

MERCEDES TRIES TWO WHEELS

.....
A Star exclusive reveals the never before
disclosed ambition of Daimler Motoren
Gesellschaft to manufacture motorcycles
.....

ARTICLE
KARL LUDVIGSEN
IMAGES
LUDVIGSEN PARTNERS
DAIMLER ARCHIVES

If Ferdinand Porsche did pioneering work at Daimler-Benz in every respect – even in the field of motorcycle design. This connection sounds a little improbable at first – Porsche and motorcycles and also Daimler-Benz and motorcycles – because nothing about it has ever been publicly disclosed. One model was depicted on the drawing board early in 1923, right at the beginning of Porsche's work at Daimler. It was up for discussion. The concept had an air-cooled two-cylinder boxer engine of about 500cc, with shaft drive, and engine and gearbox combined into a smooth block and a tubular frame.

The expert will already have guessed what kind of machine that was: nothing more or less than the first BMW twin-cylinder, which was created under Porsche and an engineer [named] Fritz at Daimler. The Untertürkheim-based company decided not to build their own motorcycle after all. So, the design went to the Bayerische Motoren Werke in Munich, which at the time was affiliated with the same banking group and accordingly coordinated its production with Daimler. Fritz also came to Munich with this machine. All this resulted in the most famous motorcycle on the continent, the BMW, the design principles of which have essentially been the same since the first model."

The above is my translation of two paragraphs in a book authored in 1951 – the year of Ferdinand Porsche's death – by Herbert A. Quint and published in Stuttgart. It's startling stuff, the idea that the multi-talented Porsche was the man behind the

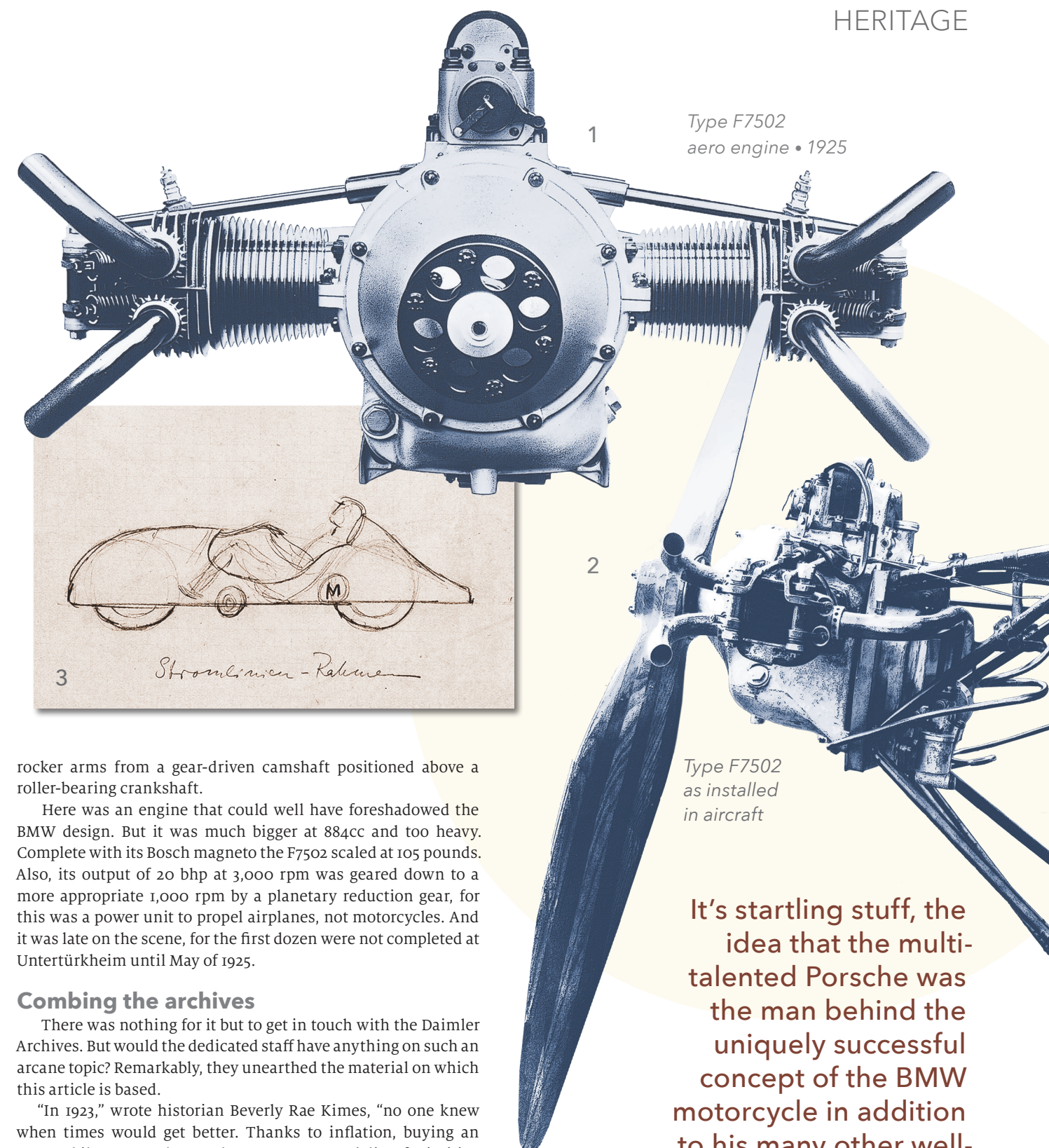
uniquely successful concept of the BMW motorcycle in addition to his many other well-credited achievements. Was there no end to this man's influence in the world of wheels?

