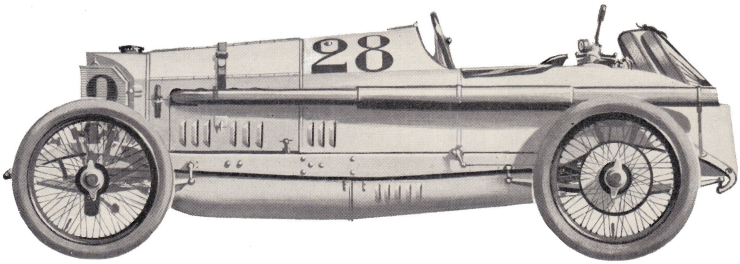
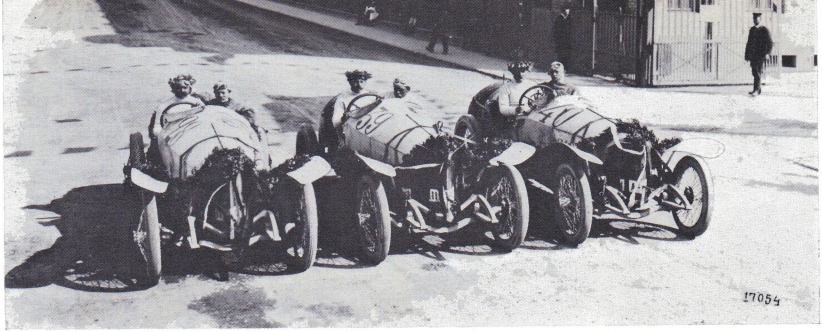
The 1908 & 1914 G.P. Mercedes



NUMBER 1

TWO SHILLINGS

PROFILE PUBLICATIONS



The conquering heroes: three of the team cars outside the Daimler-Benz works at Stuttgart-Untertürkheim.

From laps five to fifteen Peugeot seemed to be dominant, and when curiously slow pit work lost Lautenschlager two minutes on the eleventh lap the cautious punter might have baulked at putting any money on the Mercedes. On orders from the pit Christian Lautenschlager, Louis Wagner and Otto Salzer now began to close up and harry the opposition. On the eighteenth lap, which he covered at 68·7 m.p.h., Lautenschlager took a 23-second lead over Boillot who had, by then, little chance of winning and none at all when he broke a valve on the last lap. His was a magnificent attempt; particularly as he had to make eight tyre changes against Lautenschlager's four.

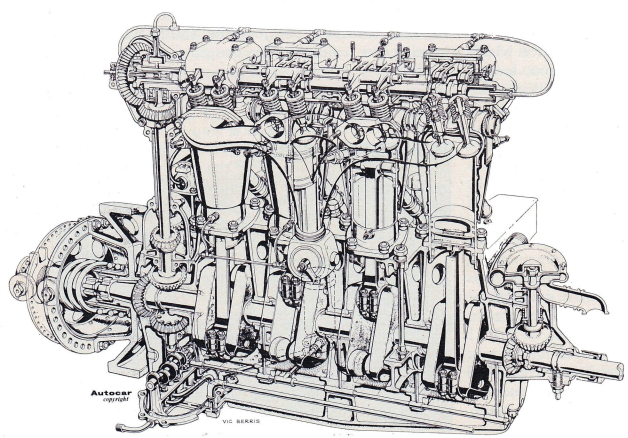
Mercedes had the satisfaction of taking first three places; Lautenschlager at an average of 65·83 m.p.h., Wagner at 65·3 and Salzer at 64·8. The race remained extremely close to the end; fourth place was taken by Jules Goux (Peugeot) at 63·94, and Dario Resta (Sunbeam) was fifth at 62·46.

Allowing for the vastly more difficult circuit it is seen that the 4½-litre cars of 1914 were notably superior to their 1908 predecessors whose engines were nearly three times as big.

Although the 1908 type of car continued to appear in competitive events for some while, and, indeed, Mercedes and Benz chassis of this period were still favoured in the 'twenties as suitable foundations on which to build 'specials' for record attempts or particular events (by the simple old-fashioned expedient of cramming in the largest engine the work could stand), the 1908 Grand Prix cars represent the last magnificent specimens of a dying breed. By contrast, the 1914 cars were very much in advance of their time in almost all respects but their brakes.

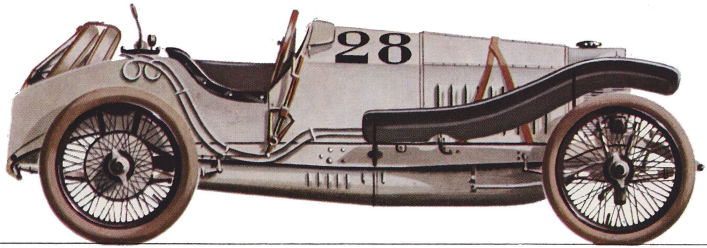
It has been said that no cheer was raised and no hands clapped as the three Mercedes crossed the finishing line in 1914, and this has been attributed to the tense feelings brought about by the imminence of war. It seems unlikely that the spectators at the Lyons circuit were particularly aware of the terrible doom then preparing, but that the rigid system of control imposed on the Mercedes team left the spectators puzzled and disapproving. The future pattern of racing procedure was drawn and public approval was at first withheld.

