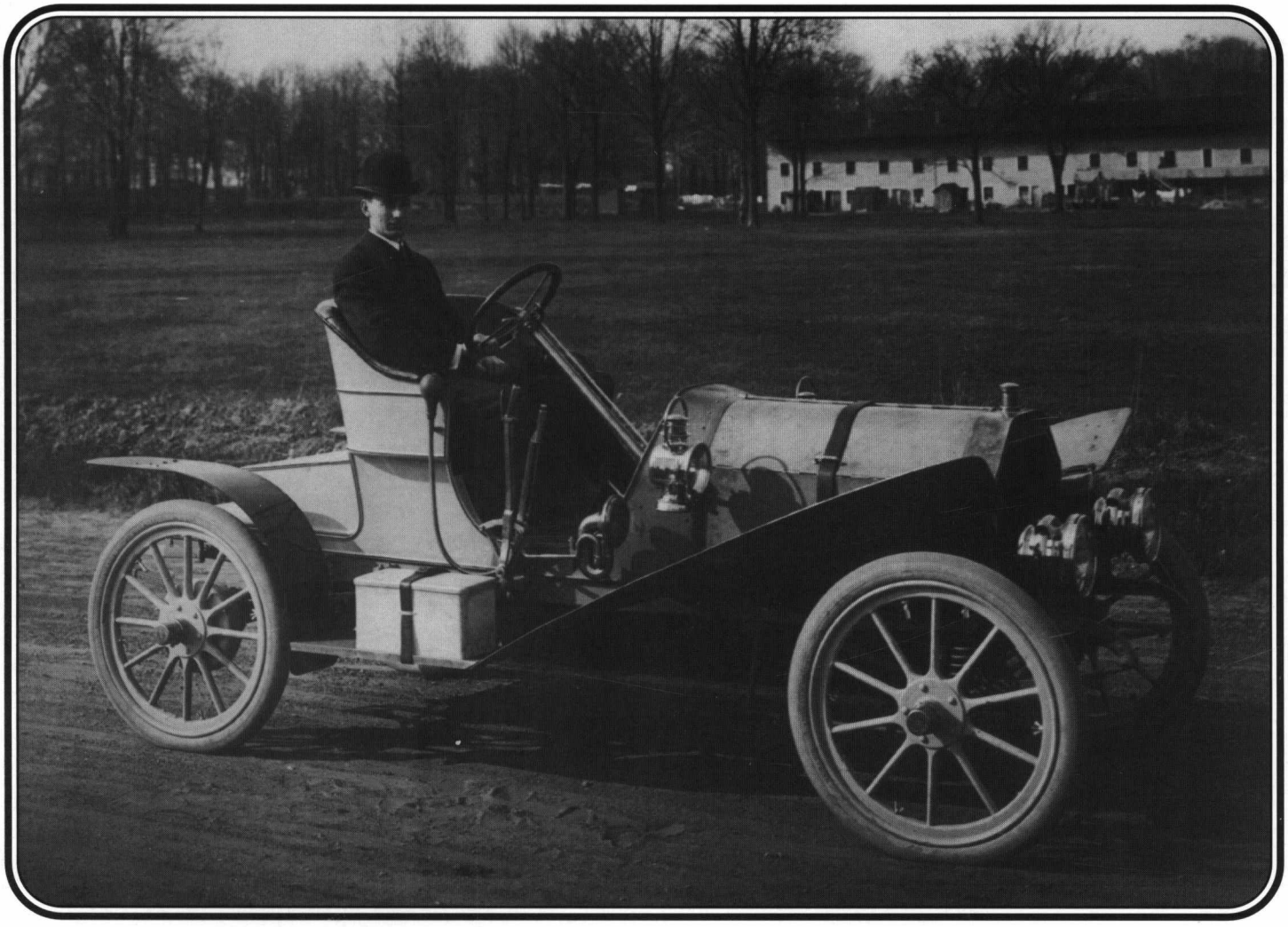
# AUTOMOTIVE HISTORY REVIEW

Spring 2007 Issue Number 47



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# EDITOR'S NOTES

It always cheers the editor to have the *Review* praised, as it shows that we're on the right track. However, I want to address some comments by member-readers received last year.

With respect to Issue No. 45 (Spring 2006), two members mentioned that the Editor's Notes were continued in two different places, hence that this was disruptive. Here's what happens. The pages of an issue must be divisible by four. When I get the first galley from Mountain Laurel Press, it is rare indeed to find that we have an exact page count divisible by four. There is usually blank space left at the end of many of the articles. One way to reduce the number of pages in a galley is to "jump" (I believe that is the professional term for continuing an article on another page) some text to fill the space. As the articles are the really important part of an issue, rather than "jump" one or more of them at the end of a page, I think it less disruptive to the reader to print them in their entirety. Criticism noted.

Another member phoned commenting on what he perceived to be an emphasis on articles reflecting automotive history outside the United States, probably in reference to Issue No. 44 (Fall 2005). To the extent that there is a bias—and I agree that there might be—it reflects my view that much automotive history has occurred outside the United States and deserves to be better known within our borders. The judges of the Student Paper Award appear to agree; two recent awards have gone to articles relating to France and Australia. I also note that consistently since its founding, 20 percent of the members of the Society reside outside the United States. However, practically speaking, virtually all the articles that appear are submitted rather than solicited, and in recent years we have received a number of them from non-U.S. members. I encourage articles no matter what the source.

Finally, a member commented that the message from the Conference Chair in No. 46 (inside back cover), printed in a single column, would have been easier on the eyes if it had been formatted in two columns. Comment noted.

I am very happy to report that The Society of Automotive Historians in Britain, under the capable editorship of *Malcolm Jeal*, has issued *Aspects of Motoring History 2*, as a follow-on to the initial issue about which I wrote in Issue No. 45. The contents of the 64-page magazine are as eclectic as those of the *Review*. The issue begins with an article by *John Warburton* on the Crossley 20/25 hp car which first saw the light of day in 1909, with a few final pages on the postwar (1919) model 25/30 hp. I found of great interest *John Reynolds*' piece on the varied career, motoring and otherwise, of Dennis Kendall, MP, and his ill-fated 1945-46 Kendall-Grégoire car. The car's subsequent life as the Hartnett in Australia was also short. *Tony Beadle* has some interesting and not unkind words to say about the last car to bear the Triumph name, the Honda-based Acclaim. Malcolm himself contributed a piece on the virtually-forgotten Coupe de la Commission Sportive race of 1907, full of references to obscure French makes such as Porthos and Gilles-Forest to name only two (that last was new to me!). The issue ends with a review by *David Burgess Wise* of motoring events since 1896 in years ending in "6."

Turning to the issue at hand, we begin with the most recent winner of the Student Award, *Katharine Mechler*'s "General Motors: Innovations in American Class Structure." Katie is a native of Dallas, Texas, and majored in History at the University of Dallas. She now works in Human Resources for a small IT company in Washington, D.C.

We continue with "Packards From South Bend: Economic Perspectives on 'The Last Packards' Decision, Part 2," which concludes the paper that *Robert R. Ebert, Ph.D.* and *Niccole Pamphilis* presented at the South Bend history conference. For biographical details on the authors, please see Issue No. 46, p. 68. As noted there, this article was peer-reviewed by *Robert Neal*.

*Graham Orme-Bannister* has previously contributed to the *Review* with "John Davenport Siddeley" in Issue No. 35 (Winter 1999-2000), and now gives us "The Aluminium Piston Story." In deference to the British style, we are retaining his spelling of what we call "aluminum" on this side of the pond. Graham has a license in metallurgy and spent his career mainly in the oil industry concerned primarily with the marketing and technical aspects of lubricants, motor fuels, and additives. He is the author of the just-published book *South Harting Hill Climb*, and does his own climbing in a Bristol 403. This article was peer-reviewed by our ever helpful student of automotive technology *Fred Roe*.

We close Issue No. 47 with *D. J. Kava*'s "Mobilizing the Nation: an 'Interview' with Howard E. Coffin" reconstructed from documents that D. J. found in the National Archives in Washington. D. J., who lives in Beaumont, Texas, is a retired Federal meteorologist and regional union executive (*Who's Who* 1995-96) and is now an artist and writer. Hudson has long been one of his primary interests. He joined SAH in 1972 upon the urgings of *Marshall Naul*. This article was peer-reviewed by *Kit Foster*, the owner of a 1925 Hudson and knowledgeable about the company's history.

Mountain Laurel Press and Arena Press produced and printed No. 47 in their usual fine and helpful manner. In addition, I am grateful to a new member, *Omar Abou-Zied*, for his help in reformatting some articles sent as e-mail attachments in this and future issues, so that they could be edited and printed.