At the beginning of 2020 I was asked about this possibility by Dutch historian and author Willy Elbers, during a conference at the fabulous Louwman Museum in The Hague. By e-mail he reminded me that he had queried "if it could be possible that Porsche had a hand in the design of the first real BMW motorcycle, the R32 of 1923." He mentioned the statement in Quint's book as apparent verification. In my own copy of the book I found the reference Elbers mentioned on page 122.

The Daimler connection

"Herbert A. Quint" was a pseudonym used in those days by Richard von Frankenberg, who was the first to write in depth about Porsche's life and work. I checked his later works under his own name, in which the same story was absent. I was uneasy about the 1951 text because I knew that the name of the responsible engineer was Max Friz, not Fritz. But he had indeed been with Daimler in Untertürkheim before moving to Munich and BMW.

As well, I knew that in 1923, soon after his arrival at Daimler, Ferdinand Porsche had in fact designed an air-cooled flat twin for his new employer. It was the F7502, whose two opposing finned cylinders were made of steel. Both were bolted to its aluminum crankcase and screwed into their iron cylinder heads, each with its complement of four valves. Opening them were pushrods and



Type F7502
aero engine • 1925

Type F7502
as installed
in aircraft

It's startling stuff, the idea that the multi-talented Porsche was the man behind the uniquely successful concept of the BMW motorcycle in addition to his many other well-credited achievements.

rocker arms from a gear-driven camshaft positioned above a roller-bearing crankshaft.

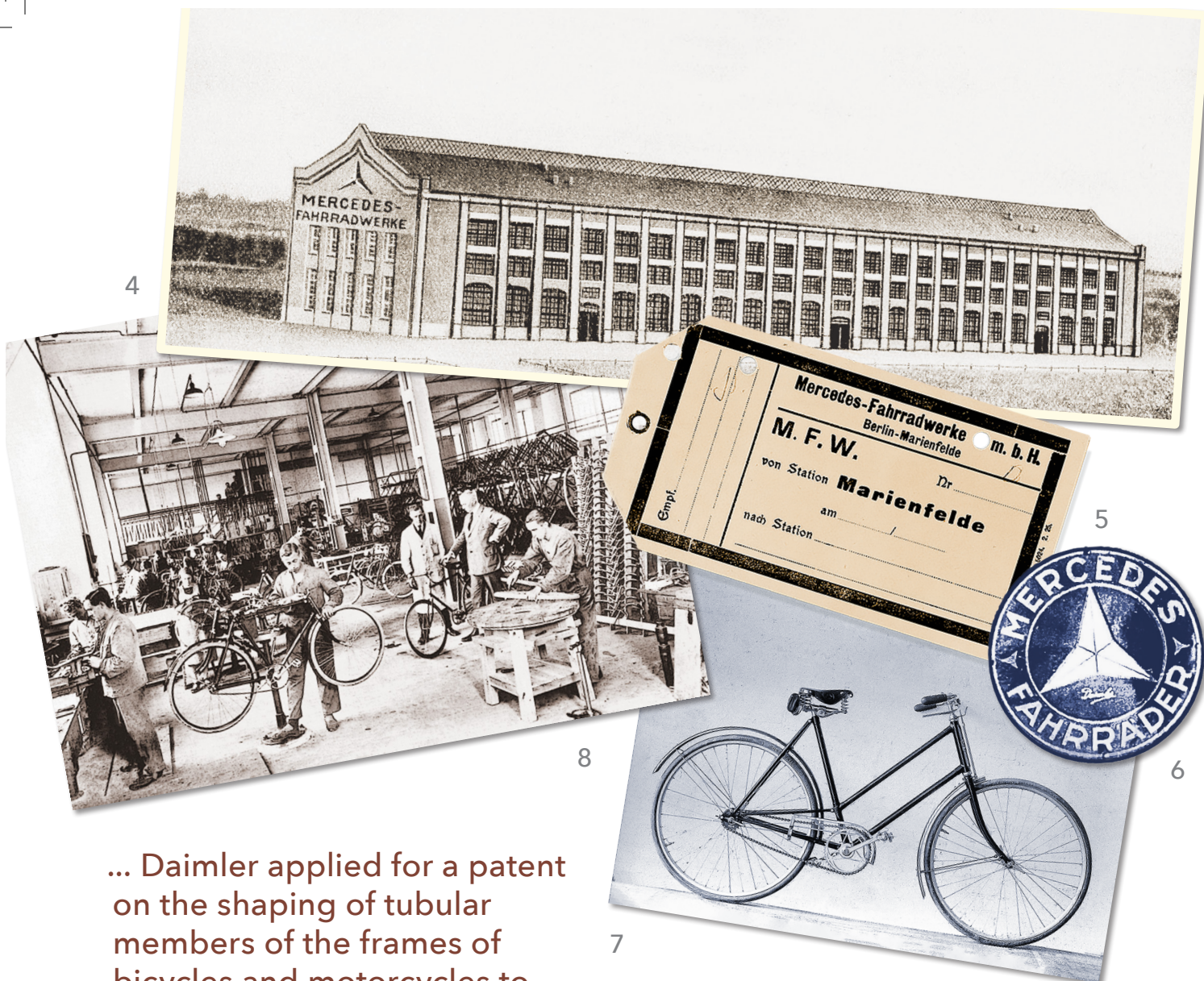
Here was an engine that could well have foreshadowed the BMW design. But it was much bigger at 884cc and too heavy. Complete with its Bosch magneto the F7502 scaled at 105 pounds. Also, its output of 20 bhp at 3,000 rpm was geared down to a more appropriate 1,000 rpm by a planetary reduction gear, for this was a power unit to propel airplanes, not motorcycles. And it was late on the scene, for the first dozen were not completed at Untertürkheim until May of 1925.

