

Welch: History of an Early General Motors Acquisition

Automotive History Review



Autumn 2019

Issue Number 60

A High Price for Perfection: The Saga of the Gaylord



Universal Cars: The North-American Vehicle in World Markets

The Society of Automotive Historians, Inc.

An Affiliate of the American Historical Association



Editor's Note

The idea of engaging storytelling and presentation in the arena of automotive history is one that I believe is particularly important, as all of the research into the topics we choose really goes nowhere if the reader doesn't get past the second paragraph.

I believe that this notion is particularly important as we move further and further into the 21st Century. As consumers of information become more sophisticated and demanding in their requirements, we need to effectively convey the messages that we intend to but do it in such a way that it actually lands and is accepted by our target market. This means attractive graphics, engaging storytelling, modern photography wherever possible and an accessibility that brings us new members looking to learn more about automotive history.

As Katya O. Sullivan authoritatively illustrated in her article in our last issue, entitled "Authentic Nostalgia: Engaging Millennials and Gen Z with Our Automotive Heritage," younger people are most

definitely interested in automotive history, but they need to be approached in a welcoming manner that appeals to their sense of authenticity, local orientation and shared experiences. No longer can we get by with forcing people to accept our rigid and sometimes anachronistic standards; they will simply look for other venues in which to spend their time. Otherwise, I am afraid that our mission may go the way of the buggy whip.

As a result of the changes in society and technology, we must endeavor to evolve our concepts of stewardship of history to make it a viable platform as we witness the loss of many of our first-hand sources of information and the emergence of new people, new technology and new stories to tell. As I mentioned in our Allentown roundtable discussion last year, we need to track down and interview recently-retired designers, engineers and executives to get their stories while they are still relatively fresh in their minds. This will become more and more of a challenge, as enforceable non-disclosure agreements are becoming very common requirements in retirement packages, particularly at General Motors.

This issue is particularly special for me, as it represents to my mind, exactly the kind of storytelling that I have been talking about since I became editor. All three of these articles are by longtime SAH members—two of them are academic papers. The third is a commercially-published article, written by your editor, which appeared in the April, 2017 issue of *Collectible Automobile*. It was recognized by

the Automotive Heritage Foundation and won both a Gold Award, as well as the Best Marque-Specific Story Award at the 2018 Concours of America. I consider it the best article I have written in my 31-year career in automotive journalism and I wanted to include it to illustrate that informative, entertaining and most importantly, *accurate* historical research is being conducted outside of academia and it deserves to be included in publications such as this.

I wish to thank John Biel and Frank Peiler of Publications International for allowing us to reprint it and the accompanying photos here.

With that said, I have decided to step down as Editor of the *Automotive History Review*. My professional responsibilities as the editor of three other automotive magazines and my duties as President of the National Impala Association have spread my resources far too thin to complete my duties and have a normal personal life.

I wish to thank my colleagues on the SAH Publications Committee, Kit Foster, Louis F. Fourie, Rubén L. Verdés and Steve Wilson, as well as Committee Chair Tom Jakups. I could not have made any of the past four issues happen without each and every one of you.

I congratulate my successor John Heitmann on his new position and encourage him to continue our goals of engaging readers with great storytelling, colorful illustrations and an array of modern photos wherever possible to help bring these fascinating stories to life.



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Don Keefe, Editor
1448 Seagull Drive, Apt. 312,
Palm Harbor, FL 34685 USA
donaldjkeefe@aol.com

Further information about the Society may be obtained by writing to The Society of Automotive Historians, Inc., c/o Cornerstone Registration, Ltd., P.O. Box 1715, Maple Grove, MN 55311-6715 USA or at www.autohistory.org.

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Front Cover: The lone surviving Gaylord. Photo courtesy of Publications International. Used with permission.

Back Cover: A very rare 1908 Welch Model 4L seven-passenger touring car. Photo by Louis F. Fourie.

Below: The intake side of the innovative overhead cam 1908 Welch four cylinder with hemispherical combustion chambers. Photo by Louis F. Fourie.



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THE WELCH MOTOR CAR

THE HISTORY OF AN EARLY GENERAL MOTORS ACQUISITION



Figure 1: A recent photo of one of the few surviving Welch automobiles, a 1908 Model 4L seven-passenger touring car.

BY LOUIS F. FOURIE

PHOTOGRAPHY SUPPLIED BY THE AUTHOR
ADDITIONAL PHOTOS BY KIT FOSTER

Bill Durant, founder of General Motors, was not an engineer or an early tinkerer but he was always on the lookout for the “next big thing” or automotive feature. His first automotive purchase was Buick because of its overhead-valve design. William Pelfrey quotes Durant as saying, “They say I shouldn’t have bought

Cartercar. Well how was anyone to know that Carter wasn’t to be the thing? It had friction drive and no other car had it.” Another Durant purchase and possible big thing was the two-stroke Elmore. If Durant was looking for a truly advanced automobile, he found it in the Welch.

Chelsea Manufacturing Co.

Alfred (Allie) Ray Welch's unusually creative skills began in his youth. He built his own lathe and a steam engine to power it in his mid-teens. Once employed, his talents quickly elevated him to become the superintendent of a stove factory in Chelsea, Michigan. In 1895, he left to run a metal-working factory in

Connecticut and then a self-owned sheet metal operation in New York.

Allie returned to Chelsea in 1898 where his younger brother Fred was running a bicycle shop. Together they formed the Chelsea Manufacturing Company in February 1900 with an authorized capital of \$25,000 of which only \$16,000 was subscribed.

Initially trinkets such as knife sharpeners, pistol flashlights and tea strainers were produced. The Welch brothers started experimenting with a two-cylinder car, getting their prototype operational in April of 1901. According to Mary Shaw, who worked for Allie Welch, doing many of the engineering drawings, the first test on Jackson Road occurred after midnight with herself, Mrs. Welch, daughter Vesta, brother Fred and a few friends as witnesses.¹ Development continued through to late 1902. At the January 1903 Chicago Show their production Model A was announced. Unlike in the prototype, the engine was moved from beneath the seat to out front below a hood and a steering wheel replaced the earlier tiller. Bodies were a runabout or tonneau with either a rear or side-entrance.²

The two-cylinder engine had what was described as "concave" pistons with "globe" topped cylinders, with a single head and cylinder casting. Mounted on the top of each cylinder was a vertical center 1.75-inch exhaust valve plus a pair of side-by-side angled (at close to 45 degrees) automatic or atmospheric inlet valves that relied on

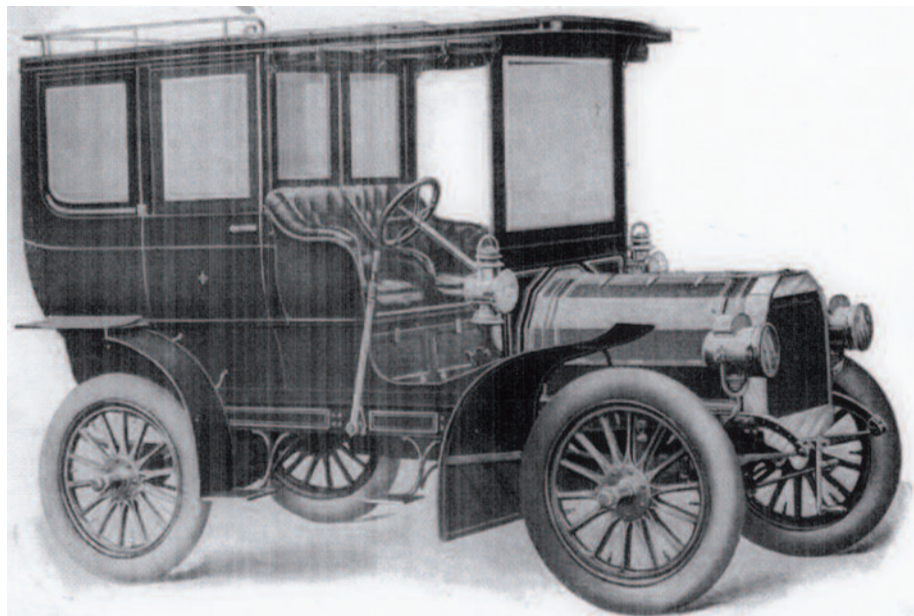


Figure 2: A 1904 Welch Model B Limousine.

suction from the withdrawing piston to open. The exhaust valve was operated by what is described as "a rotating overhead disc cam."³ But the cross-section diagram fails to show any camshaft or push rod, only a possible cylindrical shape surrounding the valve stem. The engine ran at an 800 to 900 rpm range, which translated to 20 mph, but was able to attain 2,000 rpm.⁴

Steam engine practices were evident in the design of the Welch. Rather than an end cap to secure the connecting rod to the crankshaft, a U-shaped strap was fastened and tensioned by a tapered pin. Unsure that ball bearings would stay in their cages, the Welch brothers used Babbitt bearings nearly everywhere except the steering box and back axle. Babbitt

THE 1905 MODEL C
WELCH TOURING CAR
IS
THE CROSS COUNTRY PULLMAN
ITS 36 H. P.
CARRIES SEVEN PASSENGERS
OVER THE COUNTRY
WITH R. R. SPEED AND COMFORT

A 1905, 4-cylinder Touring Car of the highest possible class. Two speeds, forward and reverse, with single lever that you can't possibly do anything wrong with. Sliding gear construction, but with the gears always in mesh and standing idle on the direct-drive. Trouble-proof, multiple disc. Metal to metal in oil clutches, bevel gear drive, 5 to 50 miles per hour on high speed, dustless, side door or rear entrance, tonneau.

OUR HANDSOME CATALOGUE TELLS YOU A LOT ABOUT GASOLINE MOTORS IN GENERAL AND OURS IN PARTICULAR

WELCH MOTOR CAR CO. DETROIT and 3 PONTIAC, MICH.

Figure 3: An ad for the 1905 Welch Model C seven-passenger touring car.

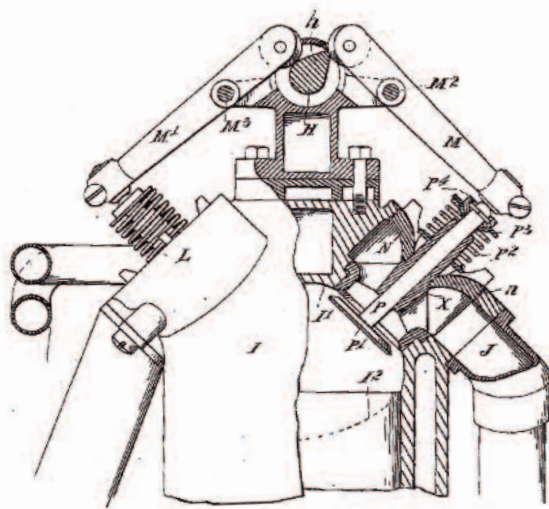


Fig. 2.

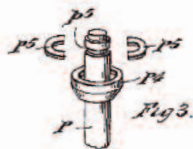


Fig. 3.

WITNESSES

J. Massey
Lotta Lee Hayton

INVENTORS

Allie R. Welch
By Fred Stinson Welch
Parkes & Kauler, Attorneys.

Figure 4: A U.S. Patent illustration shows the Welch engine's unique exposed overhead-cam valvetrain system, large rocker arms and hemispherical combustion chamber.

bearings were even included in the gearbox and kingpins, offering damping and shock-load capability from the oil fluid-film common to these bearings.

Not only was the engine leading edge, so was the two speed transmission. Rather than sliding gears back and forth to engage each other, two clutches, each with their related constantly meshed gears, alternated the ratio depending on which clutch was engaged. These multi-plated saw-steel and bronze clutches were in the gearbox and lubricated by its oil. There was no

conventional clutch or pedal. Instead the left pedal, held down by a ratchet, served as a parking brake. Once the brake pedal was released, the gear lever activated the clutches, pulling back for first and pushin forward for top. In reality the gear lever was a two-stage clutch lever and its operation was absolutely silent with absolutely no grinding of gears. A telescopically adjustable steering column on all Welches complemented this ease of operation.

By the fall of 1902, a severe cash flow situation prompted Allie

Welch to approach Abram C. Wisner of Battle Creek, a "high finance" expert. Articles of partnership were filed in Ann Arbor, Michigan in February 1903 by A.R. Welch, J.D. Watson and Fred S. Welch under the name Chelsea Mfg. Co. (Ltd.) recapitalizing the company to \$200,000. Wisner proved to have questionable integrity. Financial difficulties closed the Chelsea Manufacturing Company in January 1904 after partial production of about 15 cars called the Welch Tourist. A liquidation auction was held on March 31, 1904.⁵

Welch Motor Car Co.

On March 1, 1904, the Welch Motor Car Company of Detroit, Michigan was established with the head office in Detroit and manufacture at a new plant situated on South Saginaw Street in Pontiac, Michigan. Until the new plant was ready the manufacture of the first ten cars was subcontracted to Hodges Vehicle Company of Pontiac.⁶ The principal stockholder was Arthur Pack of Orchard Lake, Michigan, taking 447 of the 450 shares issued. The company was capitalized at \$50,000, half paid in cash and \$20,000 contributed in property. By the end of the year the capitalization had doubled and a year later at the end of 1905 had reached \$250,000. Other major investors were George S. Hodges and Allie Welch. Pack was president and treasurer, Allie vice-president and Fred secretary.⁷

A four-cylinder Model B was

displayed at the February 1904 Detroit Show and production began two months later. Even at this early stage in the industry, these 30/36 hp cars were referred to as 1905 models and likely called the Model C. The engine continued with the spherical head arrangement but advanced even further with a single overhead camshaft. A vertical shaft drove the camshaft with bevel gears at front, with all of the valve train arrangement, the camshaft, tappets and valve springs, fully exposed. The inlet and exhaust valves were inclined at 45 degrees on opposite sides of the head with the spark plugs also inclined at 45 degrees from either the front or back of the paired head/cylinder casting. The valves were in easily accessible cages, which could be screwed out of the cylinder/head casting for maintenance.

The Welch engine may not have been the first to use a hemi-head or an overhead camshaft, but it was the first to use a hemispherical combustion chamber and an overhead camshaft and inclined valves.⁸ Dean Nelson, owner of a 1909 Jackson Model E, has noted that the 1908 Jackson OHC Hemi-head engine was a blatant copy of the Welch design.

On May 29, 1905 the Welch brothers filed for a patent which was awarded as US patent no. 870,065 on November 5, 1907 for the use of the overhead cam in combination with the rocker arms splayed on both sides of the head to activate valves inclined at 45



Figure 5: Driver side view of the 1908 Welch Model 4L engine, which featured a tubular intake manifold. Note the exposed nature of the blade-shaped rocker arms and valvesprings.

degrees.⁹ The bronze-cast casing that held the bearings for the camshaft was hollow allowing an oil trough, used to feed the bearings of the exposed camshaft via cloth wicks.

Unfortunately, the concave pistons collected lubricant and had to be replaced with mildly crowned pistons. This was likely the stage when the bore was increased by an eighth of an inch. What started out

as a spherical combustion chamber changed to a hemispherical head partway through 1905 and for the 1906 Model D. Accordingly, GM can claim a linkage with Hemi heads long before Chrysler launched their 300 series in 1951. It should be noted that the May 1905 patent application showed the old concave piston design. Other improvements for 1906 included enclosing the bevel gear

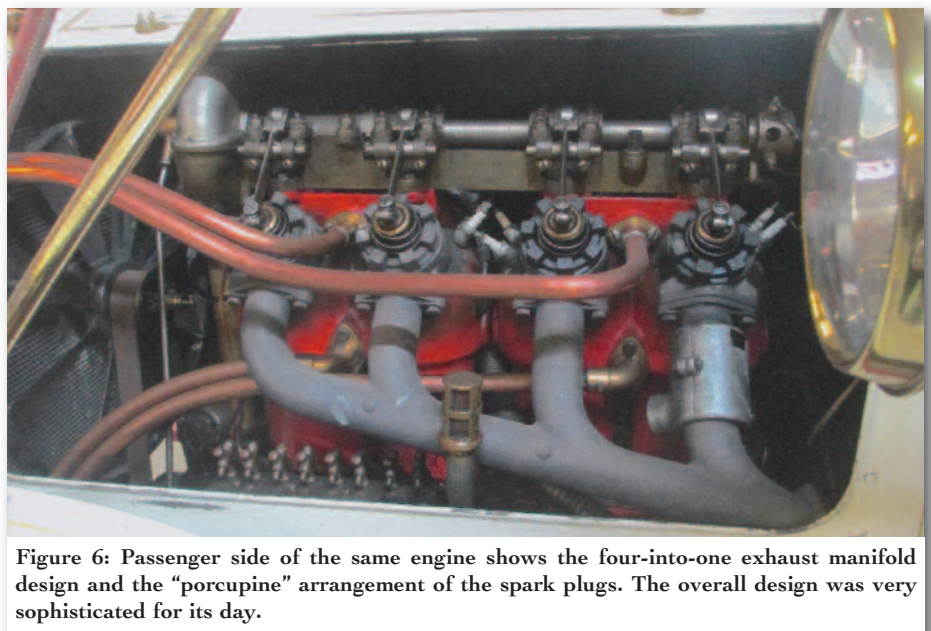


Figure 6: Passenger side of the same engine shows the four-into-one exhaust manifold design and the "porcupine" arrangement of the spark plugs. The overall design was very sophisticated for its day.