Four weeks later the pistol shot which started the war was fired. A macabre twist to the tale is provided by the fact that the chauffeur at Sarajevo who was wounded in the attempt to drive the murdered Archduke out of range was Otto Merz, a Mercedes apprentice, one time riding mechanic to Poege and himself a famous racing driver in the 'twenties.

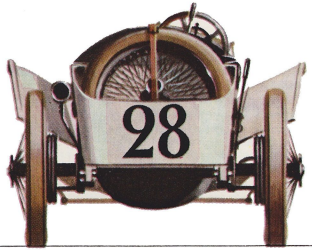


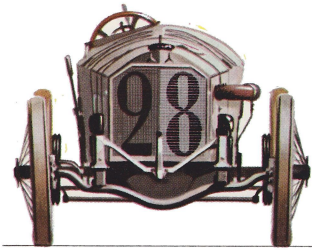
The 1914 Grand Prix Mercedes engine.

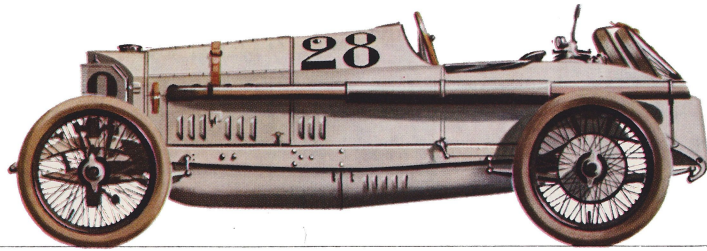
Mercedes radiator emblem as carried by the 1914 Grand Prix cars.



THE 4½-LITRE MERCEDES, winner of the 1914 Grand Prix at Lyons. Average speed: 65·83 m.p.h. for 466 miles. Driver: Christian Lautenschlager.







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1914 G.P. Mercedes with front-wheel brakes: Otto Salzer's car in the 1922 Targa Florio. (Photo: Radio Times, Hulton Picture Library)

SPECIFICATION 1908 GRAND PRIX MERCEDES

12·8 litres capacity. Designer, nominally Paul Daimler but most details of design basically similar to those already established by Wilhelm Maybach.

ENGINE: **4-cylinders, cast iron, in two blocks of two. Integral cylinder heads, inlet valves in detachable cages, exhaust valves accessible through screwed caps. Bore 155 mm.; stroke 170 mm. except for car No. 2, which is stated by Gerald Rose *(A Record of Motor Racing 1894-1908)*, to have had a stroke of 180 mm. (See Text.)**

Camshafts: **One either side of engine at upper crankcase level driven by spur gears from rear of crankshaft.**

Valves: **Two to each cylinder, situated in valve chests at the near sides of the blocks. The exhaust valves directly operated by tappets from near side camshaft, and the inlet valves inverted over them and operated by push rods and rockers from off side camshaft. Inlet valves of Maybach annular form.**

Ignition: **Single Bosch high-tension magneto driven by spur gears from near side camshaft; one sparking plug to each cylinder.**

Carburettor: **Single, Mercedes.**

Lubrication: **Essentially 'drip and splash'. Oil lifted by quadruple plunger pumps to sight feeds on dash, thence by gravity to main bearings, supplemented by hand pump to feed to cylinder walls and to maintain crankcase level. Big ends fitted with dippers.**

CHASSIS: **Channel section.**

Clutch: **Mercedes 'scroll'.**

Gearbox: **Separate; 4-speeds and reverse.**

Final drive: **Bevel geared differential countershaft integral with gear box and final drive by side chains to 'dead' axle. Ratio of drive bevels: 1·6 : 1.**
Ratio of chain wheels: 1 : 1.
(The chainwheel ratio was, of course, easily altered to suit different conditions. As raced in 1908, the ratios used allowed approximately 60 m.p.h. at 1,000 r.p.m. on direct drive.)

Suspension: **Nearly flat laminated plate springs (leaf-springs) front and back damped by friction shock absorbers.**

Brakes: **Footbrake: Contracting brakes acting on counter-shaft imposing reverse loading on chains and sprockets. Handbrake: Expanding shoes acting on drums integral with final drive sprockets on rear wheels.**

Wheels: **Wooden, artillery pattern, twelve spokes front and rear. Fixed hubs and detachable rims. The wheels were obviously not standardised; some photographs show six nut fixing of detachable rim, others show eight; one photograph shows rear wheels without detachable rims.**

Tyres: **880 × 120 front; 895 × 135 rear.**

Weight: **Unladen, approx. 1,340 kg.**

Claimed output: **Approximately 120 h.p. at 1,400 r.p.m.**

Maximum speed: **Approximately 100 m.p.h.**

SPECIFICATION 1914 GRAND PRIX MERCEDES

4½ litres capacity. Designed by Paul Daimler. In addition to winning the event for which it was designed the Mercedes also won the 1915 Indianapolis 500 Mile race and, with front brakes added, the 1922 Targa Florio. A supercharged 1914 Grand Prix car won its last event in 1926.