Combing the archives

There was nothing for it but to get in touch with the Daimler Archives. But would the dedicated staff have anything on such an arcane topic? Remarkably, they unearthed the material on which this article is based.

"In 1923," wrote historian Beverly Rae Kimes, "no one knew when times would get better. Thanks to inflation, buying an automobile was very low on the average German's list of priorities. German automakers began to fail at an alarming rate. DMG was in a serious quandary, as various attempts at diversification now indicated. Berlin-Marienfelde began building Mercedes bicycles and Untertürkheim produced typewriters, both products complete with three-pointed star. The bicycle was produced until 1925, the typewriter until 1927." Although the latter was a short-lived venture, it left behind a swathe of patents on innovations in typewriter engineering.

After arriving at Daimler in 1923, Ferdinand Porsche designed the Type F7502 aero engine (1 & 2), an air-cooled flat twin of 884cc, with opposed finned cylinders fabricated of steel. (3) When Daimler considered producing a motorcycle in the 1920s, engineer Rudolf Mertz undertook a design study. This sketch hints at a possible solution – with the engine (M) behind the rider. When static, small side wheels could be lowered for support.



... Daimler applied for a patent on the shaping of tubular members of the frames of bicycles and motorcycles to reduce aerodynamic drag.

"Mercedes" brand bicycles • 1923-1925

In 1923's uncertain postwar German economy, Daimler assigned part of its Berlin-Marienfelde (4) works for its new Mercedes bicycle manufactory. The new enterprise lasted just two years. (5) Rail freight delivery tag for bicycles from Marienfelde. (6) "Mercedes Fahrräder" bicycle identity badge. (7) A woman's model. (8) View into the bicycle assembly shop.

"The typewriter was called the DMG," Kimes added. "Before the war Daimler had sold the rights to use the Mercedes name to another typewriter company – and to a shoe factory, the only times the Mercedes name was ever used on a product not manufactured by the company."

The decision to make bicycles was taken at a June 13, 1923 board meeting, which approved the founding of the Mercedes-Fahrrad-Werke GmbH, a "daughter company", at Marienfelde. As a prelude to that decision, on June 13, 1922 Daimler applied for a patent on the shaping of tubular members of the frames of bicycles and motorcycles to reduce aerodynamic drag. For the use of the Mercedes name and star the new company paid the mother company 3½ marks per bicycle. This venture shut its doors in 1925.