Figure 7: A 1907 Welch on that year's Glidden Tour. It is likely the car is the G.P. Moore entry, which earned a perfect score.

of the camshaft drive. A torque-tube rear axle was suspended by full-elliptic rear springs.

An unusual feature of the Welch from 1906 was the placement of the water pump in the middle of the cellular honeycomb radiator, taking water from the top header, down to the base of the radiator and into the engine. The radiator

fan was attached to the radiator but spun along with the pump using a pulley off the front of the crankshaft. Welch claimed that because of the efficiency of its combustion chamber in comparison to a side or T-valve arrangement, their engines ran cooler and therefore required less cooling. The fully-machined concave head did not absorb heat

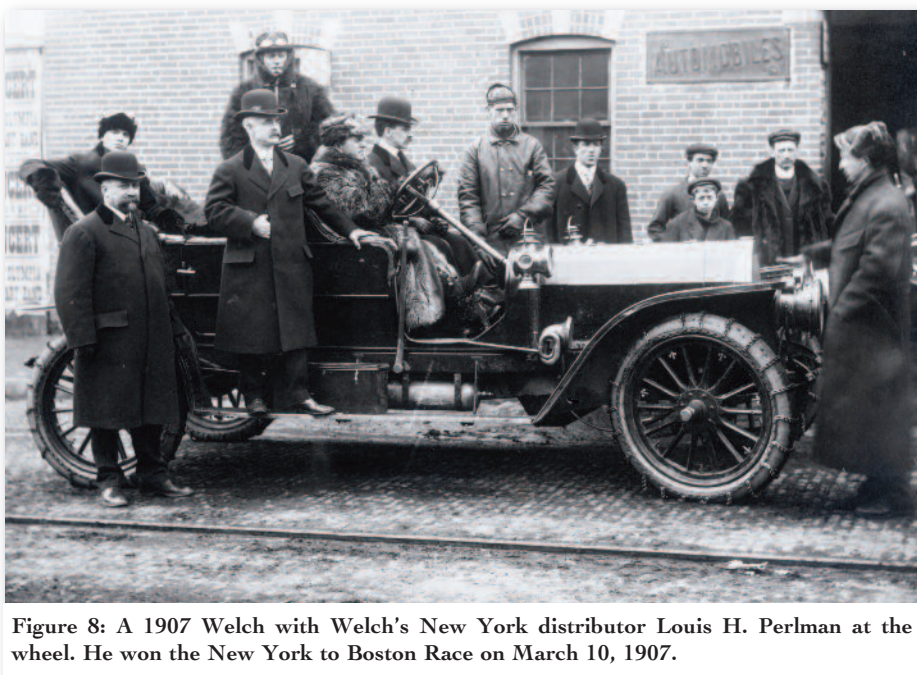


Figure 8: A 1907 Welch with Welch's New York distributor Louis H. Perlman at the wheel. He won the New York to Boston Race on March 10, 1907.

in the manner of the rough casting that made up the passages of conventional side or T-valve heads. One Welch idea that is still with us today is the Welch core plug used to allow the removal of casting sand that provides water passages for cooling in cylinder blocks. Previously these openings were threaded for a pipe type plug, but when one of these came out on a test drive a coin was hammered in as a temporary fix, becoming the source of the idea.

The 1906 Model D was offered as a five-passenger touring or limousine and a less expensive \$2,000 1906 Model F was listed only as a tourer. The limousine included internal electric lighting and an exhaust fed heater, supposedly a first in the industry.¹⁰ For 1907, the Model D continued as before but the Model F tourer expanded by six inches to a 124-inch wheelbase providing seven seats and with an even larger Model I limousine and Model G tourer introduced. A shorter 112-inch wheelbase was the basis for a Model E 2/4-seater runabout.

The Model D was an early form of convertible. The glass divider between the front seat and the rear landau compartment could be removed along with the glass portion of the rear door, which already was upholstered to serve as a seat. Going further, the landau hardtop could be totally detached creating a completely open touring car.

For 1907 the transmission gained a third gear forward, but because of the internal clutches

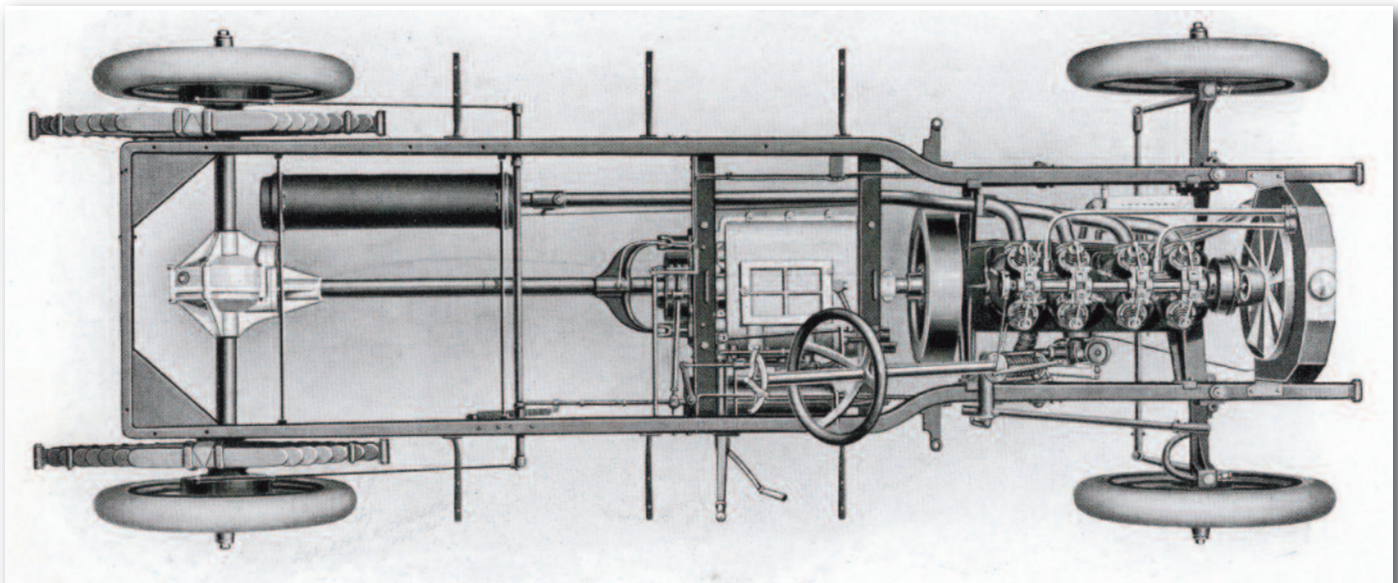


Figure 9: A top view of a 1908 Welch Model 4 chassis. Note the unique valvetrain and spark plug locations.

and the novel workings of the transmission, the additional forward gear automatically provided a second reverse gear. What other automobiles had or have two reverse gears? As before, no clutch pedal existed. To engage first gear, one simply raised the collar handle and pulled the gear/clutch lever backwards. Second or intermediate gear was selected by moving the lever forward to neutral, allowing the collar to drop and pulling the gear lever back again. Third or top was engaged simply by pushing the lever fully forward past the neutral zone. Obviously coming to a stop meant placing the gear lever in neutral where none of the creep was evident that was otherwise a characteristic of the Model T Ford planetary transmission. A separate reverse lever was activated when the gear lever was in neutral, and then operated in the same manner as moving forward. Strangely this author has seen no reference indicating a patent was taken out for this novel transmission, nor has he

found an application in another make.

Continuing to be at the forefront, Welch added a 75 HP six-cylinder engine early in 1907 with the same head design as the four. The six was made up from three pairs of cylinders with integrated heads. At first in 1907, the six was known as the Model H but thereafter simply as the Model 6 with a suffix of L or I to signify the body type.

The longer chassis of the six was offered with two body designs, a

tourer (Model 6-L) or a limousine (Model 6-I) for 1908, both seven-passengers. For 1909 the Model 6-I was expanded to include a Landauet and a Town Car, but these long cars were also ideal for custom bodies. The six continued basically unchanged for four seasons up to 1910. From 1908 the body designations of L, I or D were shared for both the four and six-cylinders ranges.

For 1908 a twin ignition system was introduced. The one set of

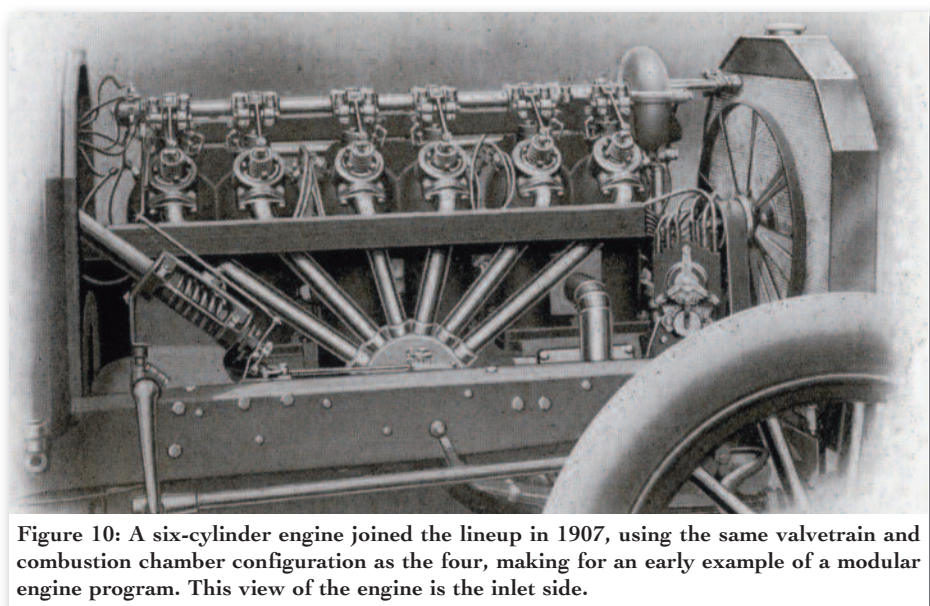


Figure 10: A six-cylinder engine joined the lineup in 1907, using the same valvetrain and combustion chamber configuration as the four, making for an early example of a modular engine program. This view of the engine is the inlet side.

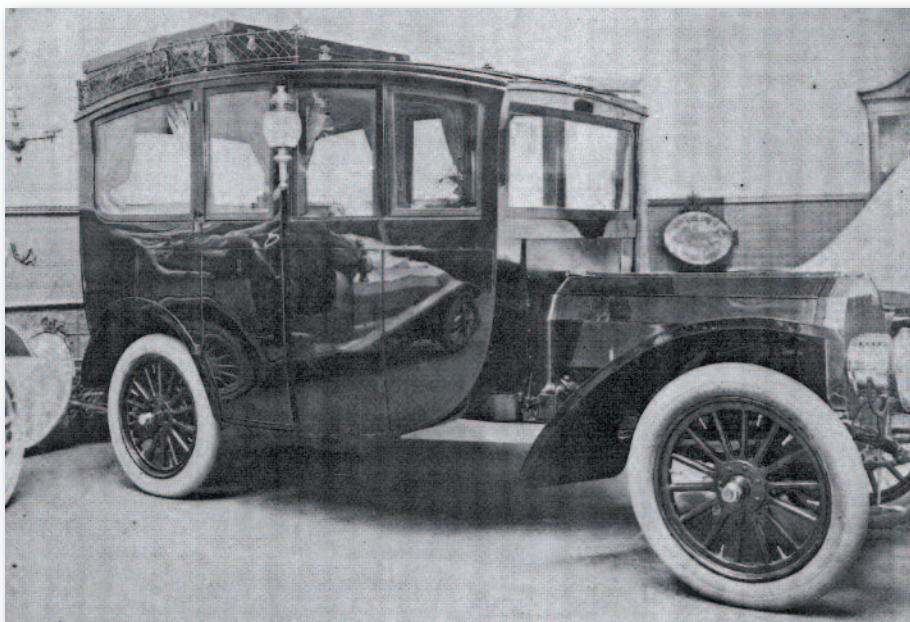


Figure 11: This 1908 Welch Touring Coach and Camper featured a full-width body and possibly the first rear wheel wells without external fenders.

plugs used for starting relied on Bosch high-tension magneto fired trembler coils and battery, while a the running plugs.¹¹ A characteris-

tic of earlier Welches was a dash mounted bronze distributor providing driver and passenger a highly visible synchronized spark show.

Both the 1907 and 1908 sales catalogs commenced with the claim that wording from the 1904 catalog was used except for a red font which indicated updated features of the newer models. Their reasoning was "thinking that the most forcible way we can bring to the reader's mind one of the most important facts, viz: the few changes that had been made within the past four years to keep our car fully ahead of the times..." Changes printed in red for 1908 related to the brakes, Babbitt lined bearings, three-speed transmission, the pioneering type of transmission clutches, the availability of a six-cylinder engine, tool steel used in the camshaft, fan belt for the water pump and fan, a reserve fuel tank and finally compressed gas tank for light illumination.

A 1909 brochure of the Model 6 boasted of the use of chrome nickel steel for the chassis rails sourced from Krupp of Germany. The four points of the upper crank were firmly attached to the chassis so as to stiffen and resist any twisting of these rails. Welch's unique steel against bronze multi-clutch three-speed transmission continued for 1909. The roadster/runabout chassis for the six-cylinder had this transmission encased in the differential, which may not have adversely affected the unsprung mass because of the overall weight of these cars. A parts diagram also

CLUTCHES

The clutches are of the multiple disc, oil bath variety, the friction surface being bronze plates interposed between hardened steel plates, giving an enormous surface with the surest grip, and yet the most sensitive one. A start from standing can actually be made on the direct drive so gently as to be imperceptible to one sitting in the car with the eyes closed. The large friction surface makes the wear slow, and consequent adjusting of the clutches a very rare necessity, but when needed, it can be done in five minutes time without soiling the hands.

We wish to call attention to the fact, that we are pioneers in adapting this type of clutch to the automobile, and have used it for seven years. This has given us an unequalled opportunity for thoroughly testing it for its weak points, and we firmly believe, that the design is fully a year in advance of that on any other make of car.

Figure 12: A factory literature description of the unique multi-clutch design.

shows the transmission of a four-cylinder engine incorporated in the back axle, so either this was an example of a four cylinder roadster or simply showing the part numbers of a rear mounted transmission. But it was an attempt to transfer the weight distribution back for the lighter roadster. For other styles with heavier bodywork the transmission was located mid-chassis but not directly attached to the engine which was common in those days.

This same brochure in discussing the transmission even advised that "a change from full speed ahead to the reverse (gear) can be made instantly without any harm other than the damage to tires incident to such rough usage." There were strong claims as to the smoothness of the integrated multiple disc clutch operated via the shift lever. "With this clutch a car standing still can be started on the direct drive (i.e. top gear) so gently as to be imperceptible to one seated in the car with the eyes closed." To further reinforce the merits of their transmission design it was mentioned that other manufacturers in the past three years had begun to copy the design.