ENGINE: **4-cylinders 93 mm. bore and 165 mm. stroke (4,483 c.c.). Separate steel cylinders, mounted on aluminium base, with integral heads and welded-on valve ports and water jackets.**

Camshaft: **Single, overhead, driven by bevel gears and vertical shaft from rear end of crankshaft.**

Valves: **Four to each cylinder inclined at 60 degrees. Three cams per cylinder one working inlet valves by a forked rocker, the other two working the exhaust valves by separate rockers.**

Ignition: **Two Bosch high tension magnetos, driven by skew gears from vertical valve motion shaft and supplying three sparking plugs per cylinder; the latter horizontally placed two on inlet side and the third on exhaust side of each cylinder head.**

Carburettor: **Single Mercedes.**

Lubrication: **Wet sump and full pressure system by plunger pumps with automatic provision for maintaining sump level. Supplementary oiling by foot pump at mechanic's option.**

CHASSIS: **Channel section with double drop and X-bracing.**

Clutch: **Double cone.**

Gearbox: **Separate; 4-speeds and reverse. Indirect ratios: 4·8 : 1, 7·4 : 1, 11·1 : 1 at the final drive ratio of 2·7 : 1. Variations of final drive between 2·2 : 1 and 2·7 : 1 naturally affected the above ratios slightly.**

Final drive: **Propellor shaft and torque tube to bevel geared live axle with two driving pinions, crown wheel to each half shaft and differential mechanism acting between the driving pinions.**

Suspension: **Flat laminated plate springs ('leaf' springs) front and back damped by Mercedes face-cam dampers.**

Brakes: **Single footbrake, acting by contracting shoes on drum behind gearbox. Hand-brake expanding shoes by toggle action in drums on rear wheels.**

Wheelbase: **9 ft. 4 in.**

Track: **Front, 4 ft. 4½ in. Rear 4 ft. 5 in.**

Wheels: **Rudge-Whitworth triple row tangent wire wheels, demountable by centre-lock nut.**

Tyres: **Front, 820 × 120. Rear 895 × 135.**

Weight: **Unladen 21½ cwt. Starting-line weight 26½ cwt.**

Claimed output: **115 b.h.p. at 2,900 r.p.m. Piston speed 3,050 ft./min.**

Maximum speed: **Approximately 112 m.p.h. (Probable slight variations according to final drive ratio.)**

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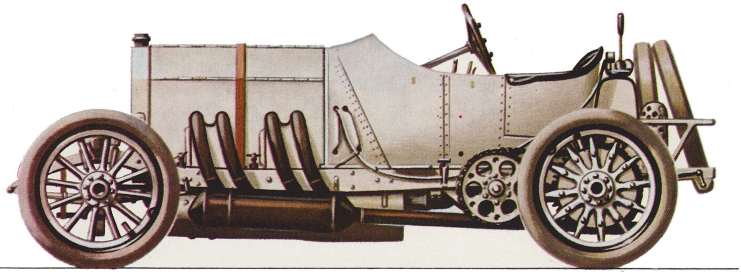
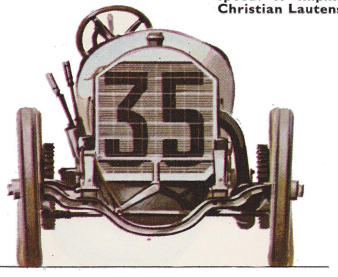
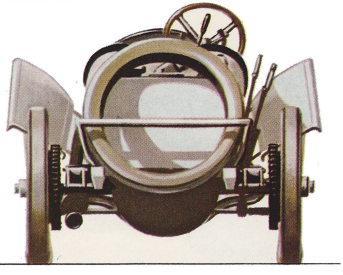
Mercedes

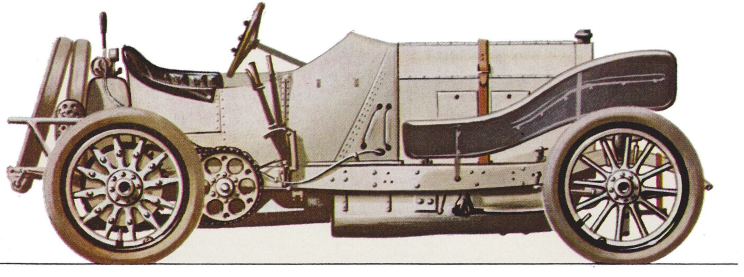
MERCEDES—as painted on the scuttle of Willy Poege's car, No. 2, for the 1908 Grand Prix.



THE 12·8-LITRE MERCEDES, winner of the 1908 Grand Prix at Dieppe. Average speed: 69 m.p.h. for 477 miles. Driver: Christian Lautenschlager.







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The 1908 & 1914 G.P. Mercedes

by Anthony Bird

1914 French Grand Prix at Lyons: Otto Salzer's car.

In the first years of the century racing car engines were composed of air and optimism encased in the least possible thickness of metal; that is, their designers were concerned primarily with making very large engines of the least possible weight rather than with increasing specific output. From this it has been argued that these designers were at best lazy and at worst inept, and that the ingenuity (possibly misplaced) of the engineer who could make a car of 13½ litres capacity (70 h.p. Panhard, 1902) fit into the 1,000 kg. weight limit was equalled only by the temerity of the man who could conduct such a monster over the roads of the period at speeds up to 90 m.p.h.