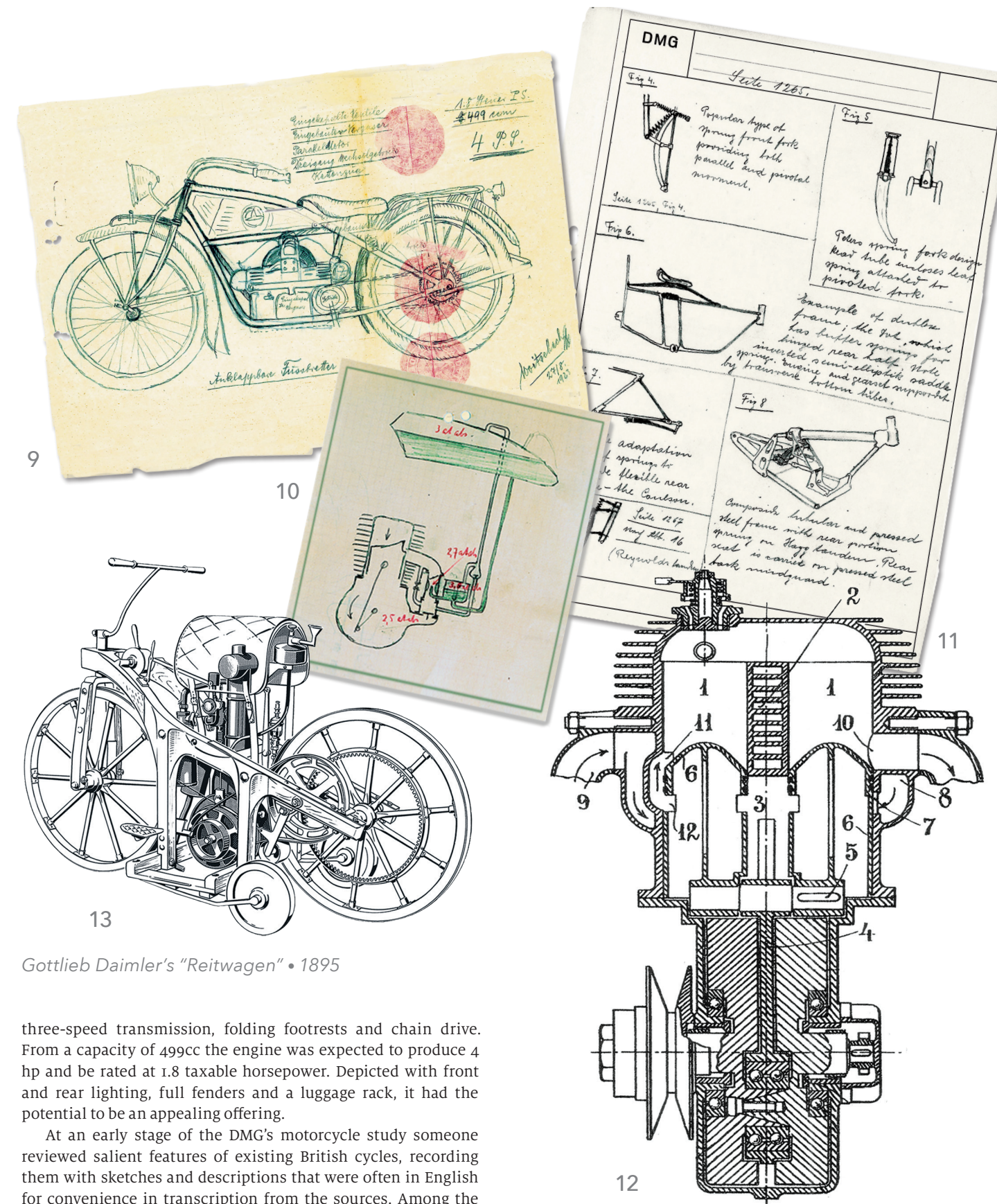
A Mercedes motorcycle?

Motorcycles were also on the agenda of the Daimler Motoren Gesellschaft (DMG). Its interest in powered two-wheelers dated

back at least to 1921, when it received detailed information on state of the motorcycle trade in Great Britain, at the time the industry leader. It was contained in a penciled dossier from two well-known experts and authors, Marcus W. Bourdon and G. H. Savage, dated December 21, 1921. They detailed technical solutions as well as market price trends in the various displacement classes.

The earliest documentary evidence we have is a drawing of a motorcycle dated August 27, 1923 by "Woitzbach" with a crude star on its fuel tank. It does have a flat-opposed twin but with its cylinders aligned fore and aft. This was strongly associated with Britain's Bristol-based Douglas, which had been making such motorcycles since 1907 as the successor to 1904's Fée, said to be the first-ever producer of "boxer" twins for two-wheelers

The 1923 design has a tubular frame and an elegant front fork, which with other tubes could easily have been streamlined in accord with the 1922 patent. Features include overhead valves with fully enclosed valve gear, encapsulated carburetor,



Gottlieb Daimler's "Reitwagen" • 1895

three-speed transmission, folding footrests and chain drive. From a capacity of 499cc the engine was expected to produce 4 hp and be rated at 1.8 taxable horsepower. Depicted with front and rear lighting, full fenders and a luggage rack, it had the potential to be an appealing offering.

At an early stage of the DMG's motorcycle study someone reviewed salient features of existing British cycles, recording them with sketches and descriptions that were often in English for convenience in transcription from the sources. Among the marques represented were Royal Ruby, Beardmore, Triumph, Coulson and, most frequently, Douglas. They depicted sprung front and rear suspensions plus frame designs and fork shapes and mountings.