A close coupled four-seater touring body was added in 1909 called the Model O intended for the owner driver. When the owner took over, the chauffeur was banished to a rudimentary fifth seat at the very tail end of the chassis outside the body. A single five-passenger touring coach and camper included a lavatory and all the

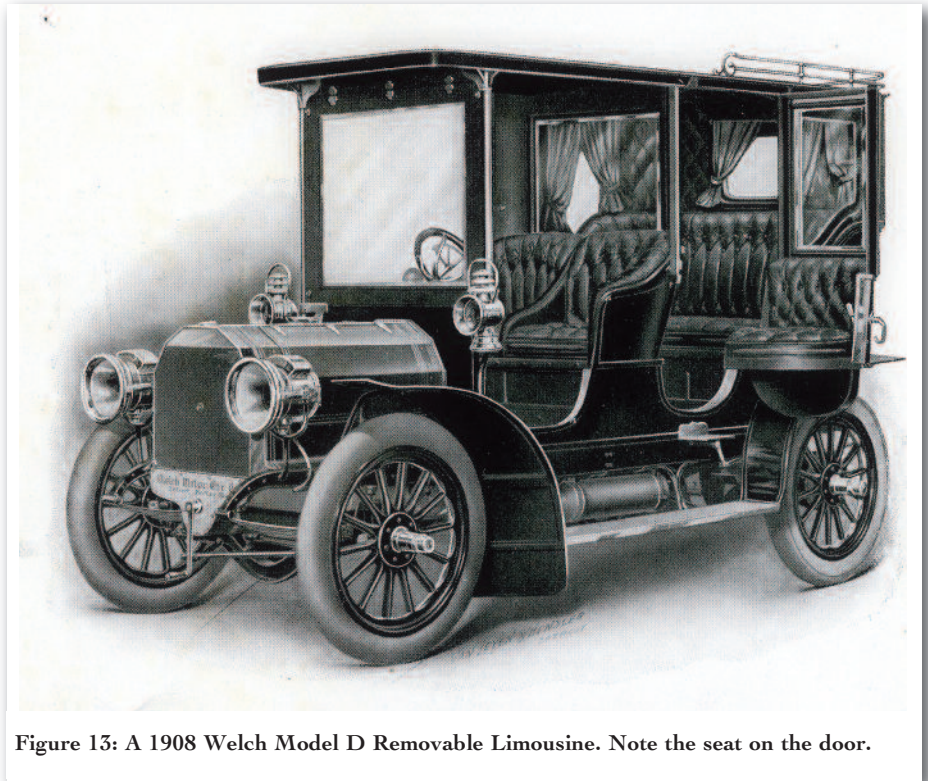


Figure 13: A 1908 Welch Model D Removable Limousine. Note the seat on the door.

accoutrements for civilized camping. This full-width slab-sided camper body must have created one of the first rear-wheel openings that were not separate fenders. The

camper was offered at an eye-popping \$9,000 price, double the price of the Model L, M or O body styles which already were at the peak of automobile pricing. The M Model

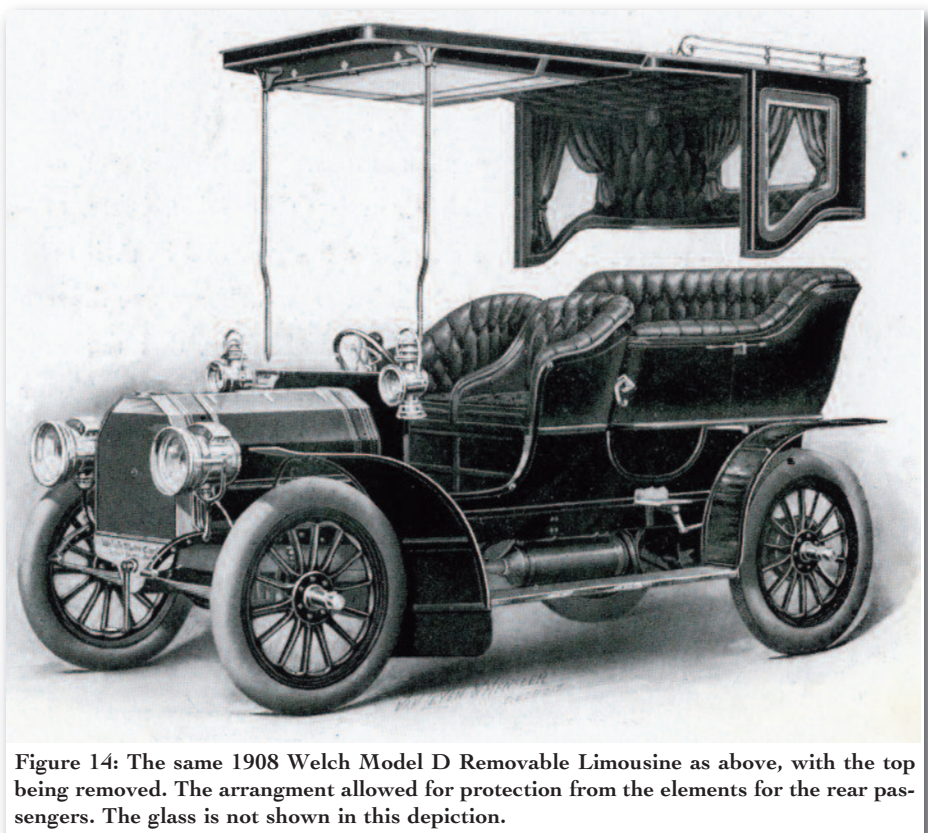


Figure 14: The same 1908 Welch Model D Removable Limousine as above, with the top being removed. The arrangement allowed for protection from the elements for the rear passengers. The glass is not shown in this depiction.

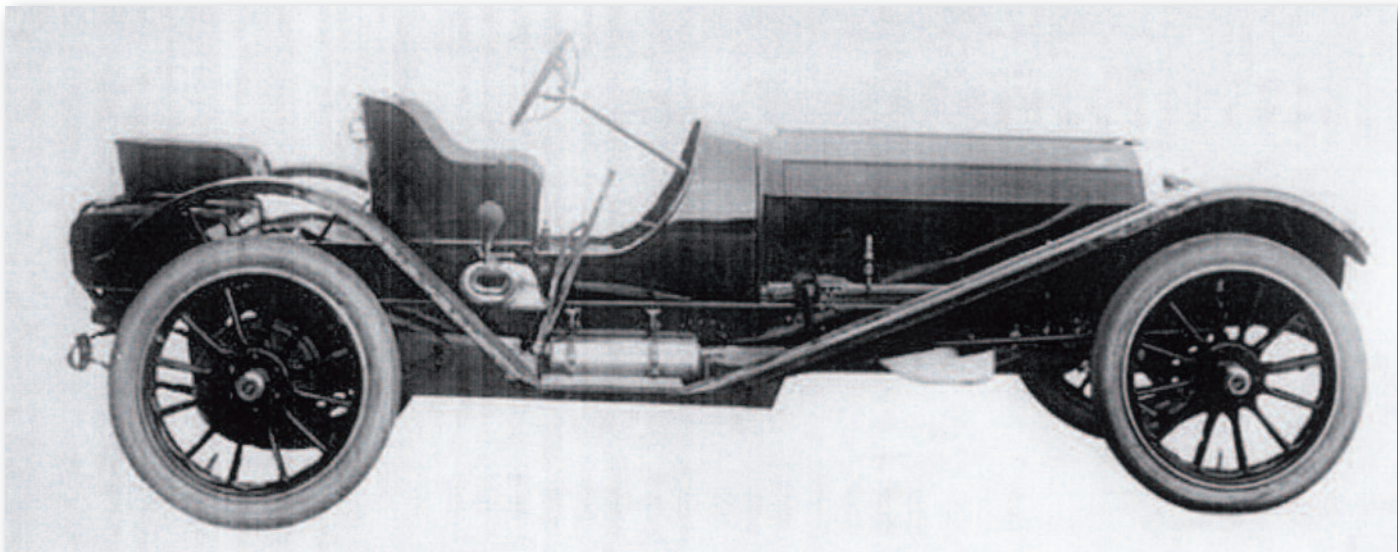


Figure 15: A 1908 Welch Model 6 Runabout.

was a Baby Tonneau or Runabout. Six-cylinder models sold for \$1,500 more than their four-cylinder counterpart.

The final design of the Pontiac built Welches was the 1910 Model R lasting through to the end of production in early 1911. Its larger 70 hp four-cylinder engine was the

only Welch to be cast en-bloc. The overhead valves were angled at 30 degrees. Evidence exists that the 1910 Model R transmission was also located in the differential housing, but it has not been determined if this was solely for the roadster/runabout model as before.¹²

The suspension on the earliest Welches was quarter-elliptic front and rear. For 1905, half-elliptics were used front and back. Thereafter all Pontiac-built Welches had soft-riding, full-elliptic rear springs except for the final Model R, which reverted to half-elliptic leaves. The brakes from

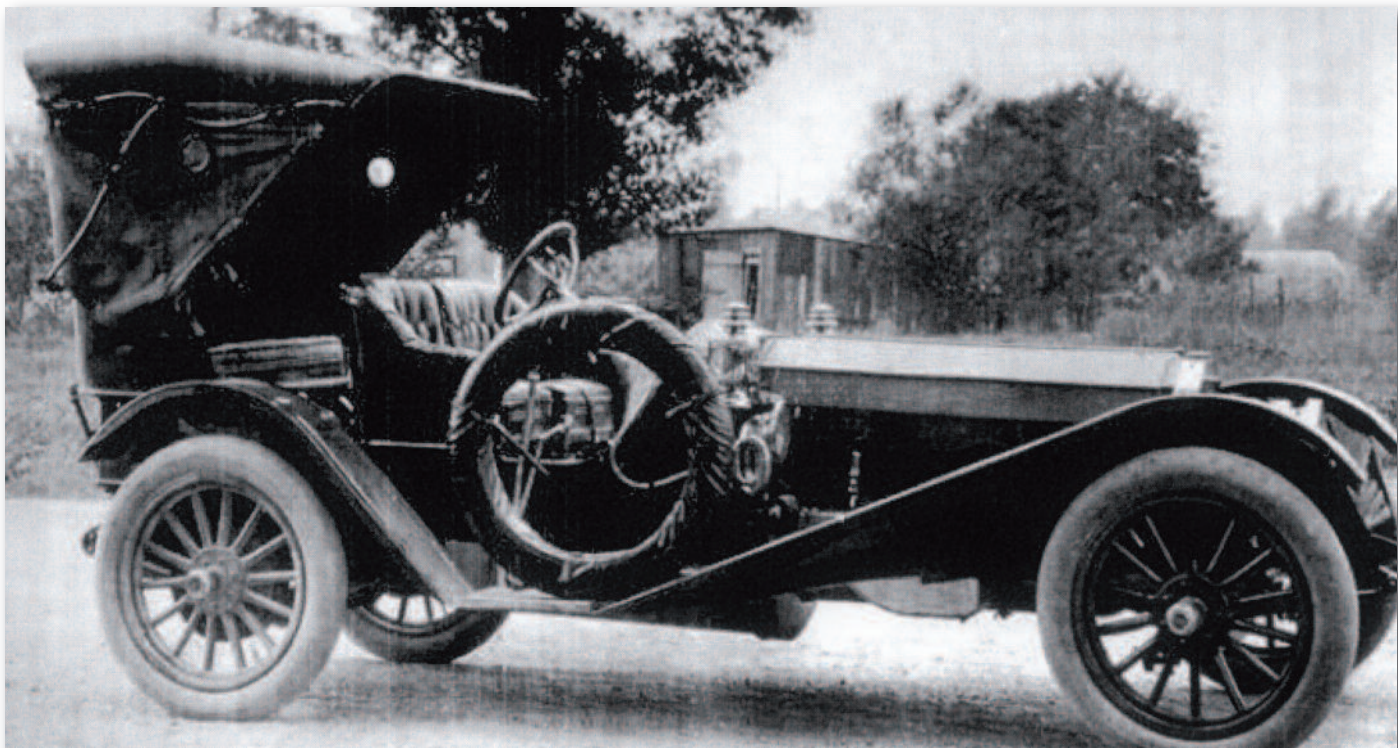
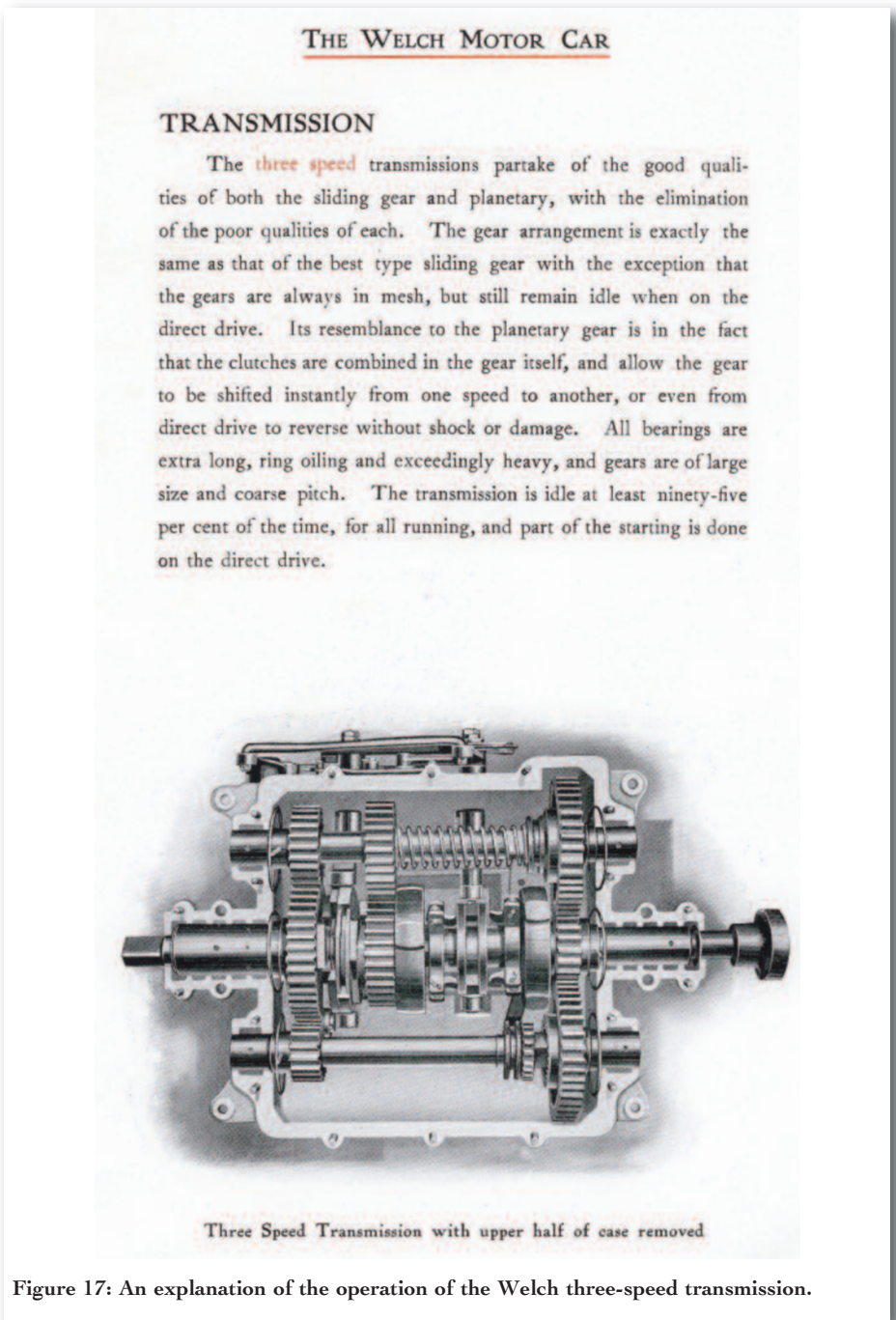


Figure 16: A 1908 Welch Model 6 Runabout with sidemount and landau top.

1908 onwards involved Welch designed expandable shoes combined with a Raymond external contracting mechanism working on the outside of the drum. The expandable shoes were the pedal operated service brake and the contracting band the emergency unit.

Welches were not particularly active in competition in spite of their advanced combustion chambers. A team competed in the 1907 Glidden Tour with G. P. Moore of Pittsburgh earning a perfect score. Welch's New York distributor, operating from 1871-1873 Broadway, Louis Henry Perlman, won the New York to Boston race of March 10, 1907. He boldly announced in the press that "The Welch Won by Three Hours" and then went on to challenge competitors to another race, but with no takers derived more press with the challenge "Are they afraid of the Welch?" specifically targeting the Rolls-Royce and Mercedes distributors. Louis Perlman also competed in the speed trials at Ormond Beach, Florida, in the same year but using a 1908 model, driving a similar car to that owned by author Ralph Stein.

Stein bought his car from Perlman's son-in-law¹³ located on an estate near Montrose in Westchester County, New York, for \$500 in 1951, selling it to Carl. R. Leonard of Colorado for \$30,000 on February 1, 1978. Don Boulton exchanged a 1907 50HP Pope Toledo for the Welch in the early 2000s and the current owner, Peter



Welch of West Vancouver, bought the car at the Amelia Island Bonham's March 7, 2019 auction for \$456,000. Only three other Welches are believed to have survived, the 1909 Close Coupled Touring restored by the Harrah collection and currently owned by Benny Johnson of Indiana, another in the Henry Ford Museum in Dearborn and a 1909 in original

condition at the Natural History Museum of Los Angeles County.