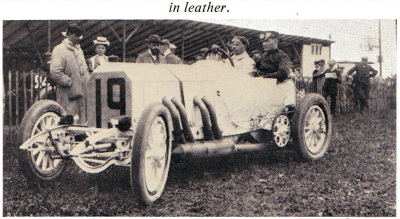
In fairness, however, it must be said, in view of the manufacturing techniques and materials available, that the designers were justified at first in concentrating on sheer size and weight-saving rather than in breaking new ground and increasing volumetric efficiency by raising crankshaft speeds and compression ratios. Indeed, on the evidence of their performances the 'monster' racing cars must have been considerably more efficient and less lethal than they appear, and as the designs permitted the use of relatively 'soft' springs neither the drivers nor the machinery suffered so much from rough surfaces as one might suppose.

By virtue of their lower build and the neat appearance of their honeycomb radiators, the earliest Mercedes cars looked much less clumsy and monstrous than their contemporaries. It has been an article of faith for many years that the first Mercedes of 1901 was completely new and revolutionary, but this is not so. In meeting Emile Jellinek's demand for a more docile and manageable successor to the 1899 24 h.p. Cannstatt-Daimler racing car, Wilhelm Maybach's particular genius was directed to refining and improving the old car without sacrificing its most successful features. Thus, many of the 'new' features of the Mercedes such as the steel frame, the selective (or 'gate-change') gear control, the low-tension magneto ignition and the famous honeycomb radiator were not new at all but had already been proved on the earlier models. In subsequent designs the Daimler Motoren Gesellschaft made numerous innovations, but never just for the sake of doing so and in some respects they were unduly reluctant to break away from the past: the retention of the scroll clutch is a case in point. In their 1908 and 1914 Grand Prix cars the policy of keeping certain fundamental and well-tried features was followed.

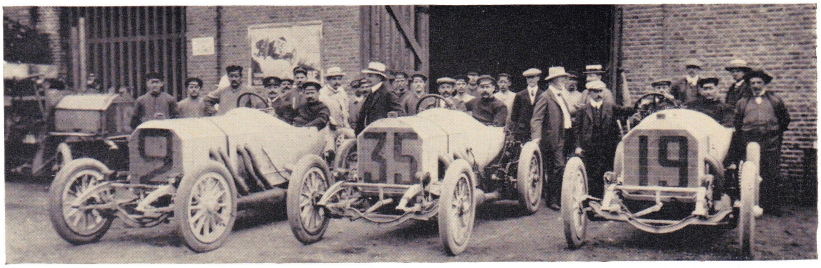
The 1907 Grand Prix was run under a fuel consumption formula which, sound though it was, did not please the competing firms, and for 1908 it was stipulated that the cars should have a *minimum* weight of 1,150 kg. and a *maximum* piston area of 117 sq. in. This limited cylinder bores to 155 mm. for 4-cylinder engines or 127 mm. for those with six cylinders. For the first time emphasis was put upon specific efficiency in terms of power developed per square inch of piston area; also for the first time, as a result, output exceeded 1 b.h.p. per sq. in. or 10 h.p. per litre.

By the standards of 1966 engines of 12 litres or so, which the bore limitation imposed, still seem pretty monstrous, but the new formula, particularly the

Salzer in the Paddock: note double-armed shock absorbers cased in leather.



Photographs: Courtesy Daimler-Benz A.G.



The three 1908 Mercedes cars before leaving for the course: Lautenschlager No. 35; Poege No. 2; Salzer No. 19.

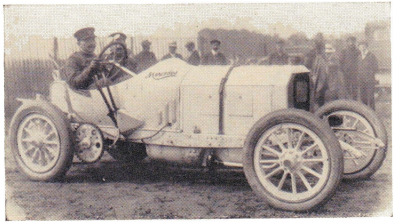
minimum weight limit, gave designers an opportunity to improve chassis rigidity as they no longer had to skimp the margin of safety in order to save a few ounces here or there.

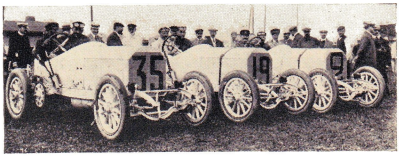
Wilhelm Maybach left the Daimler Motoren Gesellschaft in 1907, and Paul Daimler returned from the Austrian branch of the concern to take his place, but it is at once apparent that Maybach's influence was still dominant in the 1908 Grand Prix cars, the design of which followed established Mercedes practice throughout.

With the bores (for 4-cylinder engines) limited to 155 mm. most of the competing firms sought to increase output by increasing the stroke without reducing rotational speeds; in other words, piston speeds were considerably increased by comparison with 1907—remarkably so when one considers the size and weight of the reciprocating parts. Clément-Bayard was the most daring with a stroke of 185 mm. and a maximum crankshaft speed of 1,560 r.p.m. to give a piston speed of 1,900 ft. per minute. Even this was notably less venturesome than Sizaire-Naudin who won the *Coupe des Voiturettes* (run immediately before the Grand Prix on the Dieppe circuit) with a single-cylinder engine of 250 mm. stroke which could run up to 2,400 r.p.m. giving a piston speed of 3,937 ft. per minute. By contrast the Mercedes dimensions were slightly more conservative with a stroke of 180 mm. According to Gerald Rose (*A Record of Motor Racing*, 1894–1908) and one other contemporary English source only car No. 2, driven by Willy Poege, had the 180 mm stroke, whilst Christian Lautenschlager (No. 35) and Otto Salzer (No. 19) had cars with 170 mm. stroke engines. The historical expert at Daimler-Benz A.G. denies this and states that all three engines were of 180 mm. stroke. The bore was the maximum permitted—155 mm.—and the engines were rated at 120 PS or 135 DIN horsepower. It is certainly true that the solitary 1908 Grand Prix Mercedes, which survives in America, has a stroke of 180 mm., but it is also fair to point out that where it has been possible to verify them beyond question, the figures quoted by Gerald Rose in his monumental work are almost invariably accurate.