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Further information about the Society of Automotive Historians may be obtained by writing to the Society of Automotive Historians, Inc., 1102 Long Cove Road, Gales Ferry, CT 06335-1812 USA or online www.autohistory.org.

# AUTOMOTIVE HISTORY REVIEW

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**Front Cover:** Howard E. Coffin on 1906 Oldsmobile prototype Model S, with the Lansing factory in the background. (provided by D. J. Kava).

**Rear Cover:** 1941 Packard One-Sixty Convertible Coupe (from the editor's collection).

**Acknowledgments:** Except as otherwise noted, each author provided the illustrations for his or her article.

**Back Issues of Automotive History Review**

We can offer sets of the issues remaining in stock (numbers 4, 5, 6, 7, 11, 12, 14, 15, 16, 23, 29, 30, 31, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46 and the Index ) for $125.00 postpaid in the USA. Single copies are $8.00 each plus $2.00 postage, $5.00 postage internationally. All payments in US funds, please, Mastercard, Visa and American Express accepted as well as checks. Orders and inquiries should be sent to Fred Roe, 837 Winter Street, Holliston, MA 01746-1159. Make check or money order payable to Society of Automotive Historians, Inc. Inquire for shipping costs outside the USA.

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# General Motors: Innovations in American Social Class Structure

by Katharine Mechler

***Preface***

During his 1953 Senate confirmation hearing for the position of Secretary of Defense, former General Motors' president Charles Wilson responded to questions concerning possible conflicts of interest between his new position and his old company by saying, "I thought what was good for our country was good for General Motors—and vice versa."[1] Though often misquoted, Wilson is not wrong in his statement or the meaning behind it. The relationship between General Motors and America is one of interdependence.

On the surface, it appears that concern for economic growth forms the bond between the two. Throughout the 20th century, there is a clear correlation between the economic influence of the automotive industry and national prosperity. When the national economy changed, whether positive or negative, people turned to Detroit for an explanation. A 1939 *Fortune* magazine article said that Detroit and the automobile industry was "probably the birthplace of both good times and bad."[2] National prosperity and personal happiness were one and the same. Due to its sheer size and market holdings, General Motors was the main actor in the automotive industry for the better part of the 20th century, and therefore directly responsible for many of its financial fluctuations. Historian Ed Cray points out that various economists cite General Motors' low sales in 1957 as the main cause for the recession in 1958. Wall Street, recognizing the economic impact of the corporation, "ruefully jok[ed], 'General Motors sneezed, and the country caught a cold.'"[3] But Wilson's statement alluded to a more fundamental relationship between the two.

Combining a corporate structure based on the principle of decentralization with co-ordination, a product policy of mass-class production, an understanding that style sells cars, and careful utilization of advertising, General Motors not only completely controlled the automotive market but also helped to create a social class structure with the automobile as the determinant. General Motors developed the correlation between automobiles and social status better than any other manufacturer, and through its five automotive divisions—Chevrolet, Pontiac, Oldsmobile, Buick, and Cadillac—ensured there was "a car for every purse and purpose."[4] The policies and practices of General Motors did not merely influence the American economy. Rather, they were designed to manipulate the American social structure at its foundation and thus transformed American culture.

***Historical Introduction***

*Tocqueville, Democracy, America and Automobiles*

Alexis de Tocqueville traveled to America in the mid-19th century in order to observe the American democratic system and the effect upon the lives of its citizens. His observations and analysis resulted in a two-volume work, *Democracy in America*, which awarded both praise and criticism to the American democratic experiment. In his reflections on democracy in antebellum America, Tocqueville argued that "equality of conditions" was influential in forming the "habits, ideas, and mores" of civil society, and, therefore, in maintaining a system of democratic government different than any that had come before it.[5] He reasoned that only when there is equality in society does the desire for freedom arise: "the taste for and idea of freedom began to arise and to develop only at the moment when conditions began to be equalized and as a consequence of that very equality."[6] In other words, though people were deemed equal, they were not all the same and so societal divisions still occurred. Tocqueville wrote: "Neither a social state nor laws can render men so alike that education, fortune, and tastes do not put some difference between them,"[7] meaning that even within the same environment, people will make choices that manifest their individuality. But Tocqueville maintained that there was a distinction between selfishness and individualism: "Individualism is of democratic origin, and it threatens to develop as conditions become equal," while "Selfishness is a vice as old as the world. It scarcely belongs more to one form of society than to another."[8] The distinction Tocqueville makes is critical to understanding the development of American society and the subsequent impact of the automobile on it.

In the early years of automobile production, Henry Ford created a mass-produced automobile at a declining cost, eliminating the car as merely a toy of the rich. An "equality of conditions" was formed in which all had access to automobiles. Adolf Hitler recognized the significance of Ford's design for American society, stating, "I have come to the conclusion that the motorcar, instead of being a class dividing element, can be the instrument for uniting the different classes, just as it has done in America, thanks to Mr. Ford's genius."[9] But as Tocqueville argued, though people seek equality, they still seek distinction and some expression of individualism. General Motors, in contrast to Ford, produced a wide spectrum of automobiles through a variety of divisions. An "equality of conditions" continued, but now there was a car for every "purse and purpose," allowing for individualism and a means of self-representation.

Another attribute of American democracy Tocqueville noted was social mobility. In contrast with aristocracy, democracy allows movement and communication between naturally developing social classes.[10] In a democratic society, there is a means of upward mobility by hard work and discipline. General Motors, recognizing flexible social movement along with the desire for individuality, arranged its automobiles into a hierarchy. The highest, Cadillac, was the most expensive and

luxurious, and therefore a symbol of status. Now not only was there the means of self-representation through consumption, but achievement in social movement could also be reflected. Using Tocqueville as an unwritten guide, we begin to see that the bond between General Motors and America, while economically important, is a bond formed from democratic ideals, affecting social structure and culture.

The development of the automobile was possible because of the technological innovations resulting from the Industrial Revolution, and its social dominance was possible in America because its presence blended well with her democratic institutions. As technology progressed and society shifted from agriculture to industry and wage labor, societal norms also changed. In antebellum America, utility was the focus of production and one's profession was life defining. Status and social classes both existed. W. Lloyd Warner, in *Social Class in America: The Evaluation of Status*, writes, "When societies are complex and service large populations, they always possess some kind of status system which, by its own values, places people in higher and lower positions."[11] America was both complex and large, and, according to Tocqueville, it was natural in a democracy to find social differentiation, as well as status. Further compounding the idea of status, Warner states, "the more complex the technological and economic structure, the more complex the social structure."[12] It follows logically then that, as the economic complexity increased with the shift from agriculture to industry, it would bring with it a more complex social structure. There is evidence of this occurring in late 19th century America.

*Veblen and the Conspicuous Consumer*

Thorstein Veblen witnessed the shift from an agrarian to an industrial economy and society in the late 19th century. In his own reflections on American society, *The Theory of the Leisure Class*, he saw industrialization at the end of the 19th century as producing a leisure class that practiced "conspicuous consumption." Specifically defined, "the term 'leisure' . . . does not connote indolence or quiescence. What it connotes is non-productive consumption of time."[13] The leisure class of the industrial era was not a new development in itself. Veblen wrote: "The institution of a leisure class is found in its best development at the higher stages of the barbarian culture; as, for instance, in feudal Europe or feudal Japan."[14] What separates the leisure class of the industrial era from the previous leisure class is the development of what Veblen termed conspicuous consumption.

Veblen associated the evolution of the leisure class with the evolution of the principle of ownership. Both evolved historically, but neither is as simple as it might sound.[15] With the onset of industry, what determined a man's reputation shifted from an emphasis on his predatory actions to his ability to accumulate property: "With the growth of settled industry, therefore, the possession of wealth gains in relative importance and effectiveness as a customary basis of repute and esteem." Property, rather than heroic activity, now conveyed honor, as well as provided the opportunity for invidious comparison. People want to own specific items in order to emulate those they admire. Through ownership, individual comparison occurred as people longed for reputation and esteem.

Veblen further observed that the rise of the wage laborer, a product of industrialization, was a major factor in the change of consumerism. People no longer used the goods or services they produced as a medium of exchange. Rather, they received money that was then used to purchase wants and necessities. Utility was still at the root of their consumption, but they also began to look for luxuries to improve their life and social status. The leisure class, in order to maintain its superior status, could no longer rely simply on the act of consuming to differentiate it because everyone was now a consumer. Veblen argued that a change in how and what one consumed took place within the leisure class so that individuals in the class might keep their status: hence the term conspicuous consumption: "Conspicuous consumption of valuable goods is a means of reputability to the gentleman of leisure."[16] Purchases reflected social class in a new way. Not only was the quantity of goods and services consumed important, but also the quality of those goods and services.