General Motors Pursues Welch

Not surprisingly, Durant was impressed with the hemispherical combustion chamber and overhead camshaft. His intention was to have the Welch become the premium brand of GM. It should be remembered that the Lelands were

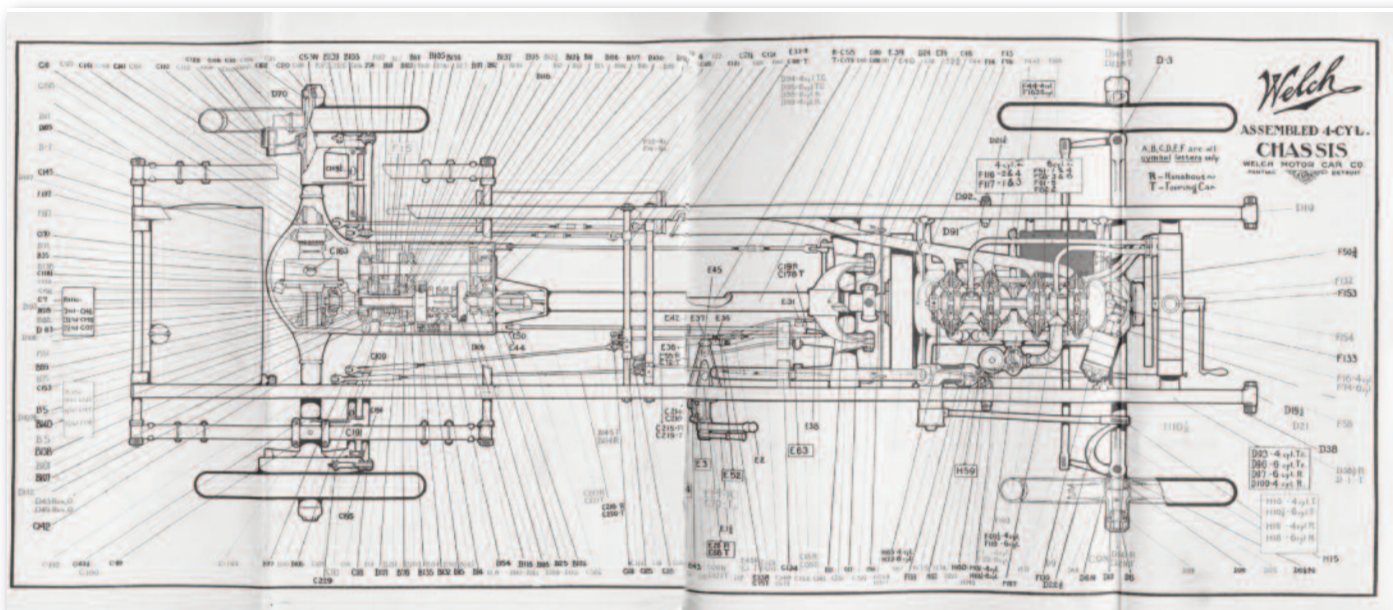


Figure 18: A 1910 Welch chassis blueprint showing the rear transmission in the differential housing.

producing a fine Cadillac but their focus at the time was precision rather than luxury. Welch became part of GM on June 5, 1909, but the decision to sell took place on October 26, 1909.¹⁴ Other sources suggest that GM only gained formal control in 1910 based on the following announcement: “The General Motors Company purchased the plant of the Welch Motor Company in this city (Pontiac, Mich.), June 27, and hereafter will control the entire output of the Welch concern. For some time the General Motors Company has been manufacturing lower priced Welch cars in Detroit, but had nothing to do with the cars manufactured at the local factory (the Pontiac plant).”¹⁵

The discrepancy in these dates can possibly be explained by an agreement whereby GM acted as the selling agent for Welch but supposedly under the GM banner. Ralph Stein indicates that Welch contracted to supply GM with ten

cars a month and fifteen during the peak spring selling season.¹⁶ This would also explain the formation of the Detroit plant (see below) to achieve the volumes required or contracted by Durant. Contemporary articles refer to GM having an “interest” in Welch prior to purchasing the company. It is generally agreed that production lasted through to early 1911.¹⁷

It was announced in February 1911 that the Pontiac operations had ceased building the Pontiac Welch with the plant turned over for the production of GM truck engines.¹⁸ Sales records of Welch have not surfaced. Invoicing from the Welch Motor Car Agency in Denver, Colorado identify a sale of a Model 4-L on June 16, 1908 having serial number 454. A year later on June 30, 1909 the sale of the same model lists serial number 517 and three months later two Model 4-M’s had serial numbers 577 and 586. These numbers suggest that the estimate of total sales of 585 by

James Zordich, past Curator of the Automotive History Collection at the Los Angeles County Museum of Natural Science, is a little conservative.

Welch-Detroit

The Welch Company of Detroit (a separate entity from the Welch Motor Car Company of Pontiac) was set up in June 1909 to build a smaller four-cylinder model than the regular Welch. The location of the business was at 1302 to 1318 Jefferson and Brush, using a plant previously occupied by the Olds Motor Works and purchased from Samuel L. Smith. Capital amounted to \$250,000 and the incorporators were Arthur Pack, A. R. Welch and Fred T. Moran.

The Model S and T were produced for only two years. They lacked the hemi-heads or the overhead camshaft of the Welches from Pontiac, instead relying on a T-head design for the paired four-cylinder engine. They also used a

Years From To	Make Model	Capacity					ALAM HP	Price		Weight lbs.		Dimensions			Wheel	
		Cu"	Litre	Bore x Stroke	Valves	Cyl		From	To	Min	Max	L	W	H	Base	
		Power Bodies	@ RPM	Compr	Carb	Gears	Suspension		Tread					Tires		
				ession			Front	Rear	Front	Rear						
Welch Motor Car Co																
03	04 Model A	Runabout, Tonneau						\$2,000	\$2,185	1600					78	
		159.0 2.606 4.5 x 5 OHV IL 2					16.2	1/4 E	1/4 E	56	56				3.50x30	
03	04	20					2	16.2 Camshaft location unknown, atmospheric inlet valve								
04	Model B	Tonneau, Limousine														
05	Model C	Tonneau														
		318.1 5.212 4.5 x 5 OHC IL 4					32.4	1/2 E	1/2 E						4.50x34	
04	05	30/36					2									
05	Model C	Tour, Tonu, Lim, Vic, Lndu						\$4,000		2800					114	
								1/2 E	1/2 E						4.50x36	
06	07 Model D	Tourer 5p, Limousine 5p						\$4,250	\$5,000			160	70			116
								1/2 E	FE	56.5	56.5				4.00x36	
06	Model F	Tourer 5p						\$4,000						118		
07	Model E	Runabout 2/4p						\$5,000			155	70			112	
07	Model F	Tourer 7p						\$4,000			164	70			124	
07	Model G/I	Tourer 7p (G), Limousine 7p (I)						\$4,200	\$5,500	3150	3500	169	70			129
06	07							1/2 E	FE	56.5	56.5				4.50x36	
08	Model 4-I/L	Limousine 7p (I), Touring 7p (L)						\$4,500	\$5,500	3800		169	70			129
09	Model 4-M	Baby Tonneau						\$4,500	\$4,700						120	
09	Model 4-I/L	Lim 7p, Lndu 7p, Sdn 6p (I); Tour 7p (L)						\$4,500	\$5,500	3450					125	
10	Model 4-L/N	Limousine 7p (L), Tourer 7p (N)						\$4,500	\$5,500						125	
08	10	336.0 5.506 4.625 x 5 OHC IL 4					34.2	1/2 E	FE	56	56				4.50x36	
05	36 As quoted but questionable					2										
06	50					2										
07	09	50					3									
07	Model H	Tourer 5p						\$6,000		3500		180	70			138
								1/2 E	FE	56.5	56.5				5.00x36	
08	Model 6-I/L	Limousine 7p (I), Tourer 7p (L)						\$6,000	\$7,000	4400		180	70			138
09	Model 6-I/L/M	Lim 7p, Lndu 7p, Sdn 6p (I); Tour 7p (L); Tonu (M)						\$4,500	\$7,000	4400		180	70			138
10	Model 6-N	Tourer 7p						\$6,000			180	70			138	
08	10	504.0 8.259 4.625 x 5 OHC IL 6					51.3	1/2 E	FE	56	56				5.00x36	
07	10	75					3									
10	11 Model 4-R	Tourer 7p						\$6,000		3600		180	70			130
								1/2 E	1/2 E	56	56				5.00x37	
		570.2 9.344 5.5 x 6 OHC IL 4					48.4									
		70					3									
Welch-Detroit																
10	Model S	Tourer 7p						\$3,200		3000					122	
11	Model T	Tourer 7p, Limousine 7p, Landalette 7p						\$3,100	\$4,250	3700					122	
10	11	392.7 6.435 5 x 5 T-head IL 4					40.0	1/2 E	1/2 E	56	56				4.00/4.50x36	
10	40-50					3										
11	45/50					3										
Body codes		p	passenger			Suspension										
	Lim	Limousine			Front	1/4 E	Quarter-elliptical leaf									
	Lndu	Landalette				1/2 E	Semi-elliptical leaf									
	Rnbt	Runabout			Rear	1/4 E	Quarter-elliptical leaf									
	Sdn	Sedan				1/2 E	Semi-elliptical leaf									
	Tonu	Tonneau				FE	Full-elliptic									
	Tour	Tourer														
	Vic	Victoria														

Figure 19: A detailed chart of 1903-11 Wech models.

conventional sliding gear three-speed transmission with ball bearings instead of the previous Babbitt type. One luxury was the ability to adjust the reach of the pedals, but tools were required for this task. The tourer body had room for seven passengers.¹⁹

The chief difference between the Model S and its successor was the addition of front doors. The Remy dual magneto was swapped for a Bosch unit as used by the earlier Pontiac-built Welches. Although a 1912 Model W was announced in 1911, it did not materialize. Buick Motor Company handled New York sales from their Broadway location at 55th Street, as well as 42 Flatbush Avenue in Brooklyn and 222 Halsey Street in Newark.

Out on his own, Allie Welch was close to launching a cycle car

with a 110-inch wheelbase and 36-inch tread, but he drowned four years later, on November 9, 1913 while duck hunting. His canoe was found but no body until May 15 the following year. *The American Cyclecar* had predicted, "Mr. Welch will make in all probability the highest-priced cycle car on the market."²⁰ Brother Fred S. Welch passed away in 1948 at age 69.

An incorrect source stated that the drowning of Fred Welch (not brother Allie) in Lake St. Claire in the summer of 1909 prompted GM to appoint A. B. C. Hardy as general manager in 1910.²¹ It did not take Hardy long to assess that the operation was not viable. Approval was given by the GM directors on September 1910 to sell Welch-Detroit but there were no takers. It was finally wound up into the

Marquette Motor Co., but by 1912, even this successor had expired.²²

The Detroit Welches were built down to a \$3,100 price rather than up to the standard of their Pontiac cousins which started from \$4,500 at the time. They were conventional vehicles that failed to incorporate any of the significant innovations that the Welch had been known for.

Although the Welch will be recognized as the first car to have a hemi-head and an overhead camshaft, the most memorable feature following a ride in a 1908 model was the lack of a clutch pedal and no need to match engine speed to change un-synchronized gears of the time. All you had to remember was to engage neutral before coming to a halt. Surprisingly no apparent patent

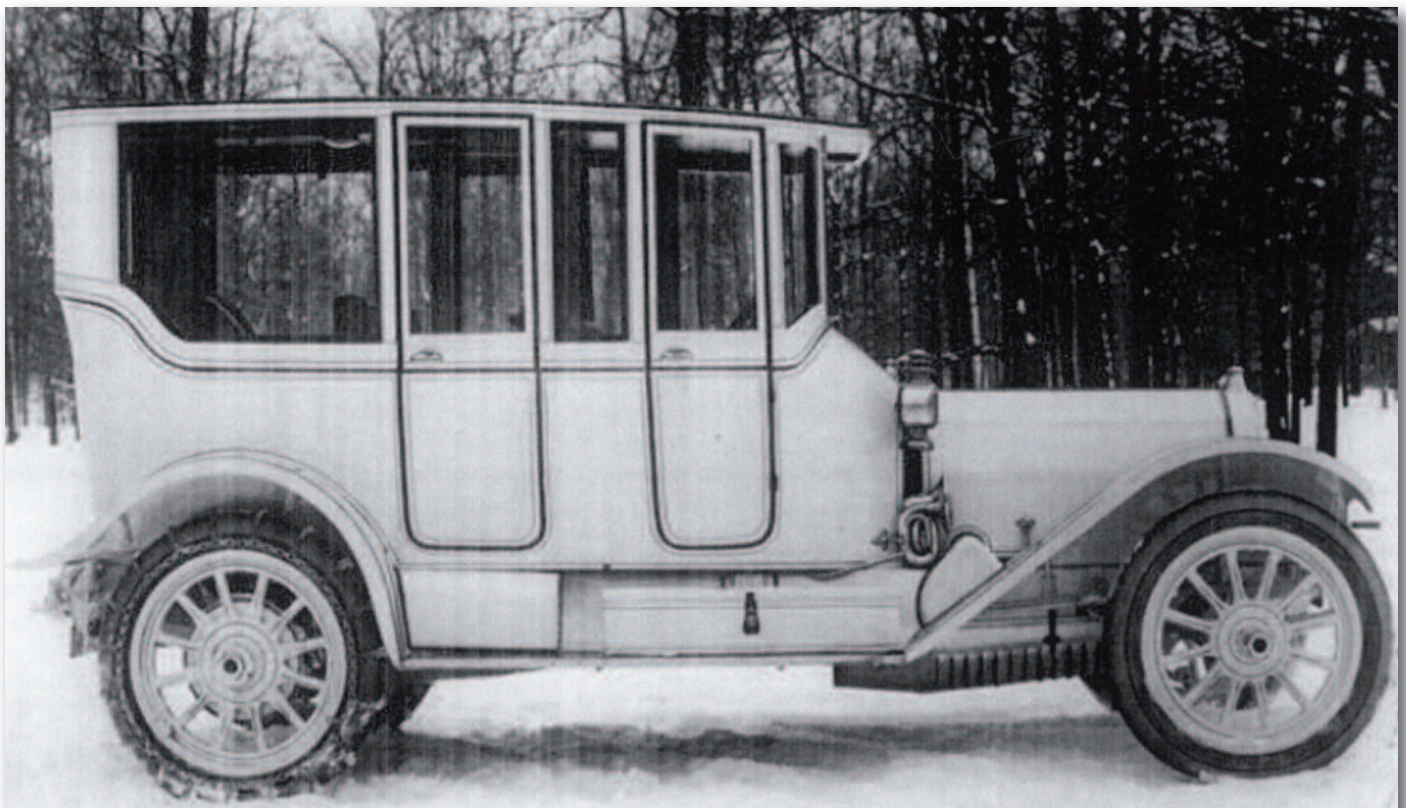


Figure 20: A 1911 Welch Model Model 4-R Limousine.

was sought for having clutch activation and silent gear selection all handled by a single lever. Sadly promising engineering features were halted only to materialize with much fanfare decades in the future and even a century later in the case of the twin-clutch transmission.

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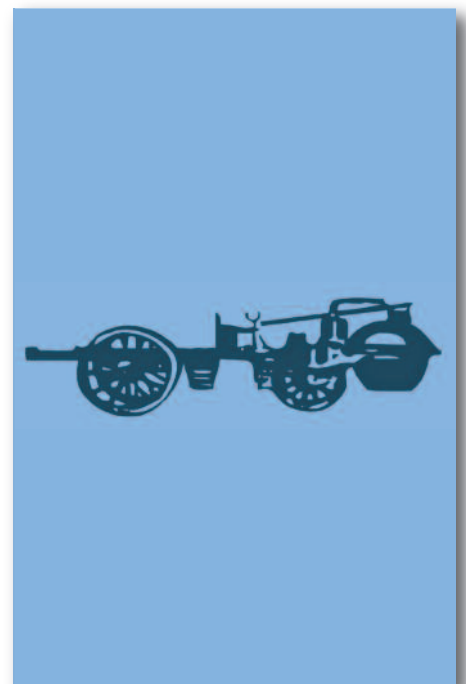
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A HIGH PRICE FOR PERFECTION: *THE SAGA OF*



BY DON KEEFE

PHOTOGRAPHY COURTESY OF
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THE GAYLORD

MOST DREAM CARS NEVER GET BEYOND NOTEBOOK DRAWINGS BUT THE GAYLORD BROTHERS HAD THE AMBITION AND THE FUNDS TO BUILD THE “PERFECT” CAR.

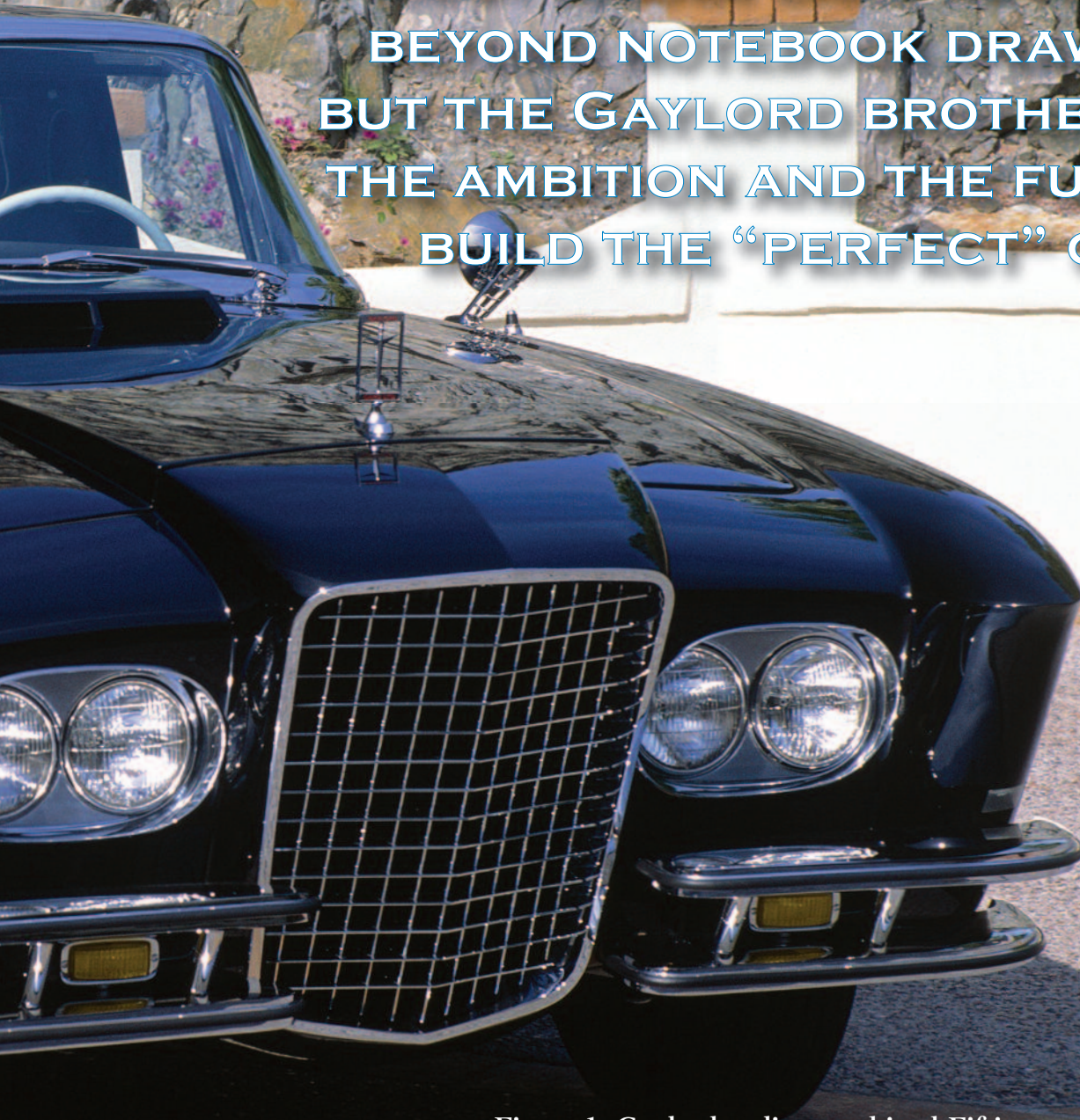


Figure 1: Gaylord styling combined Fifties trends and classic-era cues. Although the Gaylord created quite a stir at auto shows, it never made it to the production stage. (Owner: Dr. Ralph Carungi)



Figure 2: The first two Gaylords had Gordon Kelly-designed bodies built by Karosseriefabrik Hermann Spohn of Germany. Unique to the Spohn cars were large Lucas P-100 headlights and scooped-out front wheel wells. The headlights would probably have violated American regulations, and the open wheel wells would have been difficult to keep clean.