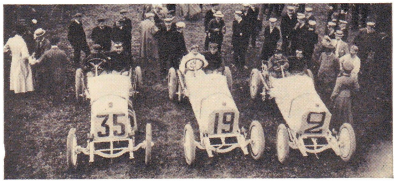
The engine had two camshafts, one either side, level with the bottom of the cylinder blocks and driven in the usual Mercedes fashion (though now somewhat old-fashioned) by exposed spur gears from the back of the crankshaft. The off-side camshaft gave motion directly to the tappets of the exhaust valves which were in pockets at the side of the combustion chambers with the inlet valves inverted above them; in present day language therefore the engine was of F-head formation. The inlet valves were opened by exposed push rods and rockers worked from the off-side camshaft and they were of the 'annular' form introduced on the 60 h.p. Mercedes of 1903. These annular, or concentric, valves were possibly influenced by Napier practice and certainly similar to a type of safety valve which had been familiar in the steam engine world for nearly a century, and the object was to increase the unrestricted port area for a given

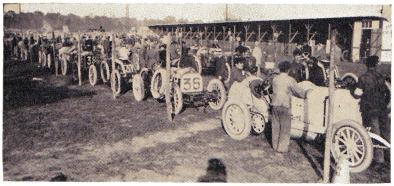
Apparently only Willy Poege's car had 'Mercedes' painted on the scuttle.





Two angles on the scene in the Paddock.





Lautenschlager en route *to the start followed by Courtadi's Motobloc, Dimitri's Renault and Minoia's De Dietrich.*

The Dieppe circuit, 1908; Lautenschlager in action.

diameter and lift of valve. For low- and moderate-speed engines the annular valve gave satisfactory results, but probably required more frequent grinding to maintain an effective gas-seal than the ordinary mushroom valve with its conical sealing faces.

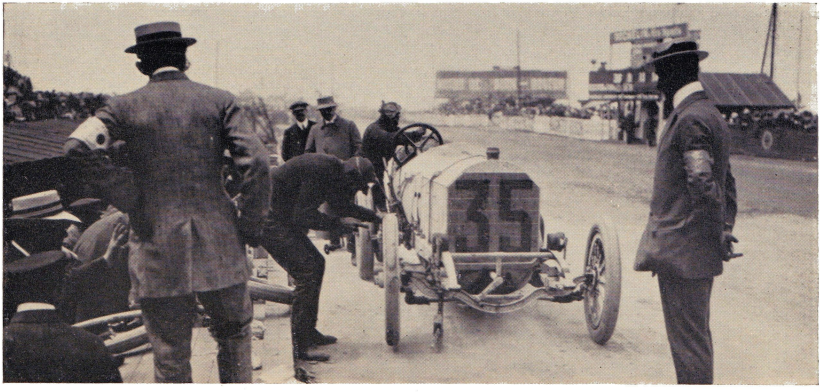
The single high tension magneto was driven by spur gears from the near side camshaft, and other well-tried Mercedes features included the scroll clutch—the *federbandkupplung*—which was as ecstatically praised by the motoring press of 1901 as it was vehemently slated by a later generation of writers who, most probably, never had first-hand experience of its alleged vagaries. The brake system was quite conventional for the period; that is the foot brake worked two contracting shoe brakes upon the countershaft, thereby imposing reverse loads upon the chains and sprockets, whilst the handbrake acted directly upon the back wheels. The earlier Mercedes system of having two separate footbrake systems, each with its own pedal, had been given up together with the use of a water-drip arrangement to cool the brake drums; better friction materials made these refinements unnecessary.

The final drive by chain, the four-speed gear box, with all four ratios more or less equally spaced, and (inevitably) the selective 'gate' change which Mercedes had made famous, were all inherited from earlier practice. In order to avoid frictional losses arising from inaccurate pitching the driving and driven sprockets were of equal diameter, and the final drive reduction was made in the bevel gearing of the countershaft. It does not seem possible to ascertain the indirect ratios, but final drive ratio was 1·6 : 1 giving approximately 60 m.p.h. at 1,000 r.p.m. in the direct drive fourth gear.

By 1908 chain drive was beginning to be thought old fashioned for touring cars and several makers, Renault and Itala in particular, had already shown conclusively that the live-axle could stand up to the rigours of racing. The disadvantages of noise, and the rapid wear of exposed chains and sprockets, were of no consequence in racing and the positive advantages of less unsprung weight and the ease of altering final-drive ratios during preparation or practice were not to be gainsaid. Mercedes were not alone: Brasier, De Dietrich, F.I.A.T., Germain, Mors, Motobloc and Panhard-Levassor were still faithful to chain drive in the 1908 Grand Prix.