Veblen wrote about his theory regarding the leisure class in 1899. Automobiles were just beginning to filter into American society, and they were arguably the most conspicuous goods one could consume, and therefore the ultimate good of the leisure class. In 1906, while president of Princeton, future United States President Woodrow Wilson said, "possession of a motorcar was such an ostentatious display of wealth that it would stimulate socialism by inciting envy of the rich."[17] Wilson was correct to be concerned because, according to Veblen, "The motive that lies at the root of ownership is emulation."[18] People want to own something that they think will bring them prestige and honor because the person they see owning it is prestigious and honorable. Veblen wrote:

> In modern civilized communities the lines of demarcation between social classes have grown vague and transient, and wherever this happens the norm of reputability imposed by the upper class extends its coercive influence with but slight hindrance down through the social structure to the lowest strata. The result is that the members of each stratum accept as their ideal of decency the scheme of life in vogue in the next higher stratum, and bend their energies to live up to that ideal.[19]

In 1906 only a small portion of the population owned an automobile and those who did were very wealthy. The desire to own one, however, was growing.

Veblen was very critical of the development of conspicuous consumption by the leisure class, and said it was a "waste because this expenditure does not serve human life or human well-being on the whole."[20] According to his definition, the automobile was a wasteful purchase at the turn of the 20th century since it had limited use, serving very little functional purpose, and was only purchasable by the very rich because of high costs. Veblen, nevertheless, noted an interesting historical phenomenon: "an element of the standard of living which set out with being primarily wasteful, ends with becoming, in the apprehension of the consumer, a necessary of life; and it may in this way become as indispensable as any other item of the consumer's habitual expenditure."[21] Examples of this were carpets, curtains, starched linen, and various items of jewelry and clothing. The automobile was soon to be added to the list.

Both Tocqueville and Veblen were wary about the developing material culture in America. Tocqueville, while praising the development of an egalitarian society, worried that it could be too leveling and not allow people to aim for something higher or more noble. Equality may be balanced by individualism, but individualism can also be debased if it is only tied to the material. Veblen recognized the negative societal changes alluded to by Tocqueville. As material goods replaced heroic deeds as the means of determining social status, Veblen saw that people would think acceptance into the leisure class to be the highest end, and would no longer strive for something greater.

Tocqueville and Veblen never commented on the American automobile or the automobile industry, but in examining their works, they offer the analytical tools to comprehend and assess the impact of them in American culture. In order to understand the development of General Motors, it is important to begin with the early history of automobile manufacturing, around the turn of the 20th century, and progress through the subsequent events examining both the people and policies considered responsible for its rise to dominance. Throughout this paper, Henry Ford and the Ford Motor Company serve as points of contrast to General Motors, contributing to the complexity of their histories. General Motors wanted automobiles to be accepted as status symbols, and therefore they encouraged a social class structure reflective of their five divisions. In the late 1920s, General Motors surpassed Ford as the automotive leader, and by the 1950s, the company completely dominated American society and culture.

## *Part I: The American Automobile and Its Industry*

Historian John B. Rae once said, "The automobile is European by birth, American by adoption."[22] It was an adoption that occurred in just two decades, but created lasting societal impacts. Only a small percentage of Americans at the turn of the 20th century had ever heard of an automobile, and an even smaller percentage actually owned one. During the early decades of the century that would all change. The automobile became a necessity of life, and automobile ownership was almost synonymous to what it meant to be American.

### *A Brief History of the Automobile*

The horseless carriage had been in development well before the turn of the 20th century. As far back as the 13th and 14th centuries the idea of a self-propelled road vehicle fascinated people.[23] The Frenchman Nicholas Joseph Cugnot in 1769 was the first person to design, build, and run a "three-wheeled carriage mounting a steam engine."[24] With a top speed of 3 mph, it caused some to wonder if it was really better than a horse-drawn carriage, but it was a huge, if slow-moving, step in making the idea a reality. During the next hundred years many more, in both Europe and the United States, would try to build their own vehicle or make some technological improvement on a particular part to advance the cause.

On September 21, 1893, two brothers, Charles E. and J. Frank Duryea, successfully tested in Springfield, Massachusetts, what is now generally regarded as the first American horseless carriage with a gasoline engine.[25] They gained further notoriety for their invention two years later when, on November 28, their two-cylinder car won the prestigious *Chicago Times-Herald* Race.[26] Races such as this and the Paris-Bordeaux race in Europe were instrumental in introducing the public to the automobile on a wide scale. Races covering long distances, proving the automobiles reliability and durability, were influential in getting the automobile publicly accepted, acting as both advertisement and testing grounds for new designs.[27]

Prior to that time, only a few people, mostly engineers, were aware of the technological improvements in the automobile and its future possibilities. Newspapers and magazines from all over the country attended local races and published stories about the entry cars and their drivers, exposing the automobile to a much wider audience. The first automotive magazines were also published at this time to keep the public informed of the developments. *Horseless Age* and *Motocycle* both began publication in 1895, and *Motor Age* soon followed in 1899.[28] Almost immediately following the foundation of these publications, people began demanding automobiles, and an automobile industry seemed to form instantaneously. From the very beginnings of production, advertisements and the media helped shape the American perception of the automobile.

### *The Beginnings of the American Automobile Industry*

Starting a business requires capital, and automobile manufacturing seemed like a risky investment. The technology and engineering were still developing, and its future was by no means certain. As a result, many bankers were hesitant to provide the necessary funds for eager inventors. The American public, however, wanted automobiles, providing a "practically limitless market for those who could offer the proper combination of quality and price."[29] Many of the first manufacturers came from other already established transportation industries. Colonel Albert A. Pope was the nation's leading producer of bicycles; Studebaker was the world's leading producer of horse-drawn vehicles, and Ransom E. Olds produced stationary gas engines, and all turned to automobile manufacturing around the start of the 20th century.[30] It is little wonder that these men would be the first in the automobile business, actually creating the industry itself. They had the necessary capital and technology in addition to invaluable knowledge of the transportation business.

In his influential history of the automobile, John B. Rae marks the beginning of the automobile industry in the United States in 1897 with the "commercial production of motor vehicles begun by Pope Manufacturing Co. in Hartford, Connecticut, and Winton Motor Carriage Co. in Cleveland, Ohio."[31] In its early beginnings, the automobile industry would see many companies form and fall before achieving industry wide stability. The leading producer at this time was Ransom E. Olds and his Olds Motor Works formed in 1899. His "curved dashed little buggy" (Fig. 1) was the "first car in the world to be produced in really large quantities over a period of years; 600 were made in 1901, 2,500 in 1902, 4,000 in 1903, and 5,000 in 1904."[32] It was on its way to being the first car of mass production when a squabble between Olds and his business partner caused the two to split, resulting in the Olds Motor Works turning to produce the higher end touring cars, which

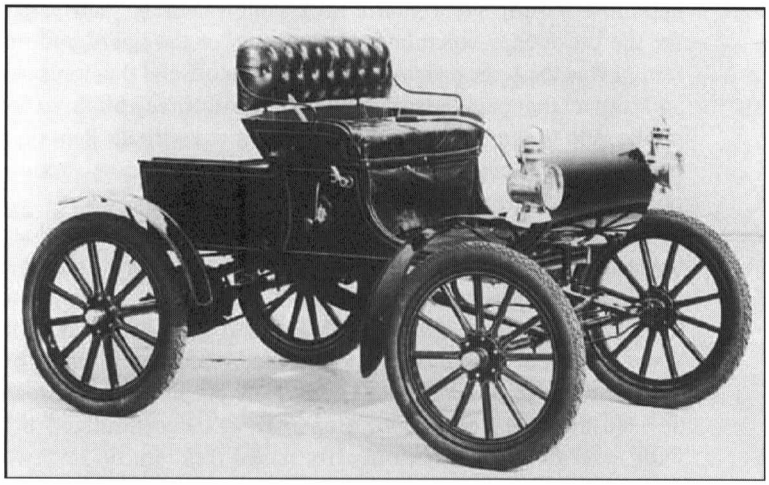



*Fig. 1 – **The Merry Oldsmobile:** The 1901 Curved Dash Olds was named for its apparent curved dashboard and appearance as a horseless buggy. It was so popular that in 1905 it inspired the song "In My Merry Oldsmobile" by Vincent Bryan and Gus Edwards. Appealing to nostalgia and history, the song was used again in a 1960s ad campaign to boost falling sales. All illustration acknowledgements can be found at the end of the paper.*

were more profitable.[33] The door had been pushed open for the possibility of a mass-produced car and soon it would be acted upon in a way that would change American transportation forever.