The years immediately following the end of World War II were an incredibly active and innovative time in the history of the automobile, particularly in America, where the pent-up demand for new cars was huge. Three-and-a-half years of automobile production were cancelled by the time the war ended, and there were countless worn-out cars on their last legs. Many that weren't sacrificed to wartime scrap-metal drives had certainly seen better days.

The established domestic manufacturers understood that they

had to strike while the iron was hot, releasing their 1946 models as soon as they could shift back from production of war materiel. It didn't make much difference to buyers that the cars were hardly different from their prewar counterparts. Completely new models began dribbling out over the next couple of years, a process that peaked with the 1949 model year.

A number of hopeful newcomers also sought to exploit this hungry market. Certainly the most successful of them was Kaiser-Frazer, which had two new brands ready for 1947. A few, like

Preston Tucker, dreamed of revolutionizing the American automobile. Others just wanted to get to market quickly with inexpensive little cars while the giants were still ramping up production.

By the early Fifties, another breed of manufacturer emerged—the “gentleman racer.” These young, well-heeled heirs tapped into family fortunes to help fund their racing activities and, ultimately, create production cars bearing the family name. Briggs Cunningham was such a person. Jim and Ed Gaylord would have been, too, had their dreams come



Figure 3. This side view of the original Spohn-bodied showcar shows the unusual contour of the front wheelwells. It was definitely a case of form at the expense of function. Windshield frame accepted 1955 Thunderbird glass.

to pass.

The Gaylord brothers weren't race-team owners but they certainly were wealthy young men with a passion for fast cars. The siblings from the Chicago area were the sons of a beauty-product manufacturer who held the patent for the bobby pin. The senior Gaylord's business success allowed him to expand into real estate and other types of manufacturing. As a result, the family fortune rivaled any Texas oilman's.

The Gaylords' financial resources allowed the brothers to indulge their automotive interests. (Jim Gaylord often referred to himself as an "autoholic.") The vehicles they had in their younger



Figure 4: A retractable hardtop filled the trunk so a rack was mounted on the rear deck to carry luggage. Figure 5 (overleaf): The final Gaylord body design was more practical than the first prototypes, featuring quad headlights and fuller front fenders, as well as stouter front and rear bumpers.

years included Pierce-Arrows, Cadillacs, Stutzes, and a particularly infamous Packard One Twenty that was prepped by none other than Andy Granatelli, he of

1949 when Jim Gaylord visited designer Alex Tremulis, who was then working for Tucker. He told Tremulis of his desire to build the ultimate sports car. Nothing came

made an impression when it was displayed for the first time in early October 1955 at the Paris Motor Show. Stevens handed the actual styling work off to associate

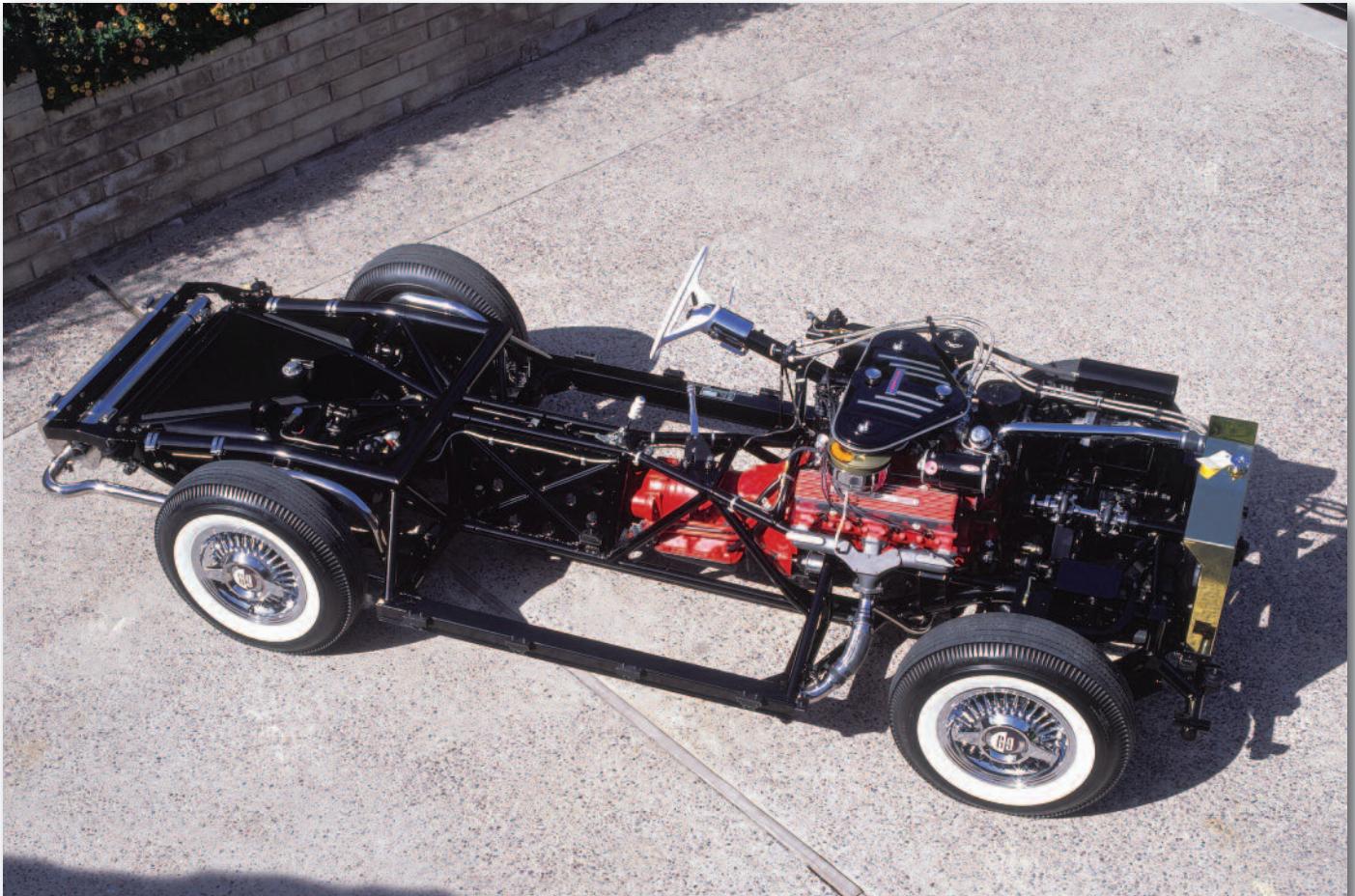


Figure 6: A 305-bhp Cadillac V-8 with dual four-barrel carburetors rested in a chrome-molybdenum steel chassis frame. This display chassis features upgraded finishes and detailing. (Owner: Dr. Ralph Carungi)

Chicago speed-shop fame. It was hardly surprising, then, that the brothers eventually hit upon the idea of producing their own car. Considering their appreciation of high-end machines, they wanted one that would incorporate the superior performance, handling, and build quality that they demanded with a look that would be all its own.

Though the first Gaylord prototype was not completed until late 1955, the story actually starts in

of it for another five years, and when the Gaylords next approached Tremulis to design a car for them, he was forced to decline: His position at Ford prevented him from participating in any outside project. Tremulis did recommend that the brothers contact Milwaukee-based industrial designer Brooks Stevens. It was advice that they followed.

Neoclassic Design

The Gaylord prototype certainly

Gordon Kelly who produced a design with a highly distinctive brand character. The two-seater was a unique combination of the more squared-off surfaces that were starting to pop up on mid-Fifties cars and classic-era cues that Jim Gaylord wanted incorporated into the final shape. There was certainly no mistaking it for anything else.

Up front, a pair of huge Lucas P-100 headlamps completely dominated the nose. They flanked

a large vertical grille that was filled with a honeycomb mesh and canted forward for the impression of speed. The front fenders also leaned forward and

wells, the upswept lower edge of which defined the shape of the door. (In a 1981 article for *Special Interest Autos*, Richard Langworth wrote that Stevens called this fea-

and down, leaving room for rather large tailfins—with trailing edges finished in chrome—to rise above them. However, the fins were actually attached to the decklid,

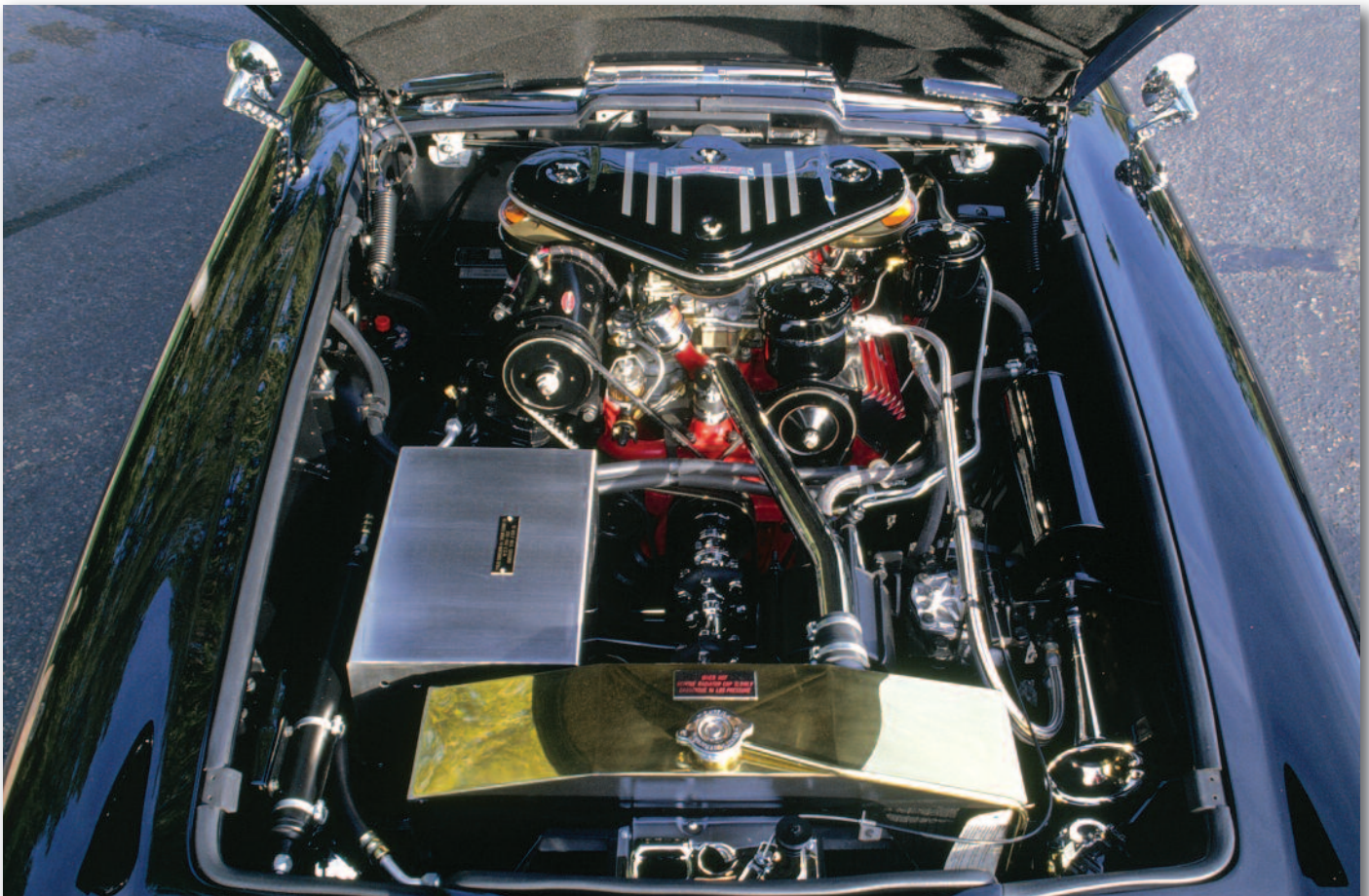


Figure 7: Underhood detail and brightwork is fitting for a car in this upscale class and price range. Engine is set back in the chassis for optimal front-to-rear balance.

featured a bladed leading edge over scooped-out wheel wells, recalling the clamshell fenders of the classic period. A low dome (later a functional scoop) near the back of the hood provided clearance for the engine. The front bumper featured thin L-shaped elements at either side that were connected by two horizontal tubes.

The front wheel wells flowed into a concave side cove that extended almost to the rear wheel

ture a “Washington coach door.”) The inner recesses of the front fender and the cove were painted ivory, forming a sharp contrast with the tuxedolike black body. Initially, the only bright trim on the bodyside consisted of a rocker-panel molding. Wheels were Kelsey-Hayes “Sabre-Spoke” units like those on the ‘55 Cadillac Eldorado, albeit with custom Gaylor center caps that simulated the look of knock-off hubs.

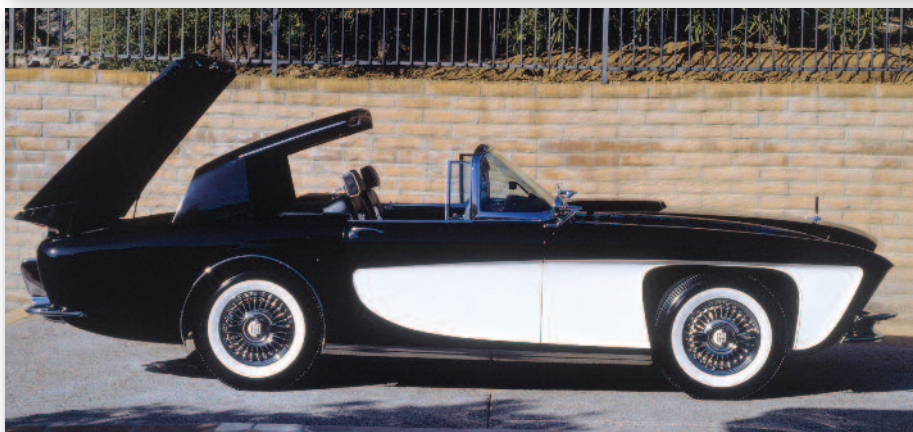
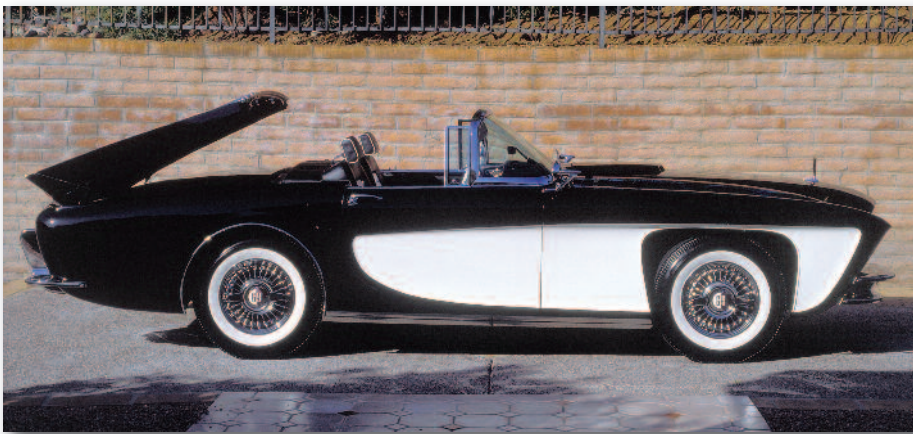
Rear quarter panels swept back

which was hinged at the rear unlike a conventional trunk. The rear fascia was covered by a large, ribbed, chrome appliqué framed by the trailing edges of the quarters and deck. It housed small round taillamps. A thin blade bumper that reprised the look of the front bumper appeared on the Paris show car.

The roof of the Gaylor was quite squared-off for the era and gave a very formal appearance, which countered the neoclassic







Figures 8-11: The operation of the retractable top is seen in this photo sequence. The retractable hardtop used an electric motor to lower the top under the rear-hinged decklid. The Gaylords compared notes with Ford engineers working on the Skyliner.

design cues somewhat. It also featured a recessed backlight with a vent just above the glass for flow-through ventilation.