This race was notable for seeing the first appearance of 'pits'. They were just that—shallow emplacements dug by the side of the track, lined with timber revetments and stocked with the necessary spares and tools. The other outstanding feature of the affair was the prodigious consumption of tyres. Since racing began cars had been too fast for their tyres, but the greater speed of the 1908 cars over those of the previous year and the rough state of the track, which had been cut about by the Voiturette Race, showed up the inadequacies of tyre design. The Rudge-Whitworth

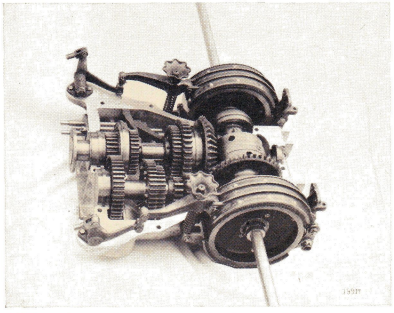
Pit work: not merely the inner tube but the air itself is almost visible in the off-side front tyre.



Down the straight.

centre-lock wire wheel had already won favour in England, but the Automobile Club de France barred it from the Grand Prix, apparently for no better reason than that the French makers had not got round to using it. Detachable rims were, however, permitted, and the Mercedes pit-staff worked wonders with the six nuts securing each rim to its felloe.

Had it not been for his nineteen tyre failures there is little doubt that Victor Rigal on the Clément-Bayard would have won; his average speed of 63·6 m.p.h. brought him to fourth place and represents an astonishing performance in view of his difficulties. The Mercedes were not so destructive (perhaps because of their lighter axles), but there were no spare tyres left at the pit during the last two laps. Fortunately neither Lautenschlager nor Poege needed more tyres and the former was able to hold first place which he had attained in the fifth lap, with the Benzs of Victor Héméry and Richard Hanriot next in succession. The order remained unchanged for the rest of the race and the final result was:

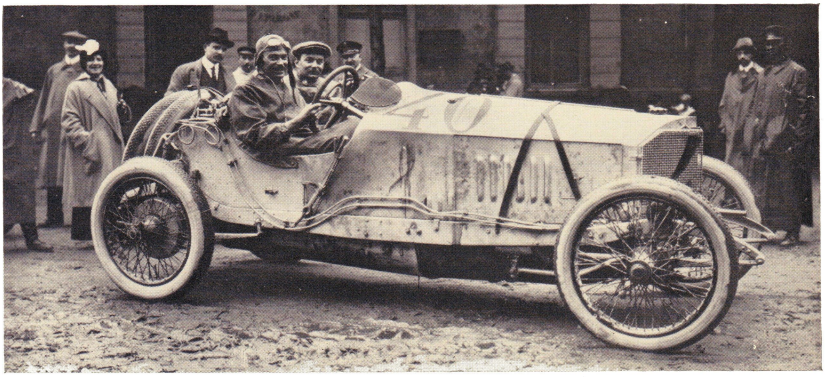


1908 gearbox and counter shaft footbrakes with cover removed.

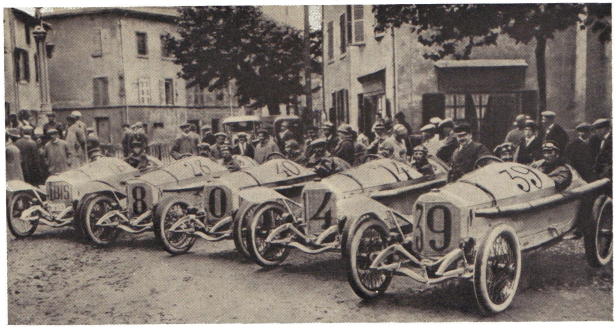
Place	No.	Make	Driver	(10 laps = 477 miles) Average speed
1	35	Mercedes	Lautenschlager	69 m.p.h.
2	6	Benz	Héméry	67·5
3	23	Benz	Hanriot	67·4
4	11	Clement-Bayard	Rigal	63·6
5	2	Mercedes	Poege	63·3

The third Mercedes, driven by Salzer (No. 19) had broken the lap record in a time of 36 min. 31 sec. on the first lap; ignition trouble then set in, the car fell back to thirty-fifth place on the second lap and retired on the third. That the two leading German firms took first three places was a sad blow to French pride, but the great cost of Grand Prix racing made all the leading firms quite happy to agree to the suspension of Grand Prix events during 1909 and 1910.

1914 Grand Prix: Louis Wagner en route *to the course.*



The five entrants lined up on a practice day (left to right): Pilette, Lautenschlager, Wagner, Sailer and Salzer. Mud splashers were not used during the race.



1914 GRAND PRIX MERCEDES

The 1914 Grand Prix, of twenty laps of the 23·3 miles Lyons circuit, was run on a capacity limit formula which fixed engine size at 4½ litres and maximum weight at 21 cwt. A look at some of the technical details destroys three of the sacred cows of motoring history:

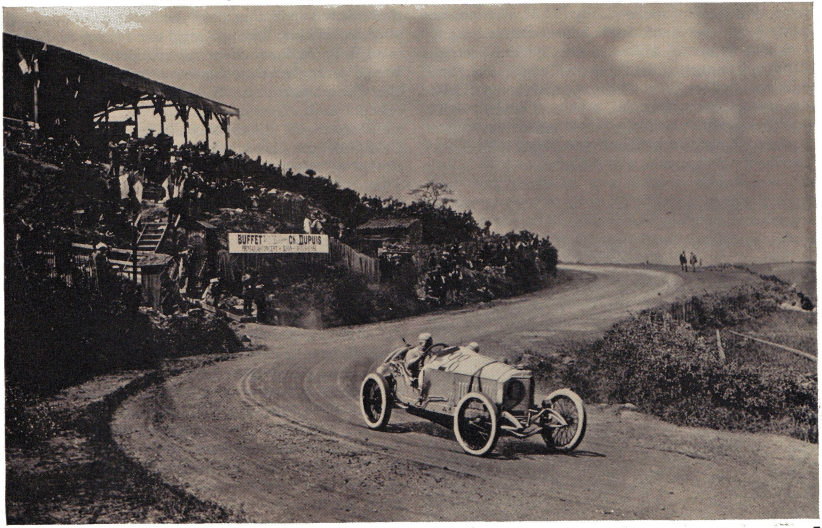
Firstly—that aero engine practice did not influence car engine design until after the war. Both the 1913 and 1914 Mercedes racing engines had much in common with the firm's well-known aero engines. (And the 1906 'Adams Eight' had been powered by a modified Antoinette airship engine).

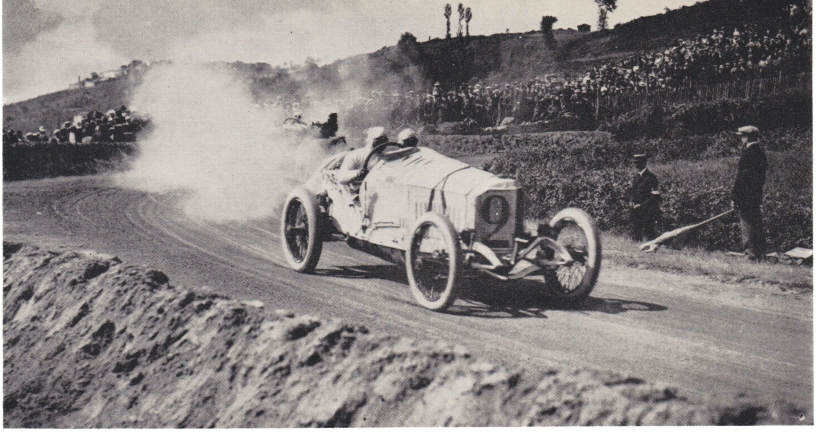
Secondly—that 'Hotchkiss drive', i.e. using the back springs to transmit driving thrust to the frame and to absorb braking torque, was superior to other contemporary systems as it avoided 'rear wheel steering'. This theoretical truth should have been amply disproved by the G.P. Mercedes, and many thousands of production cars of different makes, which handled excellently despite the use of a torque tube or some other form of torque-reaction linkage.

Thirdly—that rotational speeds much above 3,500 r.p.m. were not attainable because the virtue of opening inlet valves before top dead centre had not been realised. This puts the cart before the horse, and it was because metallurgy, sparking plug and valve spring weaknesses held back the practical application of high speed working that some 3,000 r.p.m. was regarded as a reasonably safe limit; at this speed there is no advantage to be gained by early inlet valve opening.

Paul Daimler was responsible for the 1914 racing Mercedes; although the firm's traditions were in no sense violated, the Maybach influence, which had been so clear in the 1908 cars, was no longer dominant.

Lautenschlager cornering, while his riding mechanic inspects the near-side rear tyre.



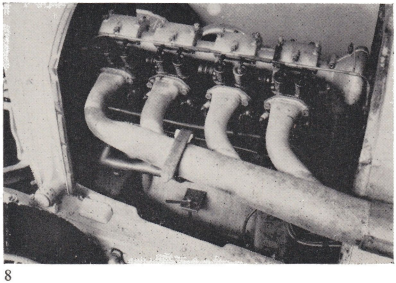


At the hairpin, Kenelm Lee Guinness (Sunbeam) swallows Lautenschlager's dust.

The photographs say all that needs to be said of the way racing cars had changed externally in six years. It must be remembered, however, that the high build and sit-up-and-beg driving positions of 1908 had not been retained purely by conservative adherence to touring car fashions. The very large engines had very large flywheels, and to give 6 or 7 inches clearance beneath a flywheel nearly two feet in diameter dictated a high chassis and floor level; this and other factors brought the driver's eye level some five feet or more from the ground in 1908. On the 1914 Mercedes this dimension had been reduced by some 10 or 12 inches, and the very narrow body (37 in. at the widest point) and *coupe vent* radiator helped reduce drag.

Though Mercedes still raced with 2-wheel brakes in 1914 (foot operated transmission brake and hand brake acting directly on the rear wheels in accordance with conventional practice), the hand brake mechanism showed novelty in the use of toggle mechanism, in place of cams, to expand the shoes which were flexible; the drums were also designed to 'give' a little and the greatest possible area of lining thus made contact with each drum. These brakes were probably as good as 2-wheel-only brakes could be, and a similar arrangement is to be found on some of the Panhard-Levassors of the 1920s.

