GM's Approach to an Air-Cooled Chevrolet

By

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The Copper-Cooled Engine

The years between 1919 and 1923 were tumultuous for President Alfred P. Sloan and GM. During this timeframe. Charles F. Kettering, Chief Scientist of GM, led a project to build an air-cooled engine consisting of iron cylinders attached to copper fins. The rationale was that copper was nine times more efficient than steel in heat dissipation.[i] The drawback was that it has always been difficult to bond dissimilar metals. After many unsuccessful attempts, researcher Charlie Lee designed a special electric furnace to braze the copper fins to an iron cylinder, which he perfected in January 1921. The effort cost nearly $50,000 and enabled the copper-cooled cylinders to be made for about $2.00 apiece. Three 4-cylinder engines were made to fit in a Chevrolet chassis. Fans were added to each side of the block for additional cooling. This approach was only marginally acceptable.[ii] That same month, the GM Executive Committee announced its intention to develop a low-priced Chevrolet with the copper-cooled engine. Designed to compete with the light-weight, tough Model T Ford (1.4 million of which were sold in 1921 compared to 0.13 million Chevrolets), the new Chevrolet would also need a redesigned frame, axles, and steering gear[iii].

Design specs were finished by fall 1921, followed by U.S. Patent 1,697,818, C. F. Kettering, Air Cooled Engine, April 17, 1922. The Executive Committee directed the Chevrolet Division to make the air-cooled "4" its standard engine by May 1, 1922.[iv] Meanwhile, sales of water-cooled Chevrolets had increased rapidly during 1922.[v] What's the payoff for going to a revolutionary new engine at such a time, realists like GM President Alfred P. Sloan asked themselves? When a copper-cooled "4" was sent to O.E. Hunt, chief engineer of Chevrolet for testing in the lightweight chassis he had designed, low power was observed.[vi] Yet plans were

continued to gradually phase out production of water-cooled Chevrolets and replace them with the air-cooled model. The Copper-Cooled Chevrolet Superior was the smash hit of the New York Auto Show in January, 1923.[vii]

The Denouement of Chevrolet Copper-Cooling

A total of 759 copper-cooled Chevrolets were manufactured.[viii] Of these 239 were scrapped by production, and 520 were delivered to dealers. Only 100 were sold to customers and the rest were retained by GM. Customer complaints included excess noise, clutch problems, excessive cylinder wear, carburetor malfunctions, axle breakdowns, and fan-belt maladjustments. In other words the copper-cooled car was a dud and was soon withdrawn from the market. In April 1923, Sloan became president of GM on the departure of Pierre S. Dupont, whose strong support for the air-cooled car had kept it going in the face of mediocre performance. Sloan possessed the "if it's not broken, don't fix it" philosophy of not changing to air-cooled cars when sales of the water-cooled Chevrolet were rising. (Sales of conventional water-cooled Chevrolets had risen from 139,000 in 1922 to 416,000 in 1923).[ix] Work on the copper-cooled car ended. Kettering went on to other inventions, like adding tetraethyl lead to gasoline to prevent knocking (eventually recognized as environmentally unfriendly). On the positive side, to support the GM Frigidaire refrigerator division (a non-core GM business left over from Durant), he invented Freon, a non-toxic refrigerant which supplanted the poisonous gases used in early refrigerators. Taking into account his electric auto self-starter, we can score him at a 0.500 GM batting average. For the sake of completeness, we mention that it was not until 1960, when the Corvair was introduced, that GM achieved successful production of an air-cooled car.

Home to Syracuse and a Question

In the paper With This or Nothing we saw how Brown-Lipe-Chapin, largest maker of automotive differentials in the world, passed into GM ownership. Although Albert P. Sloan Jr, the president of GM, fails to mention BLC explicitly in either of his 2 books, in My Years he positions BLC as a GM division in a January 1925 organization chart.[x] Physically, we have shown that the U-shaped BLC plant

opened on Marcellus St. about 1/3 of a mile east of the Lipe Incubator on the west side of South Geddes Street. Just south of Lipe was the Franklin plant, the maker exclusively of the most successful air-cooled car in America.[xi] We also remember that the early Franklin was tough and durable, having been successfully driven cross-country. The question begs: To what had the Franklin auto evolved in the years 1921-23 when GM underwent such turmoil in its failure to manufacture a similar air-cooled car?