In the early years, the automobile was very much still a consumer good of the wealthy. Automobiles for the most part were custom built, which took considerable time and resulted in their high price. Understanding the history of automobiles, it becomes easy to see how Woodrow Wilson would be concerned about their negative social impact. They visibly divided society into the haves and the have-nots. But Wilson's warning about a socialist revolution never came to fruition because something occurred in 1908 that he could never have expected. What occurred was a development that led another French observer of American society, R. L. Bruckberger, to insist that Henry Ford's revolution, the mass-produced and equally mass-consumed car, was far more important to the 20th century than Lenin's.[34]

*Changes in the American Automobile Industry*

1908 was a critical year in automotive history as it marked the beginning of two monumental developments in the industry. During that year, Henry Ford (1863-1947) released for sale his first Model T, and William C. "Billy" Durant (1860-1947) formed the General Motors Company by incorporating Buick, Olds, Oakland (later Pontiac), and Cadillac. It is important to note the fundamental differences between the two companies that led the industry for the next 60 years. Even their corporate structures reflected their underlying differences. Henry Ford had one division, and it sold one car in one color at one price. He was not only the head of the company, but also the chief engineer and the final word in all decisions, no matter the subject. In sharp contrast, Billy Durant organized a company that produced all kinds of cars at a variety of prices. Durant let each of the divisions operate independently with little central direction. He brought enthusiasm and big dreams. Once General Motors was financed, Durant spent little time directing the company, choosing rather to focus on trying to develop other new inventions and industries, which consumed both his time and money.

Both men also had different views on the purpose of automobiles. Durant saw value in producing higher end cars that yielded high profits, maintaining the prestige associated with them. As explained earlier, Thorstein Veblen had argued that in a society where social mobility is possible, people aim to achieve the next highest stratum, so people would see the wealthy owning cars and strive to be like them and also want to own cars. Ford, unlike Durant, did not want the automobile to be one of the items that defined the higher stratum because he saw too much potential in it for the common man. Ford wanted "a car for the great multitude," and worked to devise a system to produce it. Through the use of the moving assembly line, Ford was able to reduce automobile production time and cost significantly. Originally it took 12 hours and 28 minutes to produce the chassis of a car, but with the moving assembly line of 1914, it only took an hour and a half. With even more specialization, by 1920 a Model T emerged from the great Highland and Rouge plants every three minutes, identical to the one that came before it.[35]

Ford thought that the benefits of technological improvements should be passed on to society in three ways: "to stockholders in the conventional form of dividends, to consumers in the form of lower prices, and to labor in the form of higher wages."[36] With production increased because of the moving assembly line, costs decreased while profits and sales increased; the first two beneficiaries were accommodated, but Ford still had to deal with the workers. In order to meet his goals, and help reduce turnover rate in workers, he instituted the five-dollar-a-day wage. It revolutionized the automobile industry and labor relations, and could be considered at length in another study, but for this study we must look to see how it relates directly to consumerism.[37] By providing his workers with more money, Ford made them consumers of the goods they were helping to produce. So in the same instant of creating a new product for the masses, he also created the market to buy them. The status associated with owning a car was eliminated. A good once limited only to the most privileged now became a good of the masses, or as Veblen would put it, "a necessary of life."[38]

Equality, however, did not eliminate the desire for individualism, as Alexis de Tocqueville had observed. Ford may have eliminated the status of car ownership, but he did not eliminate the status associated with owning a particular make and model. In the end, General Motors' and Durant's dreams proved more successful than Ford's, but it took a specific man,

Alfred P. Sloan, to lead General Motors in the battle to overcome and then dominate Ford and the automotive industry.

### *Part II: The Rise of General Motors in the 1920s*

While Henry Ford and Billy Durant should be credited for developing the automobile industry, General Motors' Alfred P. Sloan deserves credit for making it what it is today. Sloan was president of General Motors from 1923 to 1937 and served as chairman of the board from 1937 to 1956. During those formative years, he guided the company to a position of prominence not only within the industry, but also within the country as a whole.

#### *Sloan: The Man Behind General Motors*

Alfred P. Sloan (1875–1966) entered the automotive industry indirectly.[39] The son of a businessman from New York, Sloan attended the Massachusetts Institute of Technology, majoring in electrical engineering. After graduation he began working at the Hyatt Roller Bearing Company as a "kind of office boy, draftsman, salesman, and general assistant to the enterprise."[40] The company produced an antifriction bearing used in a variety of machinery including the automobile. Feeling that there was not much future in the company, Sloan left to work for a household electric refrigerator company. He soon found there was little future in this enterprise due to technological limitations and decided to return to Hyatt, ending what would be his only departure from any kind of connection with the automotive industry. Once back at Hyatt, through financial backing from his father and an associate, he became general manager and was able to turn the struggling enterprise into a profit-making business. Through this seemingly small door—parts—Sloan came in contact with the dominant personalities in the industry in the early 20th century.

Sloan's first contact with General Motors came indirectly through the Weston-Mott Company, which made axles and used the Hyatt bearing, and which was incorporated into General Motors in 1909. General Motors, however, was the number two customer of the bearing behind Ford. Not until 1916 did Sloan meet with Durant, when the latter offered to buy the Hyatt Roller Bearing Company. Recognizing opportunity in selling the business to General Motors, Sloan made a deal with Durant for $13.5 million. The company was incorporated, along with a few other properties under the name United Motors, into the ever-growing General Motors Corporation, and Sloan became president and chief operating officer of the division. Sloan was now officially a part of the GM Corporation and his role would only grow until he was named president of the whole corporation in 1923.

Before his appointment to the presidency, Sloan had begun working on a new system of organization for the company. Seeing inefficiency in higher management as limiting production possibilities, resulting in lower returns on capital, Sloan aimed at finding a balance between Durant's system of complete decentralization and Ford's complete centralization. At this time General Motors was experiencing more than a management problem, it was also in financial crisis. The board had recently discovered Durant's many unsuccessful financial dealings and had to find a way to bail the company out and appoint a new president. Pierre S. du Pont was the logical choice for the presidency since he was chairman of the board and his family was the largest shareholder. He also offered the "prestige and respect that could give confidence to the organization, to the public, and to the banks."[41] Sloan first worked with du Pont on a new system of organization before developing a new product policy; ultimately the two would go hand-in-hand.

Between December 5, 1919 and January 19, 1920, Sloan devised what he called an "Organization Study."[42] He saw problems with the current organization of the company because there were no clear divisions of labor, and as a result, "no one knew how much was being contributed—plus or minus—by each division to the common good of the corporation."[43] Sloan devised a system of organization that was decentralized but with overall co-ordination. He based his study on two principles:

> The responsibility attached to the chief executive of each operation shall in no way be limited. Each such organization headed by its chief executive shall be complete in every necessary function and enable[d] to exercise its full initiative and logical development.
>
> Certain central organization functions are absolutely essential to the logical development and proper control of the Corporation's activities.[44]

Now each branch of the company, Chevrolet, Oakland, Olds, Buick and Cadillac, operated independently as did the various other divisions of the company such as parts, sales, and finance, but all were ultimately coordinated under the Executive Committee. This was a significant change in the organization of a major American company, and it would take time to work out the particulars. Acknowledging General Motors' economic success, many other large companies in various industries would emulate this system in the following decades.