An initial design

Progressing into 1924, a design was prepared for a possible motorcycle bearing the Mercedes name. An important change from Daimler tradition was a commitment to two-stroke

A 1923 sketch (9) by "Woitzbach" of a Mercedes motorcycle, with a 499cc four-stroke flat-twin. (10) Rudolf Mertz proposed using a pressurized fuel tank to integrate the carburetor with the passage that carried air from crankcase to cylinder in his two-stroke engine. (11) Early in the product planning process, a Daimler engineer set out examples of British motorcycle practice. (12) Adalberto Garelli's patent drawing for his Siamese-cylinder concept. Most two-stroke engines used a separate connecting rod for each piston. (13) Predating Daimler's interest in two wheels during the 1920s, founder Gottlieb Daimler is credited with inventing the motorcycle with his *Reitwagen* or "Riding Car" of 1895.

operation, namely a firing event on every downstroke instead of every other one as in the four-stroke engine. Also, air cooling was envisioned for simplicity and lightness. An air blower was specified, both to aid cooling and to assist delivery of the engine's fresh charge, for which crankcase compression held the main responsibility.

The design used shaft drive, which had been established in Germany in 1920 by the Krieger-Gnädig company and its design engineer Franz Gnädig. The prospective Mercedes motorcycle's gearbox was to be operated by the system first presented for patent in 1916 by Count Alfred von Soden-Fraunhofen, in cooperation with ZF of Friedrichshafen. It coupled conventional gearing with a mechanical system that allowed ratios to be preselected and then engaged when desired by a simple control movement.

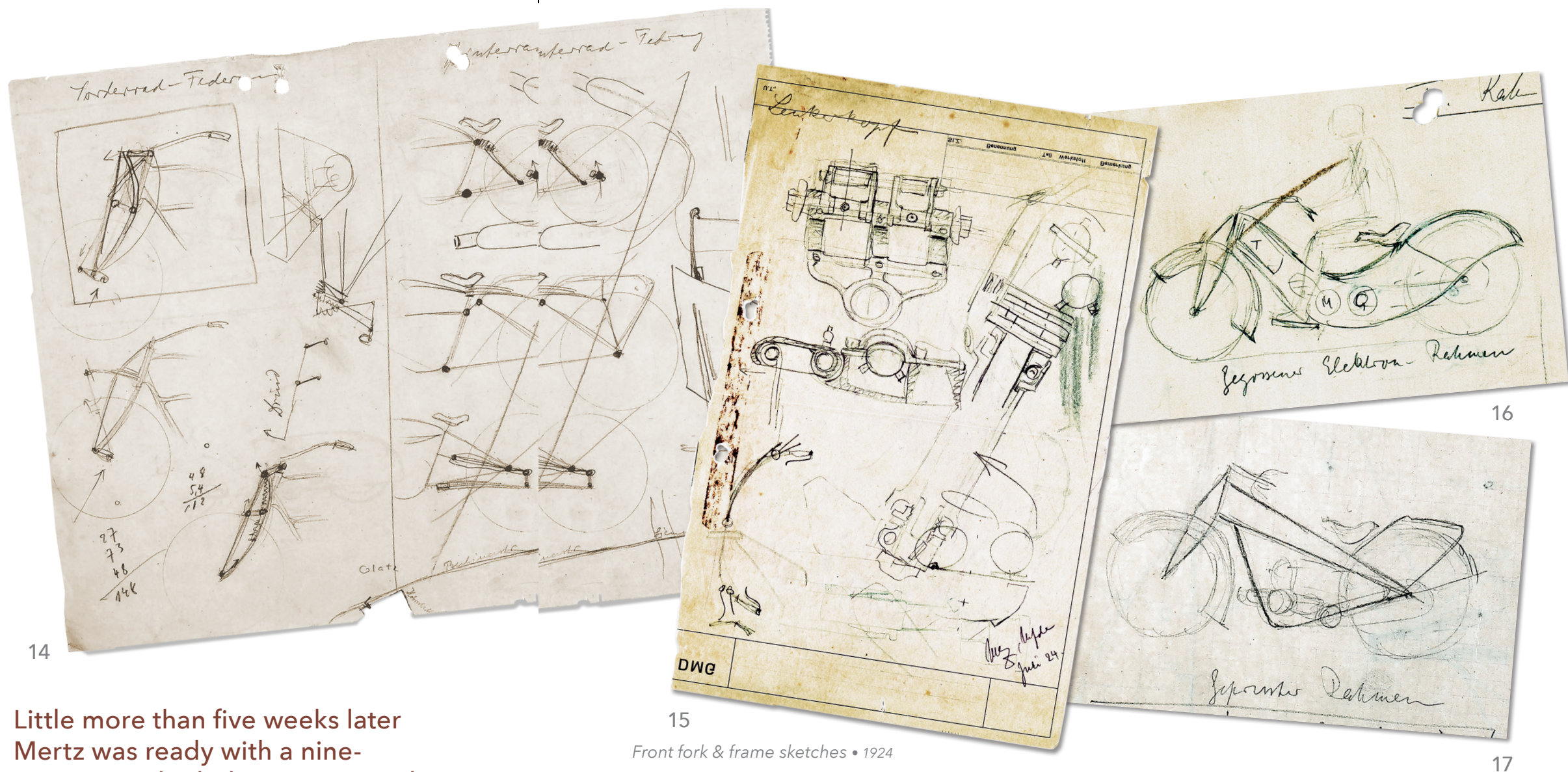
Set out in some detail, the proposed design needed to pass muster with Rudolf Mertz, head of the *Abteilung Sonderfahrzeuge*, Daimler's Special Vehicles Department. His 11-page review of June 17, 1924 disclosed that he had found much to criticize. He accepted the good mass balance of the opposed twin but noted that its offset rod bearings introduced horizontal moments that were unfavorable, especially if one cylinder should misfire. Cylinders sticking out to the sides were seen as at risk of damage and thus needing some form of protection. The rider's feet behind them, Mertz noted, were uncomfortably overheated, even more so, he felt, with the un-named designer's proposed two-stroke engine than with the four-stroke BMW.

