 2 and 3, and special silver cup for best handicap performance, constituting efficiency records.

1909—Second meeting. Two silver cups. Finest efficiency performances, and fastest time in both amateur and trade sections.

1910—First, second, third, and fourth places.

1911—First on formula.

1912—Edwards Cup for best amateur performance won for the third time in succession.

1913—Record for speed beaten and now held by the Vauxhall. Class 3, second on formula. Class 4, second on formula.

Yorks. A.C. (Pateley Bridge), 1909.

Gold medal.

Yorks. A.C. (Pateley Bridge)—*contd.*

1910—Silver cup for best performance on formula, special gold medal for efficiency, and gold medal for best performance on formula, class A, open event.

1912—Gold medal.

1913—First, second, and third in closed event; cup for best amateur performance. Seven prizes out of twelve.

Wolv'p'n A.C. (Harley Bank), 1909.

Open handicap gold medal.

Oakmoor (Inter-club), 1910.

Bolton cup and gold medal.

1912—First.

Somerset A.C. 1910.

Fastest time of the day, fastest time in class 3, and best performance on formula.

1911—First on formula.

S. Wales A.C. (Buttrills Hill), 1910.

First on formula, class 5.

1911—First on formula in class 6.

Second in classes 4 and 5. Fastest time of the day.

Manchester A.C., 1911.

First on formula.

1912—First on formula.

Manchester Motor Club, 1911.

First on formula.

North Berks A.C., 1910—First.

1911—First.

1912—Won third year in succession. Challenge cup won outright.

Hants. and Dorset A.C., 1911.

Fastest time.

Ironbridge, 1911.

First on formula. Fastest time in closed event.

Canterbury (N.Z.) A.C., 1911.

First on formula and fastest time. First and second in private owners' event.

1911—Second meeting. Four Vauxhalls gained all the prizes (four gold medals). First on formula and fastest time, both classes.

Essex M.C. (Aston Hill), 1912.

First on formula and fastest time.

Derbyshire & N. Staffs. A.C.,

1912. Gold medal and silver medal.

Craigantlet, 1913.

Fastest time in both private owners' and trade classes.

Leicestershire A.C., 1913.

Fastest time.

Sheffield A.C., 1913.

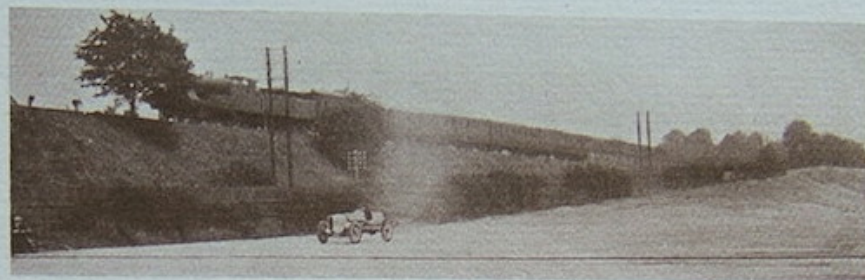
Second and third on formula.



Four of the Vauxhall cars which swept the board in the Manchester A.C. Trial, 1913.

BROOKLANDS—SPEED TRIALS

Without specialising in racing, in the sense either of employing a staff of expert drivers, or running an organisation that concentrates its efforts on the one object of building race cars, the Vauxhall company, as is well known, has been able to achieve striking performances on the track and



"Fifty per cent. faster": a Vauxhall record-breaker at Brooklands.

in speed competitions. Some among the more noteworthy performances of Vauxhall cars in this field are recorded hereunder, and afford evidence of the outstanding efficiency of the Vauxhall engine and of the leading position it has held for years past.

BROOKLANDS.

Brooklands A.R.C. Meeting, 1909.

Vauxhall driven by amateur owner, won three "firsts," two "seconds," and three "thirds," an unexampled series of wins in one meeting.

21-h.p. Class Records, 1909.

A Vauxhall car established the following records, achieving speeds greater than those which had been attained by cars holding 26-h.p. and 40-h.p. class records: Short record (flying half-mile), 88.61 m.p.h. Long record (ten laps, approx. 28 miles), 81.33 m.p.h. A flying kilometre was covered at a speed of 88.26 m.p.h.