Along with the management and organizational problems, Sloan said General Motors lacked a "clear concept of the business," a clear understanding of the automobile industry and the company's role within it.[45] The absence of a fully coordinated corporate organization had directly affected the product policy: with each division operating independently in making product decisions and setting prices, there was little concern for the company as a whole.[46] As a result, many of the seven different lines in production at the time were in direct competition with each other, actually causing the company to lose money. Buick and Cadillac, due to their longevity in the industry, had some developed markets, but they were the only profit-generating divisions. Buick was known to be somewhat high volume and in the middle-price market, while Cadillac dominated in the low-volume, high-price market.[47] The following chart of all the automobiles produced by General Motors in 1921 illustrates the lack of product policy and the resulting internal competition. Most of the price brackets overlap, for instance the Chevrolet "FB" and the Oakland are priced almost exactly the same. The Oakland, however, offered a six-cylinder engine compared to the "FB"'s four-cylinder, which begs the question: what incentive was there to buy the Chevrolet "FB," when for the same price the consumer could purchase a more powerful car?

| | |
|---|---|
| Chevrolet "490" (4-cylinder) | $ 795 -$1375 |
| Chevrolet "FB" (4-cylinder) | $1320 -$2075 |
| Oakland (6-cylinder) | $1395 -$2065 |
| Olds (4-cylinder "FB") | $1445 -$2145 |
| Olds (6-cylinder) | $1450 -$2145 |
| Olds (8-cylinder) | $2100 -$3300 |
| Scripps-Booth (6-cylinder)* | $1545 -$2295 |
| Sheridan (4-cylinder "FB") | $1685 |
| Buick (6-cylinder) | $1795 -$3295 |
| Cadillac (8-cylinder) | $3790 -$5690[48] |

*6-cylinder engine made by Oakland

In direct contrast to General Motors in terms of product policy was the Ford Motor Company. Henry Ford knew what he wanted to achieve when he produced the Model T, an automobile for the masses, and he carried that into a clear product policy. When it was first introduced in 1908, the Model T was priced at $825 for the runabout model and $850 for the touring car. The price decreased each year with every new improvement in mass production, so that by 1916 the runabout was only $345 and the touring car $360.[49] While it remained in production, Henry Ford tried at every chance to reduce the price of the Model T so more and more people could purchase it. With the Model T's continually decreasing price, Ford was able to dominate the high-volume, low-cost market.

Even with the improvements in production by 1921, General Motors still did not have even one car in the price range of Ford's Model T, as seen in the chart above. Due to the lack of competition offered by General Motors, Ford dominated the entire automotive industry, claiming 60 percent of the market share by 1921, which was a growth of 20 percent from the previous year. General Motors, on the other hand, continued to slide downward in market share, falling from 17 percent to 12 percent between 1920 and 1921.[50] Sloan realized that General Motors had to do something—change something—if it wanted to remain competitive in the industry.

*A Revolutionary Product Policy*

Motivated by economic pressures, Sloan, along with a team formed by the Executive Committee, developed a new product policy directed at penetrating the low-volume market ruled by Ford while giving General Motors the business focus it lacked. The new product policy developed along three lines of thought:

1. There should be cars produced in each price area
2. the different prices should not vary so much as to leave "gaps in the line;" and,
3. there would be no duplication in any of the price areas.[51]

Following these basic principles, it was decided that to maximize quantity and quality, the number of models produced would have to be reduced. The team formed the new price brackets it wanted to occupy before deciding which divisions would be used and which would be closed. The devised price brackets seen below provide a stark contrast to the lack of clear brackets in the previous chart:

$450 - $600
$600 - $900
$900 - $1,200
$1200 - $1,700
$1700 - $2,500
$2500 - $3,500[52]

General Motors' lowest-priced automobile was still not as inexpensive as the Model T, but the committee decided to add another factor into its policy: quality. The idea was that General Motors would attract buyers from above and below the various brackets through improved quality, thus chipping away at Ford's dominance and consequently increasing its market share.[53] Sloan did not think General Motors could challenge Ford directly in the high-volume, low-price market, which Henry Ford had created, but Sloan did believe General Motors could draw buyers from Ford through an emphasis on quality. People might buy their first car from Ford, but their second or third cars would be from General Motors.

With price brackets set, the divisions were reorganized. Sheridan and Scripps-Booth were sold or incorporated into the company leaving five divisions, ordered from bottom to top: Chevrolet, Oakland, a new Buick 4 and Buick 6, Olds, and Cadillac.[54] It would take many years before this new product policy functioned as Sloan imagined, but General Motors finally had a product policy based on "mass-producing a full line of cars graded upward in quality and price," and an organizational structure of decentralization with co-ordination to guide it, resulting in a challenge to Ford and an eventual domination of every price market by the end of the 1920s.[55]

***Part III: The Rise of the Automobile Consumer and Advertising***

As the total number of registered vehicles continued to rise, it became apparent that the automobile would not be a one-time purchase purely for transportation. Local and national governments built new roads in order to accommodate an ever-increasing number of drivers, seeming to confirm that the automobile would be a lasting addition to American life. The first federal highway program was begun in 1916.[56] The growing mass-production industries, including automobiles, employed many Americans, and not only did these workers want consumer goods; they wanted more out of them than utility. Automobile historian David Gartman argues: "As mass production and economic rationalization undermined the meaning and identity that people found in productive activity, they struggled to define themselves increasingly in terms of the things they consumed."[57] Gartman's argument is an echo of the insights of Tocqueville and Veblen. People wanted goods of distinction that gave them individuality in addition to a sense of personal progress.

Businesses, like department stores, were the first to react to this growing trend in the 1910s, hiring stylists to design "unique, stylish packages and dramatic, eye catching displays" to sell "standardized goods."[58] In his book, *Advertising, The Uneasy Persuasion: Its Dubious Impact on American Society*, Michael Schudson explains, "Luxury was not democratized so much as made markedly more visible, more public, and more often articulate—through advertising—than it had been before."[59] There was greater awareness of what was available to the consumer, and the appearance of a good became as important as its function. Automobile companies also became

conscious of the value of appearances and advertising, and began to increase advertisement spending. Historian James Flink documents in his book, *Car Culture*, that spending on automobile advertisements in magazines alone rose from $3.5 million in 1921 to $6.2 million in 1923 and to $9.269 million in 1927, while still only half of American families owned cars.[60] The importance of advertising only continued to grow, with companies spending more and more to ensure their products reached the consumers.

*Brief History of the Evolution of Advertising in America*

The business of advertising has played a crucial role in modern societal development, and therefore, in modern history. The first recorded English advertisement was in 1477 in Westminster Abbey where William Caxton hung a sign on his print shop announcing that his new prayer book could be had "good chepe" (good cheap).[61] Caxton understood how to sell his product: make sure people know it is at a low price. Early American advertisements focused on three simple things: land, runaways, and transportation, and answered people's basic questions of what, when, and where.[62] Limited transportation over far distances and a small volume of goods and services naturally resulted in advertisements that were local, pertaining to a specific community's wants and needs. Patent medicine (a term derived from the "patent of royal favor" conferred on specific elixirs in the colonial era) was one of the few items that experienced mass advertising due to its "one of a kind nature" and relatively easy transportation.[63] Even though advertisements were mostly local, people saw value in them and wanted to use them to make their products known. The majority of newspapers had more ads than news, and to meet the growing demand, newspapers began to reduce their print size and eliminate pictures.[64] Advertisements of the antebellum republic were very functional, telling people what was available, but the rise of industry caused a shift in how they were used.

There is debate among economists about the development of modern mass advertising and the shift away from products serving a merely functional purpose. The early theory argued that in the mid-19th century, increased production due to the technological innovations of interchangeable parts, assembly lines, and factories, resulted in manufacturers having a higher volume of consumer goods. Needing to sell the goods in order to maintain their businesses, manufacturers looked outside their local communities for new buyers. Improved transportation systems like the railroad combined with more newspapers, resulting from increased paper supplies, gave the manufacturer the means to advertise and then deliver the product.[65] The revision of this early theory acknowledges increased quantities due to technological improvements, but argues "it was not however, the need to sell more products that led to advertising but the need to get control of the price the manufacturers charged for his [sic] good."[66] Using advertising, manufactures created brand names by setting standards in quality and establishing trademarks thereby allowing them to equate some monetary value to their specific good. No longer did advertisements tell the consumer where to get a wagon, they told them where to get a particular wagon. This revised theory has become the accepted one and offers that there is more to advertising than just practicality and increased sales numbers; ads can portray a specific product as so desirable that prices are set in the factory rather than in the market, increasing profits as well as sales. Advertisements were not limited to solely providing the basic answers. They now illustrated commodities portrayed to bring the consumer the good life, the American dream fulfilled. Americans responded by using their new purchasing power to buy all kinds of goods. By the turn of the 20th century, modern advertising had developed, and any changes in the coming decades were only variations on existing principles.[67]

***Early Automobiles and Advertising***

Advertising historians Charles Goodrum and Helen Darlymple argue that the inventions of aspirin and automobiles right before World War I changed the appearance of advertisements forever. Aspirin eliminated the need for patent medicines, and therefore the need to advertise them. Automobiles more than filled the void, "completely dominating both local and national advertising."[68] The first automobile advertisements stressed the reliability and durability of the automobile (Fig. 2). "A small crude illustration of the car was overwhelmed with columns of fine print detailing its technical features."[69] The emphasis was on the capabilities of the automobile.