The roof's great distinction was that it was fully retractable—which explained the rear-hinged decklid. The chain-driven retracting mechanism was a model of simplicity, requiring only one electric motor to drive it. Consider that when Ford put a similar feature in production for the 1957-59 Skyliner, it used seven motors. The roof moved up and back via a pair of struts, and nestled below the decklid. A dash-mounted button started the process, which could be stopped at any point, and a manual crank was provided in case of a motor malfunction. To compensate for a trunk filled with roof, the decklid was adorned with six chrome strips and as many tie-down cleats to serve as a luggage rack. The windshield was Fifties-chic, featuring wraparound glass, rectangular vent wings, and vertical A-pillars.

Not surprisingly, the retractable roof was the feature that drew the most attention at the Paris show, especially from other manufacturers. Ford designers took more than 100 photos of the mechanism, and the Gaylords actually provided some technical data, though Ford ultimately went in another direction for the Skyliner mostly due to its larger proportions.

The General Motors camp was less enchanted. It has been reported in several places that GM Chairman Alfred P. Sloan admonished a team of designers, saying,

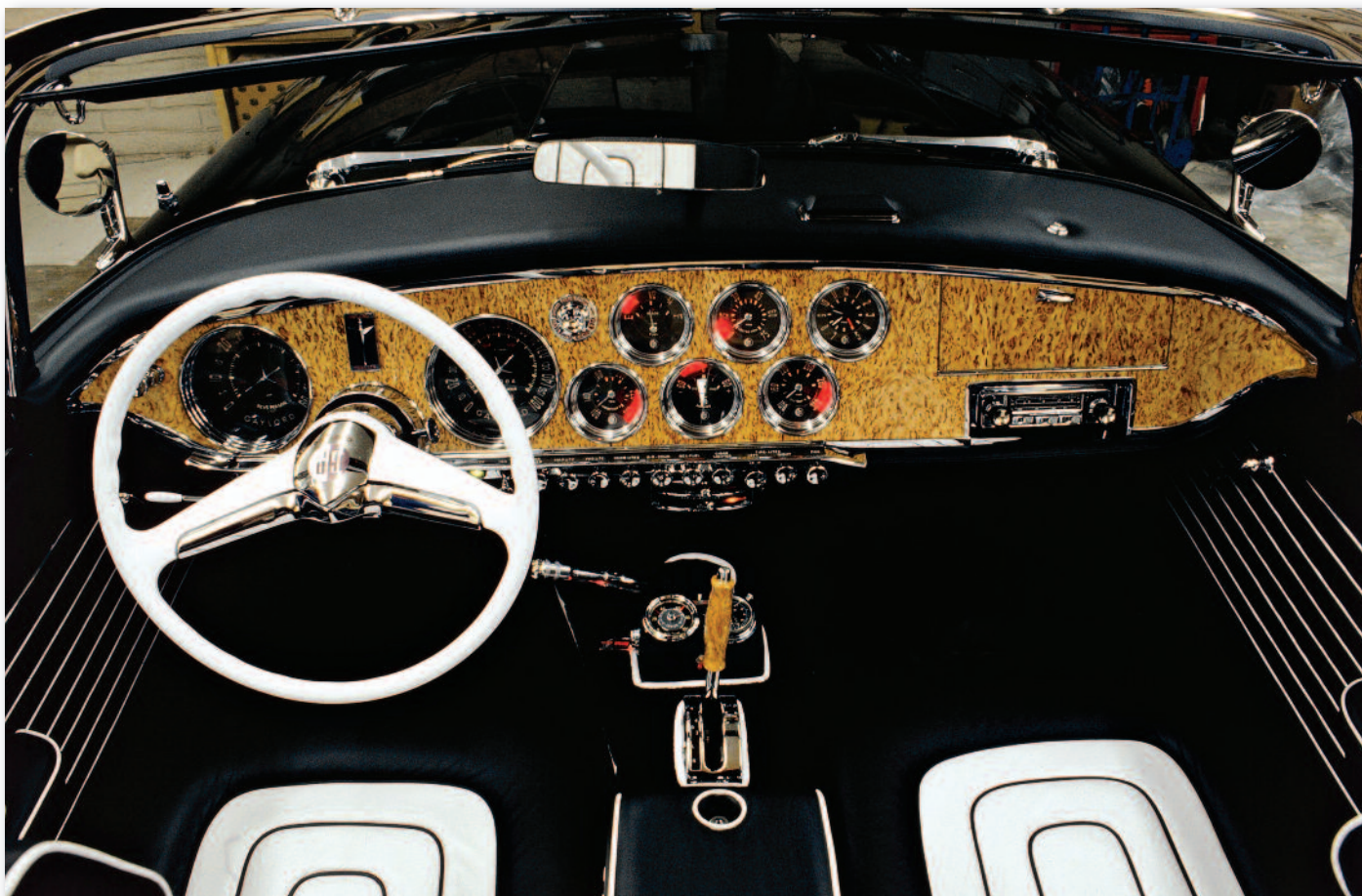


Figure 12: Interior details are elegant, yet possess a sporting character. Kaiser steering wheel was chosen as a safer alternative to a flat, wooden wheel. Black and white leather is accented with contrasting piping. Burl walnut dash applique houses the VDO gauges and adds a luxurious flair.

"You bastards told me this couldn't be done. So how did these idiots do it?"

Another one-of-a-kind feature was the compartment behind the pull-down tail panel that housed the spare tire on a slide-out tray. The car was designed for optional lamps in each wheel well to assist nighttime tire changes.

Inside, the Gaylord was a showcase of Fifties tech, with many of the amenities we take for granted today. The dash featured an array of custom VDO gauges, each color-sectored for easy reading. The largest dials directly ahead of the driver were a 160-mph speedometer and 6000-rpm tach. To their right, stacked one

over the other in two rows, were six smaller dials for a clock, oil pressure, oil temperature, coolant temperature, fuel level, and amperage. All featured sword-themed needles that mirrored the emblem Stevens created for the car (and presaged the badge that would be used on the designer's own Excalibur sports car). The numbers on the gauges and a Gaylord callout were the only elements that lit up at night. Also, a Heuer chronometer was mounted on the console.

The steering wheel used was a Kaiser unit, chosen for its small size and dished design, which Jim Gaylord thought would be safer than a flat, wooden wheel. It was

fastened to a telescoping column heavily insulated with rubber.

Gaylord's charge to Stevens was to design a car with the most passenger room of any two-seater then being built. Luxurious leather bucket seats featured seven-way power adjustment, and headrests—which were rarely seen at the time. The seat and power-window controls were incorporated into the console design, and were located under the central armrest. A floor-mounted shifter controlled the Hydra-Matic automatic transmission. Air conditioning was also included for maximum passenger comfort, a rarity on sports cars—indeed, just about any cars—of the era.



Figure 13: An essentially production-ready body with revised styling was built in Germany by a firm called F.I.F. Here former *Motor Trend* Editor Walt Woron takes the wheel with Jim Gaylord in the passenger seat.

Innovative Chassis

Though one might casually look through the chassis specifications and not find anything particularly exotic or unconventional by today's standards, there was actually a tremendous amount of innovation built into the Gaylord design for the day. "Like any true custom car engineered from the wheels up, the chassis abounds in unusual details," *Motor Trend* said in an article about the Paris car in its December 1955 issue.

The frame itself was formed out

of chrome-molybdenum steel tubing and channel. It was a semi-backbone design, very much race inspired, yet refined enough to offer the luxury ride and performance that the Gaylords demanded. The frame tubes were welded shut to ward off condensation, and the channel portions were rustproofed—the brothers were obviously familiar with salt-induced corrosion problems.

The front suspension featured unequal-length upper and lower control arms, designed for maxi-

mum travel and triangulation. They were housed in oversized rubber bushings to minimize movement at the mounting points. The rear suspension featured relatively common parallel semielliptic leaf springs, but again the Gaylords were a decade ahead of the game with permanently lubricated molybdenum-disulfide inserts, leather covers, and no need or provisions for grease fittings.

Isolating the body from the chassis was given particular atten-

tion, with custom neoprene-impregnated body mounts absorbing any road harshness not managed by the suspension. Similarly, a custom-built and balanced driveshaft featured inner and outer sections separated by a .375-inch rubber sleeve, plus permanently lubricated ball joints at either end. The idea was to prevent any undue vibration or harshness.

A variable-effort power steering system using a hydraulic servo was regulated by a dash-mounted control that adjusted the steering effort from soft to very firm. The braking system used conventional drums but they were from a Cadillac limousine and were the largest available.

The Gaylord's high-performance intentions were originally expressed via a 331-cid Chrysler 300 hemispherical-head V-8 but that was used only on the first two prototypes. Subsequent discussions the Gaylords had with GM's Ed Cole prompted them to install blueprinted versions of the 365-cid Cadillac V-8 with dual four-barrel carbs that was standard in the '56 Eldorado. Rated at 305 bhp, the engine was lighter and smoother than the "hemi." The powertrain was to be offered with an optional McCulloch supercharger and a

variety of axle ratios to suit the needs of the buyer; a 3.07:1 rear end was standard but a number of ratios between 2.78:1 and 4.10:1

brake pedal was released. The brakes would not release until the accelerator pedal was depressed, eliminating the possibility of the car creeping forward and hitting another car or pedestrian that was part and parcel of automatic-transmission operation. A motion sensor that the Gaylords patented and sold commercially kept the anti-creeping system from engaging when the car was moving, preventing lockup.

The Gaylord's wheelbase was a tidy 100 inches, a couple of inches shorter than the concurrent Chevrolet Corvette and Ford Thunderbird—or the well-regarded Jaguar XK that inspired the Detroit two-seaters. However, at 180 inches overall, the Gaylord was longer than any of them bumper to bumper, and at around two tons it was substantially heavier. Still, performance with the big

V-8s was quite spectacular for the day, with 0-60-mph times of around 7.5 seconds (In a 1974 road test for *Automobile Quarterly*, the surviving Cadillac-powered car went 0-60 in nine seconds after sitting untuned for several years). Plus, handling was very much in the sports car tradition, with a 45/55-percent front/



Figure 14: Hydra-Matic transmission is controlled by a floor shifter. A Heuer chronometer is mounted in the console ahead of the shifter.

would have been available.

The four-speed Hydra-Matic transmission was modified so that it would not shift before reaching the redline unless it was manually shifted. Another interesting Gaylord exclusive was its "no-creep" feature. When the car was stopped, the brake system would retain pressure even after the



Figure 15: The overall interior appointments compared very favorably with luxury cars of the period, such as Rolls-Royce, and with other custom-bodied machines like the Dual-Ghia. Only one finished vehicle and one display chassis are known to survive out of the five chassis built. Only three of the five chassis were bodied and neither of the Spohn-bodied machines are thought to survive. One is confirmed as destroyed. The second unbodied chassis, like the second Spohn-bodied car, was lost in Europe.

rear weight balance helping the situation.

Trouble Ahead

The lofty aspirations of the Gaylord brothers were hampered by several factors. Their initial plan was to build 25 cars per year, with production of both chassis and bodies to be handled in Germany. Originally, the target price was \$10,000 but that quickly inflated to a stratospheric \$17,500, which would be slightly more than \$155,000 today. There were people willing to pay for a Gaylord—just not 25 of them. Some of the notable personalities who placed orders were actors Dick Powell and William Holden, as well as industrialist Edgar

Kaiser. The Gaylord also met favor with royalty: Princess Grace of Monaco; Farouk, the exiled king of Egypt; and Bao Dai, the deposed emperor of Vietnam, had all expressed interest in the Paris show car.

Another problem was their initial choice of coachbuilders. Karosseriefabrik Hermann Spohn in Ravensburg, Germany, had a reputation for excellence and was recommended by Stevens himself. However, the company was in decline at the time that it was commissioned for the job. Many of its most talented workers were no longer on the payroll. The prototype was found to have an excessive amount of body lead, inches thick in some places. As

one would expect, the lead began lifting from the body, and the car began showing its age far too soon.

In a 1998 letter to Publications International, Ltd., the parent company of *Collectible Automobile*, Ed Gaylord wrote that two of the five chassis built received Spohn bodies. Various accounts of the Gaylord project have reported that after the brothers became utterly dissatisfied with Spohn's work they moved on to another German firm, Luftschiffbau Zeppelin, of Friedrichshafen, famous in the pre-World War II years as the builder of great airships like the *Hindenburg*. However, in his letter, Gaylord referred to a compa-

ny he called F.I.F.

F.I.F. may stand for Fahrzeug Instand-setzung GmbH, Friedrichshafen, which was a successor to the Zeppelin works. According to a company history published on the website of ZEPPELIN GmbH, a reconstituted version of the original firm, the Allied military government in charge of postwar Germany ordered the liquidation of Luftschiffbau Zeppelin on January 1, 1947. Personnel from the disbanded firm soon established two new businesses for construction of metal structures and for vehicle maintenance in Friedrichshafen, one of them being Fahrzeug Instand-setzung. A 1961 merger of these and other operations created a new company, which was renamed ZEPPELIN GmbH in 1995.

The Gaylord body that F.I.F. was asked to build would be different. The owlish look of the front end was changed in two substantial ways. While the huge Lucas headlamps were an odd-enough feature on their own, they came with an added concern about road debris breaking the large lenses, and were replaced with smaller-diameter quad headlamps that were actually cutting edge for the time. Then, too, the clamshell front fenders were deemed a little too radical—even though similar designs were seen

on GM Motorama cars and the Ferrari 250 Testa Rossa. Plus, the open design was susceptible to kicked-up stones that damaged the paint. The solution was fuller front fenders with conventional

front. Rectangular turn-signal lenses peeked out between the bumper blades. The rear bumper was now a pair of nerfs that incorporated the exhaust outlets. Taillights were moved a little closer to the edges of the rear cove, and they were parked above matching back-up-light lenses.

The instrument panel was redone, too. The original design had grouped all the gauges in a trapezoidal area that was separate from and slightly taller than the rest of the dash. The new design had a flat dash top that was lower over the gauge cluster, which required placing the twin rows of ancillary dials at a slight offset instead of directly above one another. The whole thing was now faced by a Siamese-wood panel that ran the

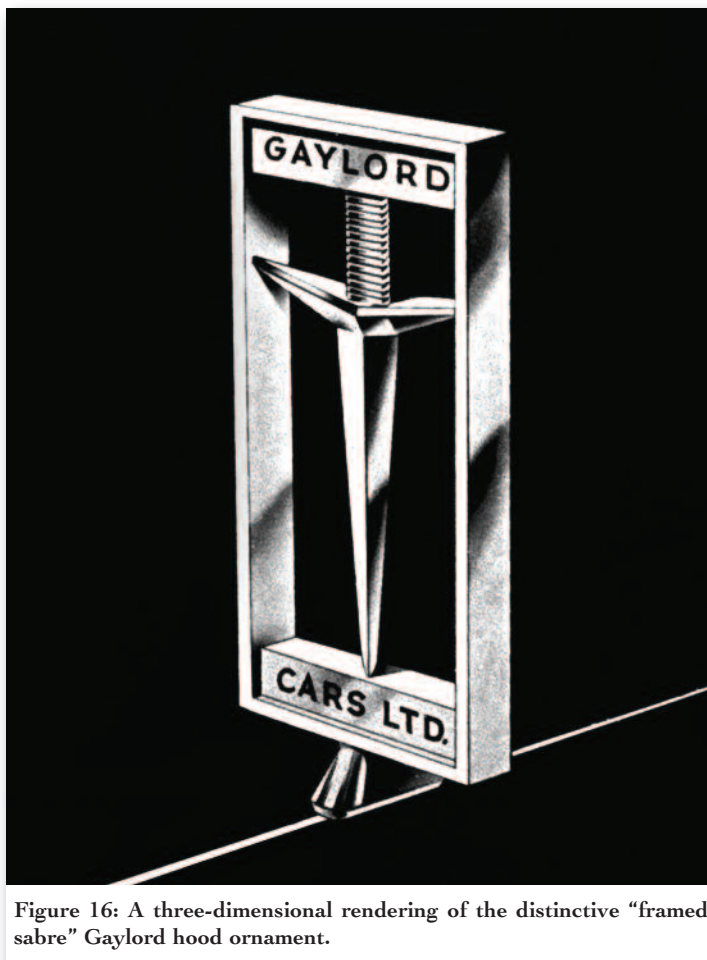


Figure 16: A three-dimensional rendering of the distinctive “framed sabre” Gaylord hood ornament.

wheel wells. The wider sheetmetal was still integrated with the ivory side coves but the wheel openings were rectangular in contrast to the round openings for the rear wheels, which were now rimmed with bright moldings.

Additionally, the grille was revised. The recessed mesh surface gave way to an eggcrate design that came all the way out to the front of the grille cavity. Beefier biplane bumpers—with a gap in the middle to let the grille show through—were used up

full width of the dash.

This updated design became known as the Gaylord Gladiator, the car the brothers would sell to a discriminating clientele—if they could. As the work progressed, it became apparent that Jim Gaylord’s passion for the project became an obsessive push for perfection. While quality improved with the new coachbuilder, the Gaylords were still not happy with the results. When the new coachbuilder failed to come up with the desired lightweight bodies, Jim

Gaylord sued the company. Unfortunately, the stress eventually caught up with him; he suffered from exhaustion and was subsequently hospitalized. The project was shelved soon after.