21-h.p. Class Records, 1910.

In October, 1910, a 20.1 (R.A.C. rating) four-cylindered Vauxhall car, weighing over 1,800 lbs., established the following records: Short record at 100.08 m.p.h., long record at 90.22 m.p.h., the latter speed being greater than that which had been attained in the 26 rating and 40 rating classes.

The 20-h.p. Vauxhall also achieved a record performance under the "White and Poppe" trophy competition rules, namely, a flying lap (2.76 miles) at a speed of 93.31 m.p.h.

21-h.p. Class Records, Nov., 1912.

Set up by a 20-h.p. 4 cylindered (90 mm. x 128 mm.), Vauxhall—Long record 96.32 m.p.h., mile 99.61 m.p.h., kilometre 101.40 m.p.h., half-mile 101.24 m.p.h. Fifty miles—97.15 m.p.h.

F Class Records, Aug. 30, 1913.

Set up by a standard 25-h.p. "Prince Henry" chassis (95 mm. x 140 mm.): All records from 2 hours to 8 hours, and from 150 miles to 700 miles (average speed 87.74 m.p.h.).

O'Gorman Trophy, 1909.

First and second. Winner's speed 70½ miles per hour.

O'Gorman Trophy, 1910.

First, second and third. Winner's speed 76 miles per hour.

O'Gorman Trophy, 1912.

First. Speed 92½ miles per hour.

Brooklands A.R.C. Meetings, 1910.

Three "firsts" and two "seconds." Vauxhalls, driven by amateur owners, won one "first" and two "thirds." Vauxhalls, driven by amateur owners, won two "firsts" and two "thirds." Vauxhall, 20-h.p., driven by amateur owner, first in big car race. Inter-Universities Meeting. Two "firsts," one "second," and two "thirds."

Brooklands A.R.C. Meetings, 1912.

70 m.p.h. long handicap won by amateur. Gala Day: inter-club hill-climb, fastest time. 70 m.p.h. long handicap won by amateur.

Essex Motor Club Meeting, 1912.

All three contests (short distance race, long distance race and hill-climb) won by amateur with a 20-h.p. Vauxhall.

Brooklands Meetings, 1913.

Easter, private competitors' handicap, first. Whitson, second from scratch (96 m.p.h.). Gala Day relay race (2 Vauxhalls), hill-climb (3 Vauxhalls). Midsummer, two firsts and two seconds from scratch. August, one first (102 m.p.h.), one second.

SPEED TRIALS.

Lincs. A.C. (Grimsthorpe Pk.), 1909.

Vauxhall, driven by amateur owner, awarded Newsum Challenge Cup and special prize for finest performance, irrespective of class.

Lincs. A.C. (Grimsthorpe Pk.), 1910.

Vauxhall, driven by amateur owner, again won Newsum Challenge Cup, permanently securing it. Vauxhalls made best performance in private owners' event, and second and third best in open section.

Grimsthorpe Park, 1911.

Fastest time closed event.

Yorks. A.C. (Saltburn), 1909.

Yorkshire cup and three gold medals, Vauxhall the smallest-engined car competing.

Yorks. A.C. (Saltburn), 1913.

Fastest time of the day—106.52 m.p.h. Two firsts and two seconds.

Irish Automobile Club, 1909.

Fastest time in speed trials.

Transvaal Automobile Club, 1911.

Fastest time and second on formula, although conceding 35 secs. in half-a-mile.

Canterbury (N.Z.) Automobile Association, 1912. First in open class.

Nottinghamshire A.C., 1912.

All four events were won on formula with a 20-h.p. Vauxhall—The Hardy, Morrison, and Wilson Challenge Cups and the open event.

Nottinghamshire A.C., 1913.

All four events again won, and with the same car.

Mersey Motor Club, 1913.

First in all four events; also first amateur prize and first touring prize in two events, and three second prizes.

Coupe de l'Auto Race, 1913.

(387 miles.) Fourth in a field of seventeen competitors.