Newspapers and magazines had ignited public interest in the automobile from its inception in the late 19th century by covering races and highlighting engineering improvements. As automobiles continued to grow into a staple of American life, three shifts in advertising marked the period leading up to World War I and following it. First, ads began to focus on the manufacturer and its reliability to produce quality cars. With so many turnovers in the industry, established brand names carried value. The second shift dealt with the car buyer and who he or she was supposed to be. The function of the automobile began to change during this time from a toy of the rich to the carrier of the doctor to the utilitarian vehicle of the farmer. The gender of the driver also changed. More and more ads stressed the simplicity of driving by showing women behind the wheel. If a woman could drive the car, than anyone could.[70] The final shift in automotive advertising "hung on price" and correlated with the second.[71] Automobile prices declined throughout the early 20th century, due in large part to Henry Ford and the Model T, and therefore more people could purchase a car, changing its function in society. Emphasis on the low price was as important as all the available features. Advertisements now focused on the consumer and what he or she could achieve by driving an automobile (Fig. 3).

***Part IV: Automobile Industry Responds to the Consumer***

From a consumer standpoint, the history of the automobile can be divided into three distinct periods: the period before 1908, characterized by expensive cars and a *class* market; the period from 1908 to the mid-'20s, characterized by the Model-T and a *mass* market; and finally the period since the mid-'20s, characterized by a mass market constantly inundated with new and improved cars resulting in a *mass-class* market.[72] General Motors was responsible for developing this third phase, and therefore the automobile, once again, became a symbol of status in the American culture. Ford was resistant to acknowledge that the automobile would not simply be a form of

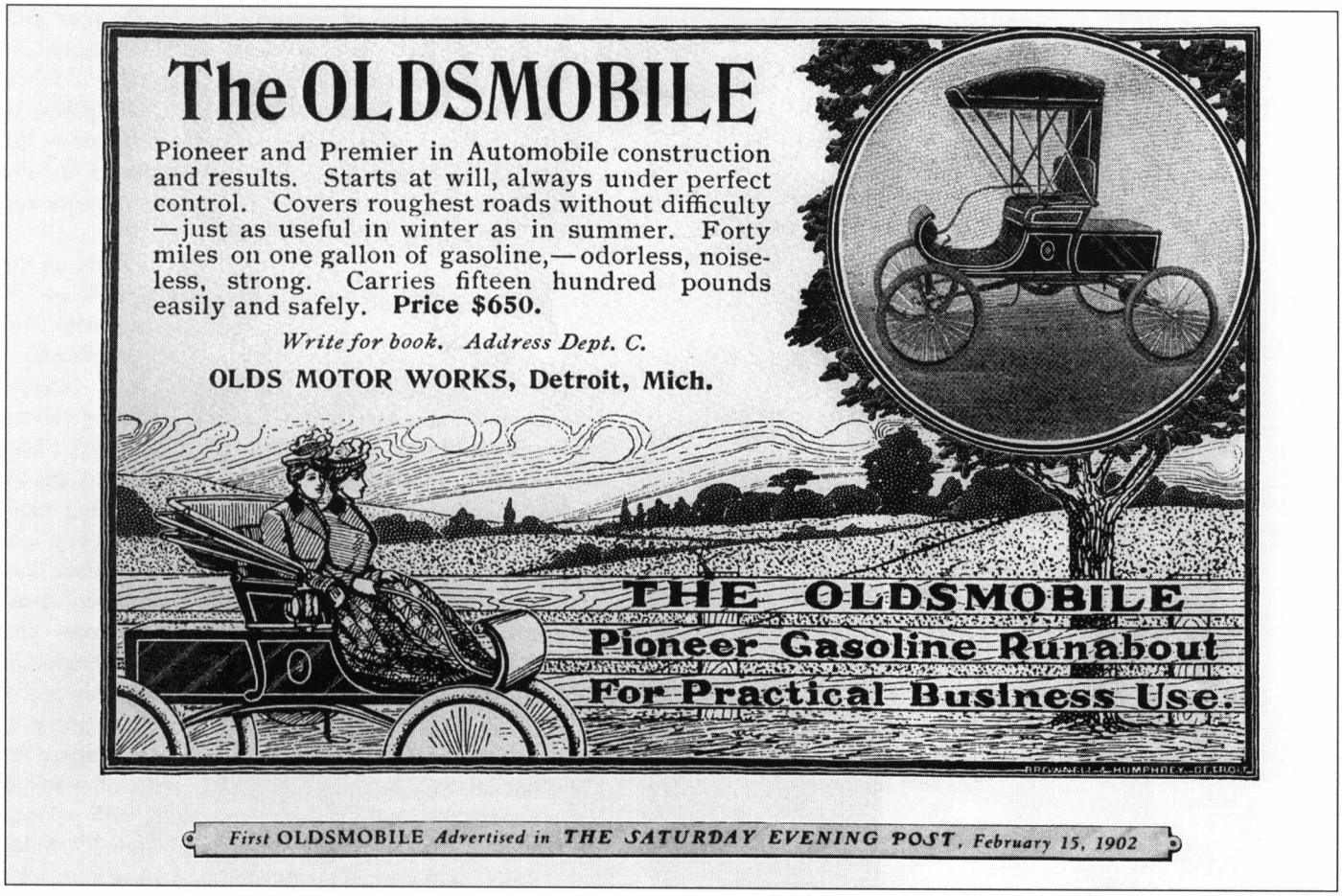



*Fig. 2 – **Early car ad:** The first Oldsmobile ad published in* The Saturday Evening Post, *for February 15, 1902* (from the editor's collection).

transportation and maintained a static product policy. By the early 1920s, half the cars in the world were Model Ts, so there was little incentive for Ford to change. General Motors, in contrast, continued to develop new policies aimed at winning both new consumers and the competitor's customers by offering diversity in their automobiles. As president of General Motors, Sloan led the company through a number of innovations in his desire to pass Ford. Two in particular, the policy of an annual model coupled with the development of automotive styling, were so innovative that by 1929 he had achieved his goal: General Motors had found its way to the top.

*The Annual Model*

In the 1920s, General Motors began to focus on the commercial aspects of the automobile industry, in addition to the mechanical and technical. The production of an annual model was never an explicit policy of any manufacturer during the decade. By default, annual models had always been a part of the automotive industry because as technology improved, which it did quickly in the early years, the changes were incorporated in to the new models each year. As the whole industry stabilized in the latter part of the 1910s, it was no longer as critical to a company's success to emphasize a car's durability and reliability with new functional improvements because there was an established consumer market. As a result, distinct model changes began to occur much less frequently, even though the companies continued to produce new cars every year. The Model T, for instance, changed very little from its debut in 1908 to its exit in 1927.

In July 1925, the General Sales Committee at General Motors discussed the details of the annual model concept in a discussion entitled "Annual Models Versus Constant Improvements."[73] Sloan argued that each year the models had to be bigger and better, so as to entice buyers. The committee, however, was concerned about pledging the company to the idea, with many in higher management wishing to maintain their current procedure of stressing "constant improvements." Several worried that with such a bold statement as "annual models," the company was setting itself up for possible embarrassment or failure if they could not live up to the promise. General Motors in 1925 did not formulate the policy as it is known today, but it is important to note that it was thinking about it and recognized the importance of attracting buyers with new models. The idea slowly developed during the coming decade as production changes became more regularized, and sometime in the 1930s executives started referring to the new cars as annual models. Sloan never attributed it to a certain date or year, but considered it a "matter of evolution."[74]

*Introduction of Automotive Styling*

General Motors' second great innovation of the 1920s, automobile styling, came as a product of the first. Sloan wanted


*Fig. 3 – **Into the West:** Jordan Motor Car Company was the first manufacturer to use advertisements that stressed the consumer. This advertisement appeared in 1926. The emphasis is on the consumer escaping reality and driving off into the West. It is about the driver and what she is experiencing, rather than what the automobile can actually do. Ads such as this would become more popular throughout the rest of the 1920s, and we still see ads such as this today.*

to focus on the automobiles' appearance in the new models, but he did not trust the engineers. He needed something different, someone new. On June 23, 1927, Sloan announced the creation of a first of its kind automobile division, the Art and Colour Section.[75] At its head was Harley J. Earl, a custom car builder from California. The new section proved to be just what Sloan needed in order to achieve his policies. For the next 30 years, Earl and the General Motors Art and Colour Section, led not only the company, but also the entire industry in automobile design.

There was no automotive styling in the early years of manufacturing. Engineers dominated the automobile industry from the very beginning, and the appearance of the automobile reflected it. When building the first cars, engineers turned to the carriage builders for bodies, hence the name "horseless carriage," while they themselves continued to focus on the mechanical and technical aspects of the cars.[76] As the bodies began to develop they had a "disjointed and discontinuous look, lacking any aesthetic unity between their elements."[77] The automobiles were also for the most part open, limiting their use to warm weather seasons. As ownership continued to rise and people wanted to use their car more often, closed cars developed. Unsure of how to integrate this new design into the automobile due to the limitations in placement of parts, manufacturers literally built "up," giving the car an even stranger appearance and making it highly unstable.