In his letter to Publications International, Ed Gaylord tallied

first prototype was rebodied—at least partially, it appears—but later destroyed because of its poor body quality. The second car remained in Europe after having been stolen from the Gaylords. Jim Gaylord hired a private investigator to find the car, tracing it to

In 1959, a couple of years after the project ended, the Gladiator (on production chassis #002) and the display chassis (#000) were donated by Jim Gaylord to the Early American Museum in Silver Springs, Florida. When the museum closed in the late Eighties, the



Figure 17: The ribbed, bottom-hinged rear panel hid a slide-out tray containing the spare tire.

up the results of the effort: Total production stood at five chassis, the first two with Chrysler engines and the rest with Cadillac powerplants. The first two fully bodied cars from Spohn were considered prototypes. The next complete car, from F.I.F., was the only one that used the updated styling. Of the remaining two chassis, one was detailed for display. Left unsaid was the total monetary cost of it all.

Of the entire production run only the Gladiator and the display chassis are known to survive. The

a castle in France, but was unable to retrieve it. It was rumored to have been dismantled and its chassis used for a hot rod of some sort. (There are photographs of a prototype Gaylord with rear-wheel moldings and nerf rear bumpers. Whether this is the rebodied version of the Paris show car or the second car is not known. A prototype Gaylord also appeared at the New York International Auto Show in April 1956.) The second unbodied chassis stayed in Europe. Its ultimate fate is unknown.

Gaylords bought the car and the chassis. Between 1989 and '91 the Gladiator was completely disassembled and restored to perfection by Phil Lufty and Bob Shortman, which made it ready to be seen at the 1992 Pebble Beach Concours d'Elegance. Then the car went into long-term hibernation with the Gaylord family.

After both brothers had died, Jim Gaylord's widow Bonnie sold the car, the show chassis, and a treasure trove of spare parts to Dr. Ralph Carungi, an Arizona-based surgeon, in 2015. When Carungi



Figure 18: Even with a wheelbase of just 100 inches, the Gaylord was designed to be a roomy two-seater. It shared its “Sabre-Spoke” wheels with the 1955 Cadillac Eldorado, but added unique center caps.

displayed it at the 2016 Arizona Biltmore Concours d’Elegance in Phoenix, he invited Bonnie Gaylord to ride with him as he passed the reviewing stand. He says she marveled at how beautiful the interior was, and when he commented that she must have a lot of memories of the car, she replied, “This is the first time I have ever ridden in it!”

Like many ambitious young men of the early postwar era, the Gaylord brothers had a vision of what the ultimate American sports car should be. Unlike some underfunded false starts and unfinished projects of the time, they actually did produce a handful of cars bearing their name—and they were truly extraordinary vehicles. The fact that the

Gaylords weren’t able to put their car into regular production doesn’t diminish the fact that it was one of the best engineered and highest quality vehicles of the Fifties. Unfortunately, it had too high a monetary price for the marketplace and too great an emotional price for the Gaylord brothers. Still, their legacy of excellence lives on.

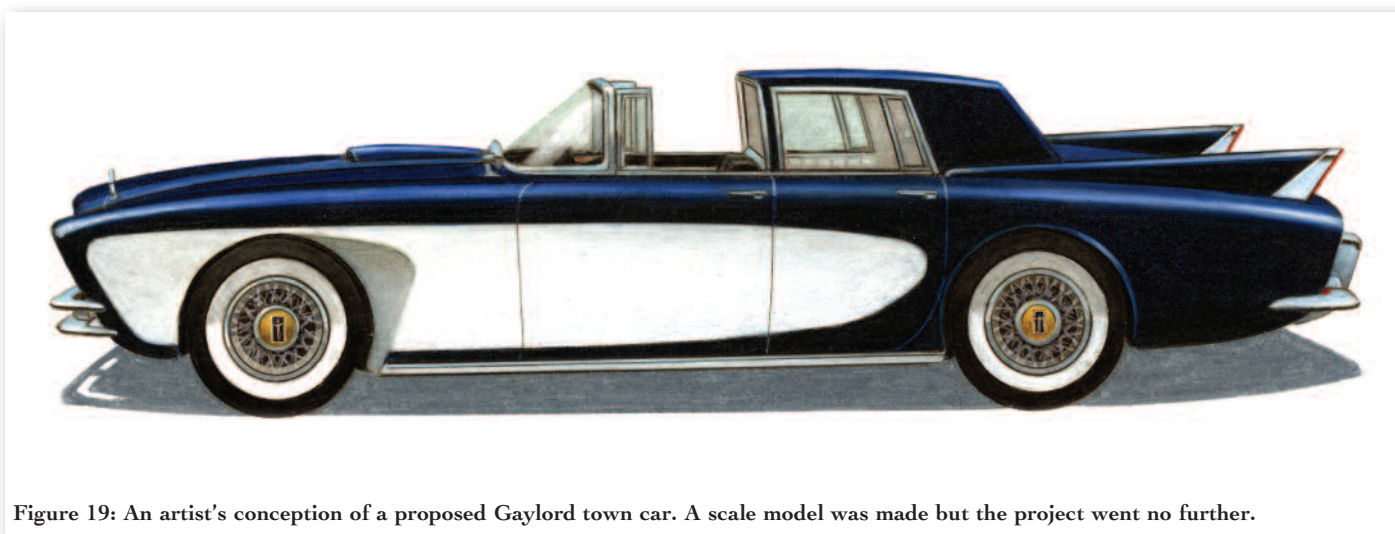


Figure 19: An artist’s conception of a proposed Gaylord town car. A scale model was made but the project went no further.

UNIVERSAL CARS: THE NORTH AMERICAN MOTOR VEHICLE IN WORLD MARKETS



Figure 1: Right from the beginning, Ford's ubiquitous Model T found favor well beyond the borders of the United States, becoming one of the most successful "world cars" of all time. This particular 1925 Model T touring car is owned by Australian Mitch Taylor, a member of the Taree Historic Motor Club and the founder of FordModelT.net, an information-packed web site devoted to the Model T. Photo by Mitch Taylor. Used with permission.

BY ARTHUR W. JONES

AUTOMOTIVE HISTORY CONFERENCE

CLEVELAND, OHIO

APRIL, 2016

PHOTOS SUPPLIED BY THE AUTHOR UNLESS OTHERWISE NOTED

In 1929 North American automotive manufacturers produced five million six hundred thousand cars and trucks in their factories in the United States, Canada, England and Germany. This represented ninety percent of worldwide motor vehicle production. The majority of those cars and trucks were destined for use in the United States and Canada. The remaining fourteen percent together with an equal number from foreign manufacturers served to meet the needs of the rest of the world. American motor vehicle production exceeded that of each of its closest rivals, France and Britain, by a factor of twenty to one. Nineteen twenty-nine was the peak year for the American car and twenty years would pass before these production records were exceeded (Export Statistics). The intent of this study is to examine how the United States, starting from a position far from leadership in technology, was able to build an industry that dwarfed those of its competitors.

Testing the Waters

The automotive industry was international from its beginning. Gottlieb Daimler and Karl Benz, unable to find German customers for their self-propelled carriages, licensed their inventions to foreign

builders and fathered the English and French automotive industries. English buyers were starved for machines by the restrictions of the infamous Red Flag Act, generating



Figure 2: An Oldsmobile advertisement as seen in the August 1903 issue of the British publication *Automotor Journal*.

a vibrant import market that lasted for many decades and was a boon to French companies, many of them financed from English sources. Until 1914 France remained the world's leading manufacturer and exporter with foreign shipments about half its output. Other European countries such as Switzerland, Belgium and the Netherlands, with economies not large enough to support an industry, became open markets for cars from everywhere, and eventually even from America. And the

United States, a late starter by ten years, learned the technology from scientific publications, joint ventures with European firms and from immigrant engineers who brought knowledge of the latest designs to inspire their work, sometimes under license and sometimes not.

Canada seemed a natural outlet for American motor vehicles and many domestic companies sold cars in the north in their first years. But the market was slim and by 1903 only 220 cars were registered in Canada. In order to promote local industry the government enacted a 35 percent tariff on imported cars but American production was thirty times higher and even such a high tariff could not overcome the cost differential. With American cars dominant the classification of Canadian deliveries as exports seems artificial and

we have adopted the position of considering the two industries as a single business, as in fact they typically were (Durnford and Baechler 1973, p. 222-226).

Britain was the first important foreign market for American cars and the Locomobile light steamer was the first American car to be exported in significant numbers, selling approximately one quarter of its production between 1899 and 1903, primarily in the British Isles. The fragile vehicle did little to establish a good reputation for



Figure 3: Oldsmobile production in Canada.

American technology. In any case steam soon lost its appeal in Europe and Locomobile abandoned the export trade in 1903. The next American to make an appearance was the Oldsmobile curved dash runabout, arriving in 1901 and quickly gaining popularity in England and indeed throughout the world. Its promising record

was cut short in 1905 when the company abandoned light runabouts for larger, more expensive models.

In 1903, the little Cadillac single took up the flag and eventually achieved a respected position. Nevertheless, by the time the model was withdrawn in 1908, the light runabout was decidedly out



Figure 4: A Cadillac in Irish A.C. Trials, 1907

of fashion (“Our Trade Balance,” *Horseless Age*, February 12, 1908, p. 168; Jones 2006, pp. 16-24).

In August 1907, the editors of *The Automobile* welcomed home James Couzens, manager of the Ford Motor Company, from a whirlwind dash around Europe. His views, they said, should carry considerable weight.

“There is a fertile field on the other side for the American car,” said Couzens, “but it needs tilling and tilling in the European way. Our methods may be better, but they are not the European methods, and to get the business it must be done in their way. There have been comparatively few American cars sent abroad within the past three or four years, and the chief impression of what the American maker can do comes from the few now antiquated specimens that were exported several years ago. The feeling towards American cars is not unfriendly, but in order to obtain a proper foothold the European situation will have to be carefully studied. As to what car will meet the popular demand, I might say at present there is no demand for automobiles in Europe, as the majority of makers are overstocked with cars. Whatever business is to be had has to be developed. In other words, there is no fruit over there ready to pick, as it

has to be cultivated and the manufacturer who can and will do this will surely pick the fruit, as it will eventually ripen and without undue delay" (*The Automobile*, August 29, 1907, p. 308).

Despite Couzens' conviction that the Americans should adopt European methods, Henry Ford had other ideas and followed his own path, modeling his foreign operations on those of the home company. American methods meant aggressive sales promotion, an emphasis on service and an all-purpose vehicle of uniform design, the foundation of Ford's leap to leadership. Ford introduced its new Model T in October of 1908. Although only 308 cars were produced in calendar 1908, it was displayed at the London and Paris shows in November. The Ford name was known in England and its appearance was favorably noted. In Paris, where previous sales had been few, the reaction was more enthusiastic and the car was said to have caused "a veritable sensation" (Wilkins and Hill 1964, p. 33). The writers recognized an automobile that incorporated significant design improvements at the forefront of current practice. Outstanding among its features were its four-cylinder motor cast en-bloc with removable cylinder head and the enclosure of the entire mechanism to retain oil and prevent the entry of dirt, eliminating the need for manual oilers. The magneto was incorporated



Figure 5: Ford's London Showroom, circa 1912.

into the flywheel doing away with troublesome dry cell batteries then common. Its flexible three-point suspension gave it the ability to negotiate the poor roads that were the standard fare of the day.

Designed for economical production in high volume and simplified maintenance by inexperienced owners, the Ford was acclaimed both for its advanced engineering and its good value. Its qualities were those that would be most useful to the owner: durability, ease of

operation and simple maintenance rather than refinement, comfort and high performance. Another Ford innovation was the decision to limit offerings to a single model with a minimum of options even as to color, and to make every car the same, "just like one pin is like another pin when it comes from the pin factory" as Henry Ford said. His car was one among several that established a new type of universal car and opened the doors of the world to the products of the



Figure 6: An early Ford Model T in the Australian outback, 1915.

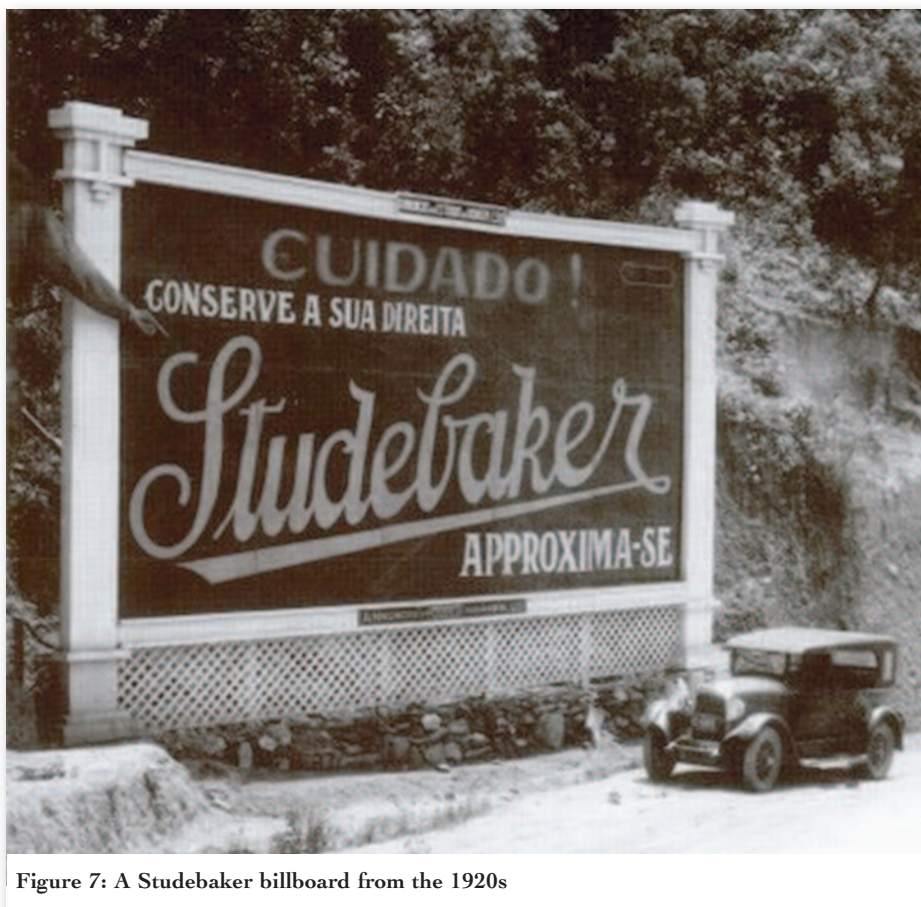


Figure 7: A Studebaker billboard from the 1920s

American automotive industry.

The arrival of the Model T in Britain was quickly followed by the start of local assembly in a plant located at Trafford Park on the Manchester Ship Canal. At first only bodies and wheels were obtained locally but soon the company reached out to local suppliers or set up its own such that by the twenties the cars were entirely British built. This was the first example of a foreign-built American car but was not Ford's initial venture into assembly outside Detroit. Beginning with the purchase of a site in Kansas City in 1909 and leading to an extensive program of assembly plants across the North American continent a striking new policy substantially reduced shipping costs and made

regional deliveries responsive to demand. The English plant was an extension of that policy and not, as some have believed, a way to avoid import duties. The Model T soon became the largest selling car in Britain and Ford also led the truck market for many years.

The enthusiastic reception of the new American models by foreign buyers was noted by other manufacturers and, in the years prior to the outbreak of the First World War, similar light cars were introduced by several other makers. Willys-Overland is a notable example offering four lines across a wide price range but were principally known for their light cars, the smallest of which was conceived as a competitor to the Ford. It was shown at the 1912 Paris Salon but

sales were not limited to the European market and in 1913 they were one of several light American cars "selling as many cars as they could get" in Australia (*The Automobile*, December 11, 1913, p. 1123). John North Willys was a salesman and advertised aggressively for agents, proclaiming:

"Write at once for details. Some foreign territory still open. Please state whether or not you have ever handled automobiles, what kind of store or garage you have, what facilities you have for service and repair work, what territory you want and how many cars you think you can handle. Send photo of store, if possible" (*American Exporter*, February, 1912, p. 56).

The Studebaker Brothers Manufacturing Company started making wagons and carriages in 1852 and by the 1870s was calling itself the "largest vehicle builder in the world." With many years of experience in international trade, Studebaker was well prepared for foreign business. Company representatives went to Australia, South Africa, South America, Mexico and the West Indies. By 1913 foreign sales were claimed to be 16 percent of total business and stockholders were told that exports were limited to the number that could be spared after domestic orders had been filled (*The Studebaker News*, Foreign Edition, May 20, 1913, p. 1-2).

Ford called the Model T “The Universal Car” a description that sums up the American concept of a new manufactured product that would soon be considered a necessity of contemporary life. The design was purely American and no attempt was made to offer models designed specifically for export. With their 100-inch wheelbase and side-entrance five-passenger tonneau bodies of standardized design, they were the smallest that could serve as a general purpose family vehicle. Simple four-cylinder 20-horsepower engines combined with light weight gave lively performance. They were sold fully equipped, eliminating the necessity of many foreign buyers to negotiate separately for bodies, tires and accessories. With the

exception of the idiosyncratic Ford, there was little to differentiate between them but what was given up in individuality was gained in value. The increasing sophistication of American production engineering and the advantages of building in large volume allowed the companies to price them at little more, and in some cases sub-

stantially less, than the runabouts they replaced.

the sewing machine and the bicycle became objects of common use (Ashworth 1962, pp. 223-226). It was a time of free trade and the motor vehicles were greeted with general, although not universal popular appeal.