By 1922, Franklin was producing the model 10, which came out in 1923 with a wheelbase of 115 inches and a weight of 2,450 lb. for the touring model.[xii] Depending on equipage, the price of this car could rise to $4000. The 6-cylinder motor made 25 hp. Now the goal of GM's copper-cooled car had been an engine of at least 14 hp. In a car weighing 1450 lb.[xiii] The designed wheelbase was 103 in. [xiv] Clearly, the Chevy car was envisioned as a much lighter car than the Franklin. But Franklin was successful, had a national dealership chain, and possessed a brilliant chief engineer in John Wilkinson. The question thus arises: Why did not Sloan or another GM executive walk the ½ mile from their Brown-Lipe-Chapin plant over to Franklin and ask for help? Remember Alexander T. Brown had been elected president of Franklin in 1901. Thus, the GM division and the Franklin company were physically as well as genetically related. Moreover, contemporaneous with the GM copper-cooled effort, Franklin in 1922 conceptualized a lightweight 4-cylinder air-cooled car, with a 102 in. wheelbase to sell for $1000. [xv]

While the light car model had been met with approval at a private showing for Franklin dealers during the January 1922 National Auto Show in New York City, by November 8, production of the car was indefinitely postponed due to the rising costs of materials that would prevent the $1000 price tag. The existing Franklin factory, tailored to manufacture a moderate number (about 10,000 yearly) of expensive cars, could not be easily converted for mass production of a low cost car. A new factory was cost prohibitive. and might produce automobiles that could draw off sales from the premium models. It is interesting to realize that the key dates of the light Franklin idea predated similar milestones (New York Car Show, cancellation) for the Copper-Cooled Chevy in 1923 by a year.

The reasons that GM and Franklin did not cooperate on the small air-cooled car are several. One was the not-invented-here (NIH) syndrome, with the prestige of C. F. Kettering overshadowing any attempt to go outside of GM for help. Another was the battle for consolidation of GM that Sloan was fighting at this time by dealing with non-standardization of GM divisional practices in accounting, inventory control, and product rationalization. Another may have simply been H.H. Franklin's reticence and his inability to speak forcefully in large groups. Whatever the case, the road taken led nowhere.

We know how the lack of cooperation between two capable automotive companies led to failure by either to market a similar product. GM was able to shake off its loss of the copper-cooled car which proved inconsequential weighed against the success of its water-cooled models. For the first time in 1927 Chevrolet sales of 1.7 million exceeded those of Ford, During the 30's, the sales leader went back and forth until 1937, when Chevy won and retained it until long after World War 2.[xvi] By comparison, Franklin never made more than 14,500 cars in its best year and only 360 in 1934, when the effects of the Great Depression tumbled sales of high-priced cars.[xvii] Another maker of luxury cars, Packard, muddled through the period by making lower-priced models. As we have seen, that option had been already discarded by Franklin. The company, which had employed 2600 to 2800 in 1929, shut its doors for good in 1934.[xviii]

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[i] Leslie, Stuart W. *Charles F. Kettering and the Copper-Cooled Engine,* Technology and Culture, Vol. 20, No. 4 (Oct., 1979), pp. 754. Published by: The Johns Hopkins University Press and the Society for the History of Technology.
[ii] Leslie, p. 756.
[iii] Production figures from Kimes , Beverly Rae and Clark, Henry Austin Jr. Standard Catalog of American Cars 1805-1942 (3rd edition), pp. 288 and 583.
[iv] Sloan, Alfred P. My Years at General Motors (New York, 1963) p. 77.
[v] Leslie, p. 763-4.
[vi] Leslie, p. 764.
[vii] Leslie, p. 765.
[viii] The facts and figures in this paragraph follow Leslie, p. 767.
[ix] Kimes and Clark, pp. 289-290.
[x] Sloan, p. 115.
[xi] See https://commons.wikimedia.org/wiki/File:1910franklin-auto_factory_postcard.jpg.
[xii] Powell,Sinclair The Franklin Automobile Company Second Edition (Cazenovia, 2014) p. 182.
[xiii] Leslie, pp. 757-8.
[xiv] Kimes and Clark, p.290.
[xv] Powell p. 176-7.
[xvi] Kimes and Clark, p. 283.
[xvii] Kimes and Clark, p. 605.

[xviii] Powell, p. 248.