In general, automobile sales began to slump in the early 1920s. Sloan had a plan but was having problems in its implementation. He did not want to compete with Ford head on, but wanted to attract buyers with an emphasis on quality for a little more money. Engineers at General Motors under the direction of Charles F. Kettering viewed improved quality to mean improved technology.[78] Sloan was unsure if technology was the best way to ensure increasing sales because, in addition to making cars, General Motors was also attempting to make money, and technological improvements could be expensive since they took a lot of research and testing.[79] However, then-president, Pierre du Pont, sided with the engineers, and pushed the production of a new copper-cooled engine to boost falling sales. The engines were a bust, only a few were made and all had to be recalled. After deciding to scrap production of the new copper-cooled engine, GM "introduced in 1923 a Chevrolet with 9-year-old technology but a body of the newest style, with a lower roof, higher hood, and more rounded lines."[80] Sales increased, as people liked the way the car looked more than anything else. Sloan, along with the rest of General Motors, saw that better quality could be translated to mean better-looking cars. Sloan knew how to proceed to achieve his product policy: focus on the automobile's appearance![81] It was not until 1927 that styling became an integral and important part in the automobile industry. In an industry where automobile functionality had been the main focus since its inception, the entrance of stylists and an emphasis on appearance marked a fundamental change. The infrastructure that had defined the automobile industry was turned on its head, and Harley Earl rose to the top.[82]

### *The First Man of Automotive Styling*

Harley J. Earl (1893-1969) came from Hollywood, California and was the son of a carriage maker.[83] As the transportation industry evolved, the Earls (like so many others) turned to automobile production, specifically the bodies. Working in his father's custom body shop, Earl Automobile Works, Earl made a name for himself by designing custom bodies that fit on American and foreign car frames for movie stars. General Motors first became aware of Earl through their leading Cadillac dealer in the area, Don Lee, who had bought Earl Automobile Works. Larry Fisher, head of Cadillac at the time, decided to see for himself what the young son of a carriage maker was doing that attracted so many buyers. When he arrived, Fisher was amazed not only at the designs Earl was creating but more so with how he was doing it. Instead of using the traditional wood and metal models in designing,

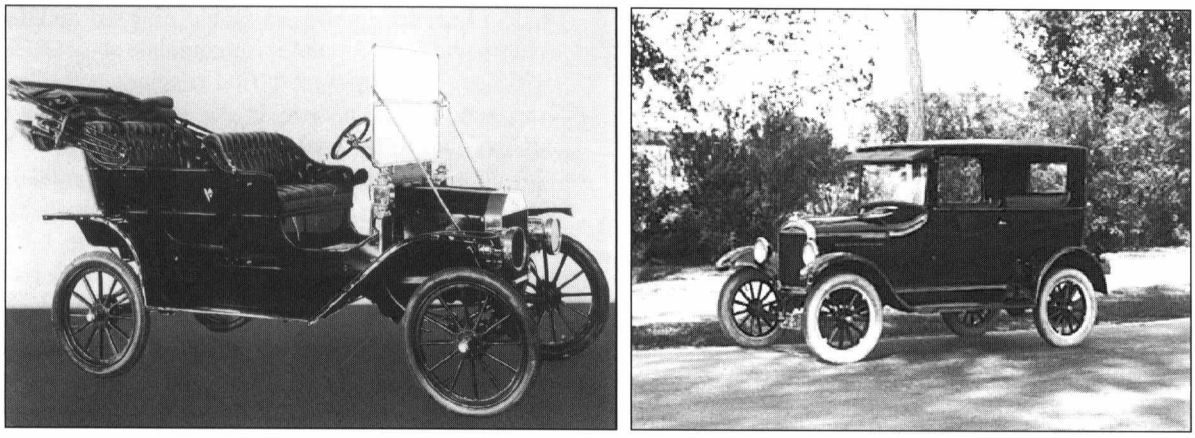


*Fig. 4 – **For Comparison:** Top left: the 1908 Ford Model T, commonly referred to as the "Tin Lizzie" or the "Flivver." Top right: the 1926 Ford Model T, which is closed in, but not drastically different even though it had been in production for over ten years. Bottom left: the 1928 Ford Model A, which is really not that different from its predecessor. Bottom right: the 1927 La Salle, with Harley Earl behind the wheel and Larry Fisher leaning on the side. The La Salle is completely different than any of the Fords. It is lower and longer, sporting features like chrome and detail that were found only on only the most luxurious cars. The La Salle was mass produced luxury.*

he used full size clay models. In addition, Earl designed every visible part of the car in the clay providing the unified and integrated look General Motors wanted. Fisher brought Earl back to General Motors and asked him to design the new Cadillac La Salle, which was to be a lower-priced luxury vehicle between Buick and Cadillac. GM wanted an automobile that appeared to be a custom-built, luxury vehicle but in fact was mass-produced. It was the first time, historian Ed Cray argues, that GM "executives were planning for the future, anticipating needs rather than responding to market turns."[84]

The La Salle was a huge success with the public and helped confirm the future dominance of stylists in automobile manufacturing. Earl's success not only proved to Sloan at General Motors that appearance was critical but also brought it to the attention of Henry Ford. The La Salle debuted in March 1927 and on May 25, 1927, Ford announced the end of production of the Model T.[85] The end of the Model T was not directly related to the introduction of the La Salle; Ford had been declining in total market share for a few years, and Ford's son Edsel had been pushing for a new model. The success of the La Salle just confirmed Edsel's pleas and motivated Ford to act quickly. A few months later he introduced the Model A, as a response to General Motors, but to many it only appeared a little more stylized than the Model T, leaving many customers looking elsewhere for a new car (Fig. 4). The La Salle and Earl's Art and Colour Section marked the fall of Ford as the leader in the automotive industry and the rise of General Motors.

*The Art and Colour Section Develops*

Initially the Art and Colour Section was under a general organizational staff headed by Sloan. It was not associated with any particular division because Sloan anticipated that the engineers would resist the incorporation of stylists in the production process. Under the personal patronage of Sloan, Earl's "duties were to direct general production body design and to conduct research-and-development programs in special car designs."[86] Sloan perceived the situation correctly: nobody liked the stylists, and nobody wanted to work with their section. There were two primary reasons for their objection: one, they could not accept that style sold cars, and two they did not like Earl. Earl came from California and brought his flamboyant dress and tanned skin with him to the more conservative Detroit. In addition, his boisterous, though at times charismatic, personality did not always mesh well with the hard-nosed productivity-oriented engineers running the various divisions.[87] One incident in 1929, however, proved the necessity of Earl and his stylists.

Earl was asked to help design a new car for Buick in 1929 to commemorate its Silver Anniversary. It was going to be lower "with a slight roundness both ways from the beltline highlight" than previous Buicks.[88] The Fisher Body Division, without consulting Earl, greatly altered the design by pulling the side panels in farther and adding five inches in height right before production began, giving it a bulbous shape. The public, and history, aptly referred to it as the "pregnant Buick," and General Motors pulled it from the market as quickly as possible. It was a corporate embarrassment, but as a result, it showed the importance of communication and cooperation between divisions. After this debacle, Earl received the corporate support, and divisional acceptance, to control centrally all designs. Many in the industry remained skeptical of the importance of style and design, but Earl, in the following decades, left little doubt. [89]

*The Social Impact of Automobile Styling*

Sloan viewed styling as the future of the automobile industry. Though the creation of the Art and Colour Section came after the initial discussions of an annual model policy, styling was the main thrust of its evolution and acceptance. With each new production year, Sloan thought that "the changes in the new model should be so novel and attractive as to create demand for the new value, so to speak, and create a certain amount of dissatisfaction with past models as compared with the new one."[90] He, therefore, wanted each car General Motors produced to have a distinct appearance and style, "so that one knows on sight a Chevrolet, a Pontiac, an Oldsmobile, a Buick, or a Cadillac."[91] In order to regularize change, and as a result consistently produce new models, Sloan turned to Earl and his design team.