Nor was he happy with the effects provoked by the rotating masses of the engine and shaft drive, which he felt produced uncomfortable motions when cornering as the Krieger-Gnädig bikes demonstrated. Mertz devoted three pages of his report to the issues raised by the Soden transmission, not so much about the shifter itself but more concerning its control system, its entanglement of the motorcycle's entrails and the issue of either hand or foot actuation or both. Some features required that one foot be off the ground when starting, which in his view should be possible with both feet grounded. He was even critical of the indicator of the engaged gear as not being visible to the rider in all situations. The kick starter was subjected to his condemnation. Mertz summed up by saying that many of the proposed characteristics would render the motorcycle useless as the partner of a sidecar, an amenity that many customers would certainly require.

Mertz steps in

Someone must have suggested to him that if he knew so much, he should be tackling the question of a suitable design himself. Little more than five weeks later Mertz was ready with a nine-page screed titled "Experimental Program for Development of the Daimler Motorcycle." It set out various criteria, each followed by his reasons for their consideration.

For the power unit, Mertz recommended a twin-cylinder two-stroke, but with its cylinders in a pair, vertical or near-vertical. Optimum air cooling would be the result of trials of two alternatives, said Mertz. One would be the use of a finned iron cylinder, sanded to form a rough surface on which a thin layer of aluminum, magnesium or copper would be sprayed. The other would be a finned cylinder of aluminum or magnesium into which a ferrous liner would be pressed, screwed or cast.



Little more than five weeks later Mertz was ready with a nine-page screed titled "Experimental Program for Development of the Daimler Motorcycle."

Mertz's experiments to determine the final design of the Daimler motorcycle would include the assessment of a centrifugal blower geared up to a higher speed than the crankshaft. Trials would be made of its placement either between carburetor and inlet ports or before the carburetor, as Daimler did with its supercharged automobiles. This was aimed at a more thorough vaporization of the air/fuel mixture. It was possible, Mertz mused, that the final engine would have the blower or the helping piston but not necessarily both.

"It will be ascertained through tests," wrote Rudolf Mertz, "whether the costly chain and the even more costly shaft drive bring corresponding benefits over a belt drive."

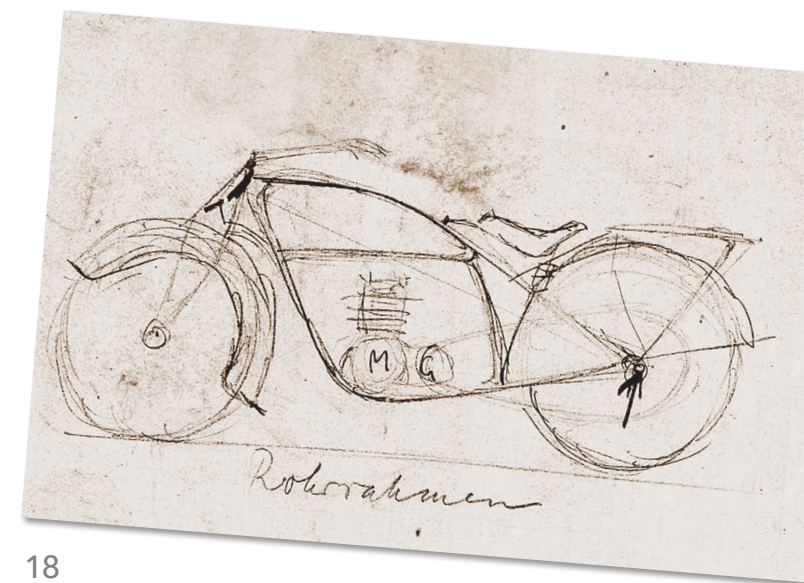
Low and aerodynamic

Although in his musings on the machine the engineer considered and pictured a cast magnesium frame or a formed sheet-metal frame for the motorcycle, he came down firmly in favor of a tubular frame. Its advantage over the others, he said, was that "it is not absolutely stiff and thus when subjected to exceptional stresses—such as crashes—it is able to exploit its flexibility instead of breaking.