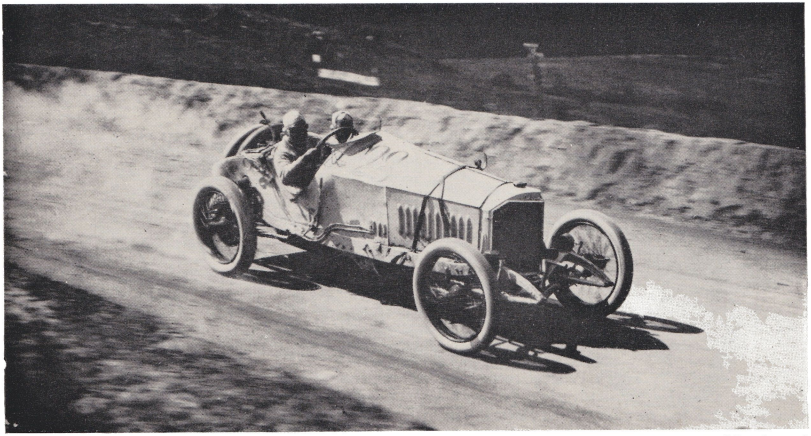
Exhaust manifolding: priming cocks and one set of sparking plugs also visible.



The cut-away drawing shows the 1914 4,483 c.c. Mercedes G.P. engine: the apparently old fashioned exposed valve springs and stems were retained to aid cooling and make for easy adjustment, but the crankshaft dimensions and combustion chamber and valve ports would have passed as up to date until quite recently. In accordance with the aircraft practice of the firm the ports and water jackets of the individual cylinders (93 × 165 mm.) were separate structures welded into place. This very costly form of construction allowed rigid control of the thickness of metal in all the vital areas and abolished the menace of distortion. Four inclined valves per cylinder allowed good breathing at the relatively low speeds used, and the single overhead camshaft was driven, by bevels and vertical shaft, from the back of the crankshaft to avoid torsional disturbances. The engine was designed to take four sparking plugs per cylinder, fed from two magnetos, though only three were used. This prodigality of sparks not only provided good flame-spread but was a safeguard against misfiring at high speed; sparking plugs were still apt to be unreliable in 1914. The engine was, in consequence, an extremely reliable one and developed 115 b.h.p. at 2,800 r.p.m.

The drawing also shows the plunger-pump system of pressure lubrication (the 1908 engines had still relied upon drip-feed-and-splash basically). One of the triple pump barrels drew in a small quantity of fresh oil from an external tank and added it to that already being circulated by the scavenge and feed pumps. In addition a foot-operated pump allowed the mechanic to feed fresh oil to cylinder walls and crankcase.

There were no departures from conventional practice in chassis, steering, or suspension, though the Mercedes face-cam and coil spring rebound dampers were noteworthy and the chassis was rather more rigidly braced than was then usual, with an X member in the centre of the frame. The old scroll



Lautenschlager takes a fast corner on his last lap. (Photo: Cyril Posthumus)

clutch had disappeared in favour of a double cone affair and the 4-speed gearbox gave motion to a propellor shaft and live axle. The shaft was enclosed in a tube and driving thrust and torque reaction were delivered to a ball trunnion joint mounted on the X member. Despite the pundits who assure us this arrangement promotes oversteer, the cars steered beautifully.

An uncommon feature of the rear axle was that the pinion shaft carried two driving pinions with the differential mechanism between them; each pinion meshed with a separate crown wheel—one to each half-shaft. This unusual arrangement had been done before and was to be done again; it had the merits of allowing great rigidity in the pinion shaft; the thrust of one driving pinion was counterbalanced by the opposite thrust of its fellow (thrust race bearings were not always as free from trouble as designers would have liked); above all it abolished the tendency to induce wheelspin by transverse torque reaction which, for racing cars particularly, was the most serious drawback of the conventional bevel-geared live axle.

The Daimler Motoren Gesellschaft entered five of these cars (the maximum allowed) for the event, and the preparation, testing and practising were done with a degree of thoroughness not previously seen in motor racing. It was this, and the reliability of the cars, rather than any outstanding novelty or merit of design which gave Mercedes a triple victory. Each car became, as it were, tailored to its driver and to the exigencies of the course. A sufficiency of crown wheels, half-shafts and driving pinions, for example, was provided to allow six different final drive ratios to be tried on each car during preparation. These ratios varied only between the narrow limits of 2·2 : 1 and 2·7 : 1. Maximum speed claimed was 112 m.p.h. and with the 2·5 : 1 ratio this was reached at 2,900 r.p.m. and a piston speed of 3,050 feet per minute.

In addition to their painstaking pre-race work, which was soon seen to pay dividends, the Mercedes team introduced a new element into racing—the absolute control of individual cars by signal from the pit. This robbed the driver of some of his individuality, and, in the opinion of many, took from motor racing its claim to be a sport, but there is no doubt it was an inevitable move and one which some other concern would have made if Mercedes had not.

Toughest opposition to the Mercedes came from Peugeot whose cars were faster round the corners by virtue of their 4-wheel brakes. At least one of the G.P. Mercedes was fitted with front brakes at one stage but at the time of the race all five relied on rear wheel braking only. Max Sailer was given the task of opening up the race and his Mercedes led for the first five laps and had by then gained a $2\frac{3}{4}$-minute lead over Georges Boillot's Peugeot; but this pace could not be maintained and Sailer went out on the sixth lap with a broken crankshaft. The need to make full use of their cornering and braking ability was already causing tyre trouble on the Peugeots.

Racing cars still carried (and needed) spare wheels in 1914; Wagner's car at the pits.