In the fall of 1914, at the moment when the American automotive industry was beginning to spread its wings, Europe became engulfed in a war that affected the world of the motor vehicle in significant ways. General mobilization and the conversion of factories to the production of military supplies forced the restriction of car production. Responding to the need to conserve foreign exchange, Britain and France prohibited the importation of passenger cars for private use and Britain’s first wartime budget

included a 33 per cent duty on motor vehicles. British and French tariffs, together with the exclusion of Germany, Austria-Hungary and Russia from international trade, had the effect of closing markets that had absorbed more than one third of American exports. Nevertheless American foreign sales increased three-fold between



Figure 8: A British newspaper ad for the 1915 Studebaker.

Consequences of the Conflict

The automobile was fortunate in being born in the late nineteenth century, a time of relative peace and prosperity. Technology was on the march with the rapid spread of railroads and steamships and the application of mechanization to industrial production. Manufactured consumer products including

Table 1: Percentage of American-Type Vehicles in Use in Principal Countries of the World, January 1, 1940

Country	Passenger Cars	Trucks	Country	Passenger Cars	Trucks
Belgium	55	80	Argentina	94	96
France	7	10	Brazil	88	93
Germany	4	0	Chile	92	95
Ireland	5	20	Colombia	98	99
Netherlands	74	79			
Portugal	43	84	Cuba	99	99
Spain	40	Unknown	Mexico	96	100
Switzerland	35	32	Panama	99	100
United Kingdom	3	4	Peru	91	97
			Uruguay	91	95
Denmark	61	67			
Finland	63	80	Australia	96	94
Norway	56	82	New Zealand	60	77
Sweden	65	65			
			China	80	80
Bulgaria	54	46	India	41	89
Czechoslovakia	5	16	Japan	90	76
Greece	75	85	British Malaya	16	56
Hungary	16	39	Netherlands Indies	70	98
Poland	40	50	Palestine	62	71
Rumania	80	78	Philippines	98	99
USSR	6	0	Turkey	78	75
Yugoslavia	35	53			
Algeria	6	2	Total outside US	37	36
Belgian Congo	85	85			
Egypt	60	81	Total including		
Kenya	70	82	US & territories	82	73
Southern Rhodesia	74	94			
Nigeria	48	78			
Union of South Africa	81	90			

Source: *Automotive World News*, vol. II, no. 13, May 20, 1940, 123-126.

1914 and 1917. Some of the gain was due to the rise of exports to South America, Asia, Oceania and South Africa where the Europeans had held the lead prewar. The withdrawal of European cars from overseas markets presented an opportunity for the American producers to build relationships that would survive for many decades. The war had indeed brought prosperity to the American industry.

Ford Motor Company was the first to address the problem of worldwide distribution in a decisive way. It was among the first to open a factory-owned sales branch and later the first to initiate overseas assembly (Knudsen 1919). It learned to take the car to the customer and its representatives drove to rural farms and villages, returning only after it had been sold. Generous advertising budgets and displays at county fairs gave an advantage over their sedentary European competitors. Other American manufacturers, General Motors, Willys-Overland and Maxwell-Briscoe among them, struggled with the disruptions of financial crises and changes in leadership that impacted them in establishing an effective foreign sales operation. Henry Ford and his associates led their company forward with a steady focus, setting a path along which others would follow.

The formation of General Motors in 1908 established the base for a vehicle producer that was to have a role equal to that of Ford in international trade, but it

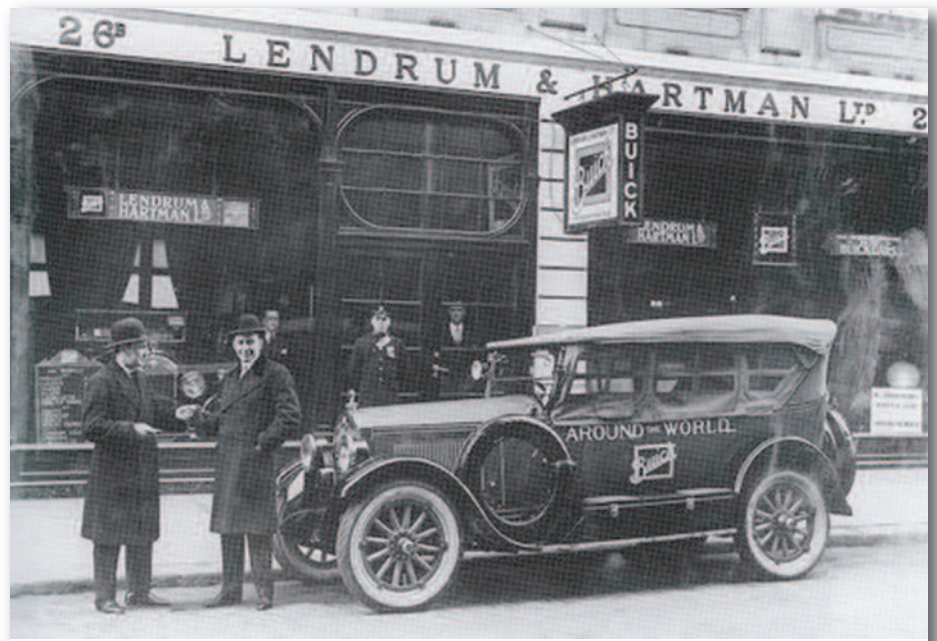


Figure 9: Buick "Around the World" promotion in 1924.

would be several years before the company was in a position to move forward in an organized way. Among the initial General Motors makes, only Buick and Cadillac were exported and each was left to manage its operations as it thought best. Buick's two most important

foreign outlets, Bedford Motors in England and McLaughlin in Canada, were independently owned and sold cars with large local content and distinct local character. Only after they had been absorbed into the corporation, respectively in 1912 and 1918,



Figure 10: Buick in Russian Trials, 1925.



Figure 11: LaSalle in a European touring caravan, 1927.

could a coordinated plan for foreign business be put in place. After founder W. C. Durant was removed from active management, steps were taken to bring order to the business and General Motors Export Company was founded. The corporation offered no light car to compete with Ford. It would take the advent of the Chevrolet and the dynamic leadership of a new General Manager, James Mooney, to realize its potential (Pound 1934, pp. 243-265).

European manufacturers realized that their traditional products had no future and responded to the American challenge with new models. First among them was the Morris Cowley, announced on the English market in 1915 but sold in large numbers after the war. With its four-passenger body, 1550 cc motor and 102 inch wheelbase, it was a reasonable proposition, more economical to license and to run than the imported car although Morris could not match the price of the Ford. By 1924 the difference had been reduced and Morris

Motors gained first place in sales, a position it would hold for the balance of the decade. In 1919 Andre Citroen introduced his Type A. Similar to the Morris, it was a 1327 cc machine with an open four-seat body, by 1924 of all steel construction. Turned out on a moving assembly line in numbers that made possible a car that was cheaper than anything else on the French market, it was aggressively promoted. Morris and Citroen were new manufacturers entering the market with a single model aimed at the low-price field. In Italy Fiat had long held sway behind a bulwark of protective tariffs. In 1919 the company introduced its new Typo 501 with standardized coachwork, 1460 cc motor and a wheelbase of 104 inches making it the first widely sold popular car in Italy. These new models inspired by the example of American policies and methods set the standard for light cars in Western Europe. Their acceptance marked the end of any claim the American imports might have made for high volume

sales in the low-price field. But in developing markets in distant lands, the American product still held sway.

The nineteen twenties have been called "The Golden Age" of the American car. British and Western European markets were closed as they struggled to repair economies crushed under wartime debt and German reparations were diverted to balance French government finances. Despite the continued imposition of wartime tariffs and import quotas, American manufacturers faced staggering demand for their vehicles elsewhere and found they could sell virtually anything they could deliver. Firms that had not previously sought foreign sales rushed to take advantage of the opportunity. Companies were formed to build assembled cars strictly for export under names not then known. Used cars were bought, refurbished and shipped abroad primarily to Central and South America. The cars of the Everymake Auto Export Company and the Rebuilt Automobile Export Company, offering the Rebuiltco Speedster at attractive prices, were not shown on the domestic market. North American automotive exports grew from 100,000 in 1919 to 800,000 ten years later. Forty percent were trucks, a statistic that did not evade the notice of industry executives.

Depression Decade

The collapse of the New York stock market in October 1929 brought a pause to the long expansion of the

North American automotive industry. Over the following three years production declined by 75 percent while exports fell 82 percent to a level not seen in ten years. It was a time of widely differing economic conditions with each country responding with political and economic policies uncoordinated to those of its neighbors with unforeseen effects.

The imposition of severe restrictive tariffs by both the United States and its trading partners must be assigned a heavy share of the responsibility. During the downturn some assembly plants were shut down, branches combined for greater economy and personnel discharged but the general structure of the business was not dismantled. Each of the market-leading companies understood what was underway and responded in terms of its own concept as to where future growth was to be found. All were convinced that the automobile faced a brilliant future in a world where so few were experiencing its benefits.

We have seen that the Ford Motor Company was the first to

gain a substantial foothold in foreign sales. Ford's simple but elegant product gained acceptance everywhere and soon became an icon. Henry Ford was convinced

Perry, strived in vain to put the plan into effect but in 1932, when production was begun, the big American Model A proved to be unsaleable in Britain and Ford's

European branches were restricted from importing cars. Henry Ford was obliged to adopt the policy so long advocated by his subordinates and introduced a small European-type car. The little Ford never recaptured the sales leadership of the Model T but Ford's American-sourced cars and trucks were well suited to the recession economy and enabled the company to prosper in other parts of the world.

General Motors arrived second to the party. In 1922, with Alfred Sloan in control, his former Hyatt

Roller Bearing associate was appointed to head the Export Company. James Mooney brought a clear perception of where foreign business would be found in the future. He saw that the American-sourced car could no longer take the lead and convinced the directors to authorize the purchase of European companies that would give him the means to offer smaller vehicles to round out the line. At first he negotiated for Citroen, then

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Prices	
delivered and dealer prep, including	
Concession Taxation and License Fee	
Ford V8 Coupe	\$275
Ford V8 Sedan	\$282
Ford V8 Tourer	\$333
Ford V8 De Luxe Touring	\$353
Ford V8 Special De Luxe Touring	\$363

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Figure 12: A Ford New Zealand advertisement from 1936.

that his car was immutable and would permit no engineering changes although its style was kept more or less up-to-date. At the moment of its fall from grace he authorized the construction of an enormous new plant along the Thames River modeled on the Rouge factory in Dearborn and intended to supply all of Europe, Africa and the Near East (Wilkins and Hill 1964, pp. 190-195). Ford's brilliant manager, Percival

was turned down by the Austin Motor Company, but in 1925 secured Vauxhall which might serve as a base for an economical contender. It would be six years before his plans bore fruit. The purchase of Opel in 1929 brought to GM the largest and most modern German manufacturer. These new makes were managed under the corporation's Overseas Operations Division, soon to be second only to Chevrolet in sales. Mooney was criticized by GM directors for exporting factories rather than cars, but of course this was exactly what he intended. During the thirties General Motors export sales of American-sourced vehicles slowly declined in relation to those foreign-sourced ("General Motors Overseas," *Fortune*, November, 1945, pp. 125-266; "Sees Great Difficulty in Auto Sales Abroad," James D. Mooney quoted in *New York Times*, March 4, 1928, Section II, p. 6; Review and Outlook Report [1929]).

With its formation in 1924 Chrysler Corporation became the third big American exporter, inheriting the modest network of agencies selling the Maxwell (Hicks and Babcock, 1927). The purchase of

Dodge Brothers in 1928 doubled the number of foreign dealers; this was one of the principal reasons for the merger, but Chrysler entered the export market at the very beginning of the depression

consolidate its foreign operations under central management. Most of its overseas distributors and assembly plants were operated under contract by independent owners. Chrysler may not have understood the growing preference for smaller European-type cars or, if it did, was not in a position to pursue it. After the Second World War, it struggled to remake itself into an international business like its competitors, buying Simca in 1958, then Peugeot, followed by Rootes Motors, the aborted merger with Daimler Benz, then its recent sale to Fiat. We may not yet have heard the end of this story. It has become common to refer to the "Big Three" automobile companies but, in the case of worldwide business, the "Big Two" may be a more appropriate term.

It should not be assumed that the manufacture of European-type cars led to the abandoning of lessons learned over time in the export market. Ford and General Motors small cars were designed in Detroit, built to American standards of quality in plants equipped with the latest labor-saving machines. They were promoted,

Figure 13: "Canada Calling," Chevrolet print ad, circa 1937.

that gripped the world. ("Chrysler-Dodge Combine will have 9000 Dealers Covering All the World," *Automotive Daily News*, June 5, 1928, pp. 1-2). Faced with the need to pay back loans for the Dodge buyout and other factory improvements, the corporation did not have the financial resources to

sold and serviced through company-owned branches and distributors conforming to the same rules as their American cousins with operations overseen by corporate executives. Frequently the American and European-sourced cars were offered by agents and displayed together, giving the new cars the prestige of a well-known partner. In this the two companies were similar but Ford, the first in the market, would continue to out-sell Chevrolet in many regions until after the Second World War. (Foreman-Peck, 1982, p. 865-881).

The beginning of hostilities in Europe and Asia in 1939 found the American automotive industry recovered from the Great Depression with about ten percent of domestic production devoted to exports. There were 65 assembly plants building American-sourced cars overseas in addition to those of the captive makes. The conclusion of the Second World War left the European motor industry with its factories destroyed and only the United States and Great Britain in a position to ramp up exports in response to postwar shortages. Ten years later inde-

pendent European nameplates were soon invading the world with revolutionary new models from Fiat, Renault and Volkswagen taking a major share. They would be the wave of the future.

forces that brought this radical innovation into a leading position from the point of view of technical development and social assimilation. Over the first fifty years of the twentieth century the American automotive industry grew to become the dominant player. After 1945 other regions assumed worldwide leadership while America followed its separate and lonely path.

Historians have proposed various reasons for the dynamic early growth of the American automotive industry: America's large population and prosperous middle class, her abundant natural resources, her peripheral role in Europe's political upheavals and her dominant financial position at the end of the conflict.

No doubt all of these were significant factors but we may assign to the manufacturers themselves a share of the credit. Some have stated that

the primary focus of the American industry was on production technology rather than on the engineering design of the vehicle. Arnold and Faurote stated in 1914 that "the Ford Motor Company's plant

Figure 14: "Number One Boy," Buick print ad, circa 1937.

Summary

The history of the North American car in international markets can be seen as a mirror of the history of the automotive industry itself. Through it we can observe the



Figure 15: A Dodge in South Africa in 1916.

at Highland Park is the most interesting metal-working establishment in the world" (Arnold and Faurote 1915, p. 1). European producers were quick to learn from Detroit, visiting Ford's factories and meeting with its leaders. The Ford plants were open to its peers from both sides of the ocean and Henry Ford counted Herbert Austin, Andre Citroen and many others as his friends. Their plants were soon equipped with American machine tools and transfer lines and Ford set up an entire automotive industry for the Soviet Union.

European historians have noted that the American car was slower to adopt high-speed engines, multiple carburetion, independent suspension, overhead camshafts, turbocharging and eventually front wheel drive, features that are now commonplace. A counter argument might claim that it was the American manufacturers who perfected the complex technologies

that brought motoring to a broader public: the electric self-starter, automated engine controls, automatic transmissions, power steering and brakes, and that it is these that have enabled the introduction of hybrid fuel engines and, at some future time, the self-driving car. Can we resolve this dispute by agreeing that European engineering has been primarily focused on raising the performance, handling and operating economy of the car while that of the Americans has been on enhancing driving convenience and reducing the need for periodic maintenance?

An important factor remains to be discussed: the role of standardization. At the end of the first decade of the century manufacturers on both sides of the Atlantic were offering models of widely differing capabilities and prices: light runabouts and powerful costly touring cars and limousines. At a moment when the automobile had

yet to find its place in society, American producers came to conceive of the car as an implement of universal application and moved away from the extremes toward a rational middle ground. By 1940 the price of a Cadillac was only twice that of a Chevrolet. Twenty years later the dimensions, style, and mechanical features of the two General Motors makes would be virtually identical. In Europe the Fiat Topolino and the Rolls-Royce Phantom continued to find a ready market but neither was saleable in the United States. This is the impact of standardization.

This essay has attempted to summarize the development of the international automotive industry through a focus on three fundamental trends. First, the evolution of the automobile from an iconic luxury to a product of practical use in all cultures and at all social levels. Second, the transformation of the automobile into a device that could be produced in great numbers in many locations through its standardization whereby each unit had become similar, at least within a particular selling environment, regardless of its source of manufacture. And third, that standardization is characteristic of industrial products when they reach mature development. The telephone, the refrigerator, the personal computer in our time, are examples. The American automotive industry was the first to understand and respond to these trends, and its early success especially in foreign markets may be credited to that realization.

Of course, in today's world there are no more national automotive manufacturers; all must be global to survive. Our cars incorporate materials and assemblies from everywhere, as Jim Rubenstein has taught us. When the time comes to buy a new one, we will select from a choice of makes with American, European, Japanese, even Korean, nameplates but all with virtually identical characteristics. How should we describe these similar automobiles? Let us call them "Universal Cars."

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