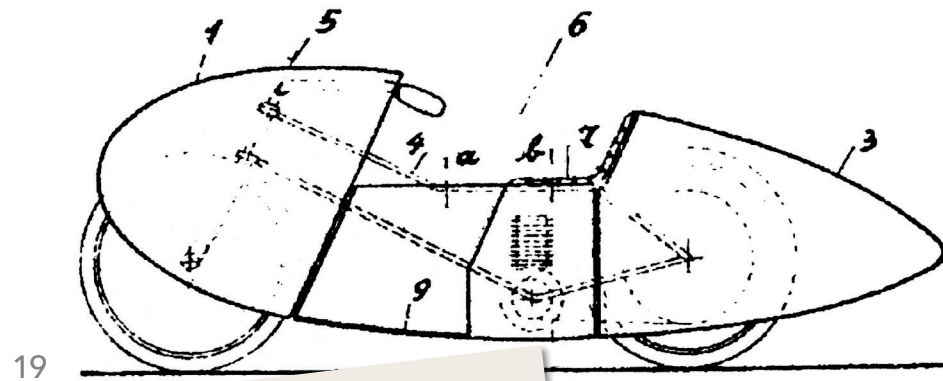
Rudolf Mertz drew a range of suspension ideas (14) for both front and rear wheels of the Mercedes motorcycle. (15) A June 1924 group of sketches explored front fork designs. (16) Mertz reviewed several possibilities for the motorcycle frame; this one was to be cast of "Elektron", then the commercial name for magnesium. (17) Mertz also considered a folded sheet-metal frame for the proposed motorcycle. (18) In the end, Mertz selected a tubular frame, known for its resilience to shocks. But he would depart far from this traditional design.

"The frame will be kept very low," Mertz added, "so that the driver more sits than rides. It should be endeavored to clothe the frame and give it a streamlined form. The contemporary motorcycle frames are built without consideration of air resistance. It's beyond doubt that for a motorcycle as well as a car a higher speed can be reached with the same engine with the help of streamlining, or the same speed reached with less power. Efforts hitherto in this direction are absurd because the body of the driver protrudes far above the streamlined body. Moreover, the external surfaces, along which the air must flow without resistance to achieve a good effect, are much too often interrupted."

These were references to a design patented in June 1922 by Max Schüler for a "Motor Vehicle with Teardrop-shaped Bodywork." Aerodynamically minded and a pre-war dirigible designer Schüler had an air field on the Netter Heide outside Osnabrück. During the ban on airplanes imposed by the Versailles Treaty he designed and built a machine he called the *Tropfen-Motorrad* or Teardrop-Motorcycle, with engines of 2½, 4½ or 6½ hp, calling it "the fastest machine on the world market," thanks to its unique bodywork. Schüler marketed the motorcycles for two years.



18 Mertz's initial tubular frame design



19



21

Max Schüler's
teardrop motorcycle • 1922



20

In his July 1924 report, Rudolf Mertz referred to the *Tropfen-Motorrad* or “Teardrop Motorcycle” being built by Max Schüler, who claimed it exhibited both beauty and speed. (19) Schüler’s 1922 patent filing shows how the front bodywork turned with the wheel; the engine was deeply encapsulated. (20) A happy rider of a Schüler motorcycle poses in front of the hangar used by the former dirigible designer for aircraft construction. (21) Advertisement for the streamlined Schüler motorcycle. (22 & 23) In his sketches, Rudolf Mertz mulled the proper shape for a Mercedes motorbike with enclosed bodywork. (24) The proud owner of a technically-advanced, streamlined Mercedes motorcycle would ride semi-reclined.

Ahead of his time

In many of the ideas described above, Daimler’s Special Vehicles Department engineer Rudolf Mertz was in advance of contemporary thinking, and usefully so. In this area he was equally farsighted, for motorcycle coachwork remains an idea whose time has still not arrived a century later. He foresaw a motorcycle with a much lower profile, into which the driver was well integrated. Mertz wanted to mitigate the effects of side winds on the higher profile of normal motorcyclists, which they find wearying and even dangerous.

“A cycle kept very low,” Mertz averred, “with only the absolutely necessary ground clearance and in which the driver sits half-reclined, will not have this disadvantage and will be able to be given a very favorable streamlined shape. Moreover, such a cycle will rest very securely on the road, thanks to its exceptionally low center of gravity, and thus tend less to skid.”

What might have been

Mertz was clearly looking out for the distinctive features and technologies that would appeal to someone who might aspire to be seen in a two-wheeler bearing the Mercedes star. In only one respect did his design diverge from what might have been expected. Why a two-stroke? The earliest proposal, that of Woitschek from 1923, showed what was clearly a four-stroke engine with its “enclosed valves”. Why was this principle not maintained in the 1924 proposal and Mertz’s rebuttal?

Could Ferdinand Porsche have been responsible? From 1923 Professor Porsche was Daimler’s board member charged with oversight of product design. When Porsche wanted to pursue a particular course of action, he could be extremely persuasive and convincing to get his way. However, two-stroke engineering did not appear on his curriculum vitae. When he built an air-cooled parallel twin engine at Austro Daimler for wartime applications, it used the four-stroke cycle.

