

Brief History of Automotive Fuel System

In 1896, an automotive development that did not receive headlines was announced. Dr. Wilhelm Maybach and Gottlieb Daimler of Germany had teamed up to build a motor car possessing a new device called a float-type spray carburetor -- a "gadget" that's still with us.

According to an 1898 issue of *Automobil-Zeitung*, a German automotive publication, the Maybach carburetor was "a major improvement over the brush-type atomizer and the wick carburetor." The atomizer was the carburetion device used on the first motor car equipped with a gasoline engine, built by Siegfried Marcus in 1875. Between Marcus and Maybach, Dr. F. W. Lanchester, a British automotive pioneer, built motor cars that used wick carburetors.

The rotary-brush atomizer used by Marcus was an integrated fuel reservoir and feed unit. As the pulley-driven brush revolved, it picked gas out of the reservoir and threw it into the air. The suction effect created by the pistons drew the mixture into the engine. Lanchester's wick carburetor improved on the atomizer. It consisted of several compartments. The bottom compartment held fuel. Wicks extending from a compartment above became saturated with fuel.

Getting vapors given off by the wicks to mix with air was achieved by drawing air into the compartment above the fuel storage area. The fuel/air vapors then flowed to the engine, passing first through wire mesh that served to filter out impurities. This was the world's first carburetor fuel filter. There's a fact about filtration you may find interesting. Until refining methods were improved (about 1910), cars came equipped with swatches of chamois. These were used by car owners to filter impurities from gas before pouring it into the fuel tank. Before drive-in stations, gas was sold by hardware and drug stores.

Maybach's float-type carburetor was, in retrospect, an invention of revolutionary proportions. Its survival for this many years tends to prove this. You probably know how it works: Gas from a fuel supply tank flows by gravity into the carburetor's float chamber or bowl. As gas fills the bowl, it causes a float (Maybach used a float made of sheet metal) to rise. When the float reaches a certain height, it forces a needle valve to close, which halts the flow of fuel to the engine.

The float allowed Maybach to attain a consistent flow of fuel to the engine. Unlike the atomizer and wick carburetors, the float carburetor lessened the tendency of engines to flood. Maybach's carburetor possessed a second chamber called the mixing chamber. It was there that gas from the float chamber mixed with air. The mixture was drawn up into the engine as pistons dropping in the cylinders created a vacuum.

Note that the fuel mixture was drawn *up* into the engine. The Maybach carburetor was an updraft unit, an approach to carburetion that lasted until the late 1920s, when the first cam-operated mechanical fuel pump was invented. This invention permitted automakers to move fuel tanks to the rear of their cars and place carburetors high on the engine.

Between the gravity-feed system and the advent of cam-operated fuel pumps, fuel was pushed from a rear-mounted tank to the carburetor by air pressure. This required large vacuum reservoirs between fuel tanks and carburetors. It's interesting

to note what the 1928 edition of *The Modern Gasoline Automobile* had to say about a disadvantage of this system: "The air pressure pump system often gives trouble, requiring a hand air pump near the driver in order to return to the garage."

Automakers had to put hand pumps in cars. When the automatic air pump system failed -- which it often did -- a driver would use the hand pump to feed fuel to the engine. As we said, the Maybach float carburetor was first used in a car built by Maybach and Daimler. This was before Daimler and Karl Benz joined forces to form the company that now builds Mercedes-Benz automobiles. Do you wonder why the cars are called Mercedes-Benz and not Daimler-Benz? When Daimler and Maybach were associated, they were financed by Emil Jellenik. In 1903, Daimler and Maybach manufactured a new car that they named after Jellenik's daughter, Mercedes. The Mercedes name went with Daimler when he joined Benz.

As automaking took off, so did road building and development of more powerful engines operated at varying speeds. Fuel-on-demand became a critical factor that the original Maybach design couldn't fulfill. Refinements came hot and heavy. One of the earliest was through the efforts of two men -- Butler of Great Britain and Venturi of Italy. They didn't know one another. In fact, they lived 100 years apart. In the 1790s, Venturi discovered that by reducing the bore of a pipe, he was able to increase the velocity of fluid and got it to break (atomize) into smaller particles. Around 1900, Butler applied the Venturi principle to a float-type carburetor. He narrowed its throat (or venturi, as we call it now). Doing this allowed greater protection against engine flooding.

Improvements to the Maybach design between 1900 and the late 1920s led to the jet-compensated carburetor, which is still with us. This unit uses jet circuits, air bleeds, vacuum-operated economizer valves and throttle-operated metering rods to attain the correct fuel/air ratios for various speeds and loads.

Other significant fuel-system developments were:

- The first dash-mounted gas gauge by Studebaker in 1914.
- The first carburetor air cleaner, introduced on the 1915 Packard Twin Six. The 1922 Rickenbacker used the dry-type air cleaner.
- The first thermostatic automatic choke, which was introduced on the 1932 Oldsmobile. The design has remained basically the same to this day.
- The first four-barrel carburetor -- by Buick in 1941.

Back in 1910, Adams Farwell of Dubuque, Iowa, pioneered a non-carbureted fuel system called fuel injection, refined and adopted for diesel engines. But it wasn't until after World War II that thought was given to putting it on spark-ignited gasoline engines. In 1949, *Automotive Digest* said, "Some automotive men feel that fuel injection for passenger automobiles is nearing the climax in experimentation and may soon make its bow to the driving public." What happened? Nothing -- the carburetor remained king for another 35 years.

But as smaller engines and greater fuel mileage have become issues, fuel injection is, like so many other automotive inventions, an old development whose time has finally come. By 1986, practically all gasoline engines have electronically operated fuel-injection systems instead of carburetors. Bye-bye, old friend -- it's been fun