Did Professor Porsche accept or advance the two-stroke alternative in the interest of cost reduction? One might have expected any motorbike carrying a Mercedes badge to be positioned at the top end of the market; the cost of a set of valve gears would have been affordable. Porsche happily spent Daimler’s budget when designing his air-cooled twin-cylinder aero engine at about the same time the motorcycle idea was brewing at Untertürkheim.

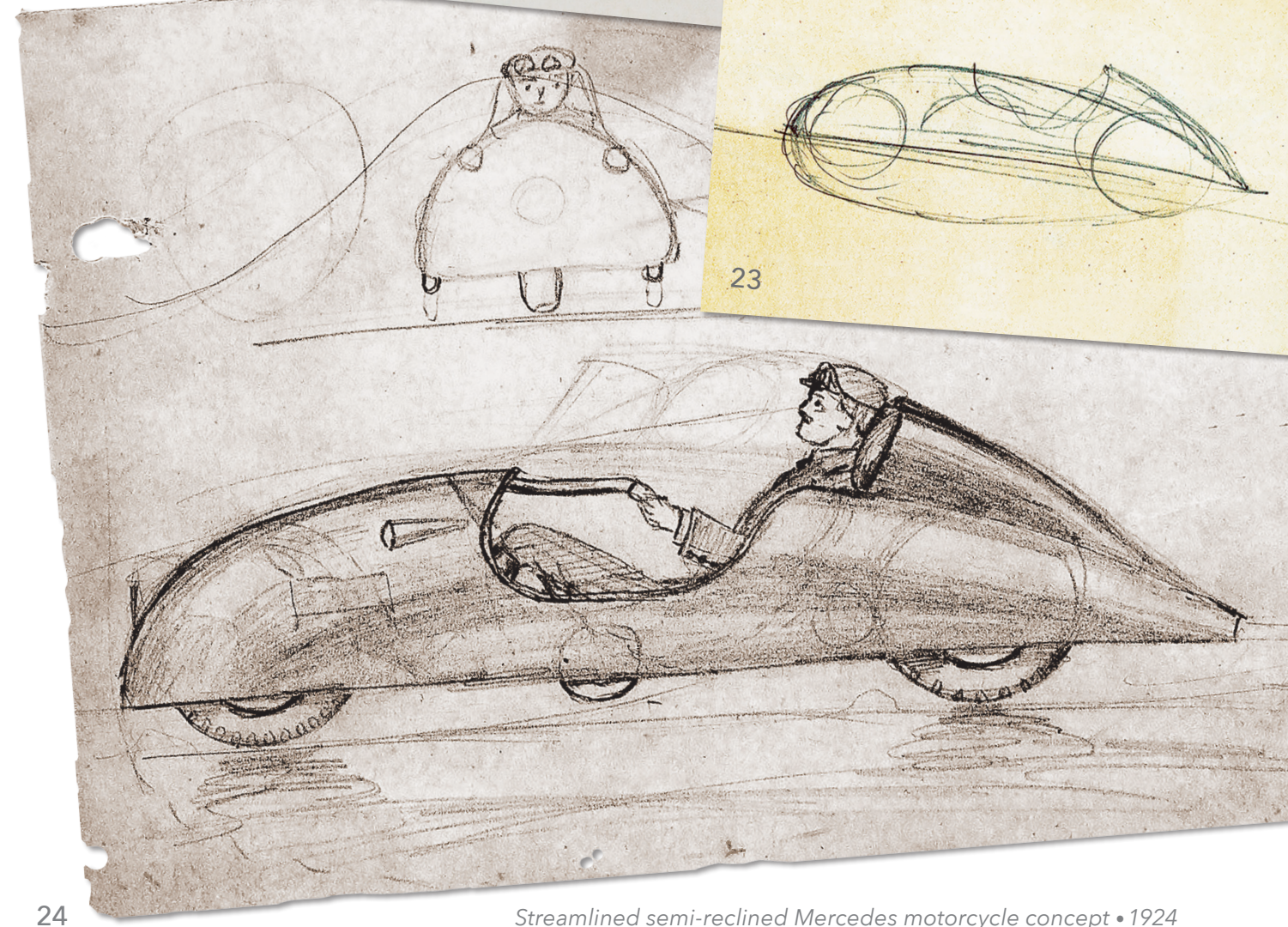
All these issues became moot when a syndicate was formed between Benz and Daimler in May of 1924. Its declared aim was to standardize car and truck design and production while unifying purchasing, sales and advertising. This brought a blizzard of new issues to be dealt with by senior managers at both Mannheim and Untertürkheim. A motorcycle? This was too much of a distraction. They left it to Munich’s BMW to pursue the motorcycle market and, eventually, to build cars at the same time. It worked out well for BMW, thanks to Daimler’s decision not to compete.

Daimler’s special-vehicles engineer, Rudolf Mertz, was clearly looking out for the distinctive features and technologies that would appeal to someone who might aspire to be seen on a two-wheeler bearing the Mercedes star.

22



24



Streamlined semi-reclined Mercedes motorcycle concept • 1924

23