Within General Motors, Earl was not known for his technical drafting skills or his ability to dictate orally what he wanted created.[92] He was, however, "an uncanny commercial critic, with an extraordinary ability to anticipate the sales success of a design."[93] He could anticipate the style changes in all aspects of consumer culture and transfer them to the automobile. Under Earl's direction, automobiles from the late 1920s onward occupied a new role in the consumer culture. Just as clothes became fashion symbols at the turn of the 20th century, automobiles became a form of fashion in the 1920s through styling. Michael Schudson explains that "Fashion differs from dress in that it is not a traditional expression of social place but a rapidly changing statement of social aspiration."[94] Automobiles also became a "statement of social aspiration." Between General Motors' hierarchy of cars and Earl's seemingly limitless progression of styles, it was possible for one's car to be representative of the owner. Earl made automobiles the new fashion, an "externalized symbol system that connect[ed] people to social worlds and individualize[d] them in those worlds."[95] His abilities to predict and manipulate consumer styles were confirmed in sales, allowing Earl to rise in the company and earn respect for stylists throughout the industry.

*Automobile Styling as an Occupation*

The introduction of an Art and Colour Section was new to the automobile industry, and Earl deserves the credit for building it into a credible and respectable division and for essentially creating the profession of the automobile stylist.[96] His main focus in building his team was to find talented art students who loved cars, and then train them in the skills necessary to turn their passion into functional reality.[97] He said they had to have "gasoline in their blood." Though Sloan was proud of the fact that General Motors was the first automobile company to hire women stylists (in the 1950s), Earl tried to maintain the male gender dominance in the business for as long as possible by initially only hiring men.[98] In the first year Earl hired 50; by the 1950s the division employed over 1,200 and even had its own building.

Automotive styling at General Motors was fundamentally different than automotive styling at any of the other auto manufacturers.[99] For one thing, by proving to top executives and engineers that appearance mattered, Earl had an independence not experienced by other stylists. After Walter P. Chrysler left General Motors to form his own motor company, he began to mimic not only its corporate structure but also the product policy of a hierarchy of cars. In July 1928, he founded an Art and Colour Department under the leadership of Herbert H. Henderson, hoping to mirror some of General Motor's success with an emphasis on style changes. But Henderson had only four designers and he reported not to Chrysler, like Earl did to Sloan, but to Oliver H. Clark, the chief body engineer, limiting his ability to contribute meaningfully to the production process. Henry Ford was the most resistant to acknowledge the growing trend regarding style, and it was reflected in his ever-decreasing sales numbers as he failed to produce new and exciting cars, clinging to his static one-model production ideology. Further, Earl was in charge of designing the whole car, interior and exterior. Most designers were only allowed to contribute suggestions and basic ornamentation to the design. As a result, Earl was able to achieve the aesthetic unity that was so highly praised and desired.

The Great Depression and World War II put a halt to new and innovative automobile production. Throughout the Great Depression, people continued to buy cars but in ever decreasing numbers. During the war, the automobile industry mobilized to contribute to the war effort, completely stopping automobile production in 1942. Following World War II, the American economy experienced a short recession before returning to a pre-war level and then surging well beyond it. Prices were low, employment was high, people had money, and they wanted the "good life." They hurried to their local dealerships, yearning to trade in their old, obsolete models for the latest and greatest, and the automobile industry was ready for them.

***Part V: The 1950s***

Some historians argue that the 1950s were the golden era of automobile manufacturing and design, the "Detroit Baroque."[100] What separates the 1950s from the previous decades? Historian David Gartman argues that during the 1950s, "the automobile industry blazed a path of fantastic, escapist consumption that brought to fruition the trends in automobile styling set in motion back in the 1920s."[101] The 1950s were a fulfillment of plans and ideas formulated in the 1920s; plans and ideas that only had been interrupted by the onset of depression and war. There was no fundamental shift in General Motors'

product policy at the time. It still had the goal to produce a variety of cars arranged hierarchically by price and quality. But there were two new emphases: (1) if you cannot sell more cars, "sell more car per car," i.e. bigger cars with more accessories and (2) try to entice consumers to buy cars more frequently, creating higher market turnover, i.e. new models should be more exciting than the previous year's model.[102] Adherence to these ideas was obvious in all the major automobile manufacturers, but it was General Motors and Harley Earl who once again forged the way for the rest of the industry.

*The Big Three*

At the start of the decade, the Big Three: General Motors, Ford, and Chrysler dominated the industry. The few independent companies remaining fought for survival by merging together in various conglomerates, but none could ever really mount a viable challenge. "Style was both the cause and consequence of oligopoly in the industry," resulting in the Big Three holding 94 percent of the market by 1955.[103] The emphasis on style was one of the main reasons for the collapse of so many small manufacturers. Even though style changes may have been less expensive than technological ones, they still cost the corporations millions of dollars. Sloan estimated that in the early 1940s General Motors spent about $35 million annually in style changes.[104] In addition, technological improvements were often shared by the industry as a whole unless the engineer sought a patent, which was rare. Style, on the other hand, was unique to each company. The smaller manufacturers simply did not have the capital to invest in the style changes necessary to make their products new and exciting, and they slowly began to fold. In 1908, 515 different automotive manufacturers had entered the market in the United States; at the end of World War II there were only a handful.[105]

*Tail Fins*

If the 1920s provided policy direction for corporate executives, then the 1940s and World War II gave Harley Earl his design inspiration. Earl became fascinated with war jets after seeing a picture of the Lockheed P38 in a magazine. He set up a visit to Selfridge Air Force base near Detroit for himself and his team in order to get an up close look at this amazing aircraft. Unfortunately, they were not allowed within 30 feet of the plane due to security, but it was enough to inspire Earl for years. Earl loved the look of the planes, so long and sleek, and most especially the twin tail booms, which were the forefathers of the famed '50s tail fins. [106] Earl was hesitant to incorporate the idea into automobile design. Testing the market in 1948, General Motors released the first Cadillac with tail fins (Fig. 5). People liked them, and so in 1949, Earl repeated the design theme. People did not just like them, they loved them; 1949 was Cadillac's best sales year to that date.[107] Other companies also adopted the design: Chrysler in 1956, and, Hudson, Studebaker, and Nash in 1957, and even Ford.[108] By the end of the decade, tailfins were so huge, they were perceived as ridiculous. In 1965 the new Cadillac debuted without them, and thus tail fins exited as quickly as they had entered.

The tail fin was the epitome of automobile design manipulation. With the 1927 Cadillac La Salle, Earl fundamentally changed the way a car looked. Earl focused on two things: making the automobile lower and longer.[109] People had wanted to improve car design for years; he was the first to show them how. There were also functional benefits with the new design. The longer design gave passengers more comfort, and the wider wheelbase helped with stabilization. The tail fins, in contrast, were completely superfluous. In addition, Earl was responsible for making tail fins desirable. It was a psychological test to put tail fins on the Cadillac first. If Cadillac buyers liked them, then it could be expected that everybody else would too, since Cadillac was the most prestigious car on the market. The tail fin is the paragon of Earl's ability to perceive the market, cater to it, and also manipulate it to suit his sense of style.

***The Conspicuous Consumer Rises Again***

Earl and the tail fin were so successful in the 1950s because consumers had changed. People wanted to buy new cars, and the number of cars in America doubled between 1945 and 1955 from 26 million to 52 million.[110] Gone was the conservatism of the Depression and wartime eras. In its place, the mass consumption of the 1920s had returned with a renewed vigor. Everybody wanted bigger cars, because in the 1920s the larger cars were the most expensive, conferring the highest status upon their owners. Consequently, during the 1950s, automobiles got bigger and bigger because people, generally more prosperious, wanted to appear wealthier. A good example of increasing size is the Chevrolet. Between 1946 and 1959, the two-door sedan grew 13 inches in length, 7 inches in width and was lowered 10 inches, gaining 400 hundred pounds of weight.[111] It was a whale on wheels.

Gartman argues that with all automobiles getting longer, lower, and flashier, differentiation no longer came through superior production quality. Rather "this homogenization of the automotive market ideologically obscured the real class hierarchy of production power behind a substitute hierarchy of consumption in which people were differentiated by income extracted from a supposedly equitable market."[112] This is an idea espoused by Tocqueville in Democracy in America, one that had made him wary of the ever growing American material culture. Material items cannot always be a means of individualizing because they can represent a false reality. Schudson explains the appeal of using material goods for self-representation. "Material goods became 'visible symbols of inner worth' in worlds where few other symbols had permanence or continuity...Consumer goods begin to be an index and a language that place a person in society and relate the person in symbolically significant ways to the national culture."[113] General Motors in the 1950s wanted people to continue buying cars and so, as they produced more cars, they continued to emphasize status associated with particular makes. A ladder of consumption was as important as a ladder of production. Not only was there conspicuous consumption, but also General Motors contributed to the process by being a conspicuous producer.

*The Importance of Advertising*

Following the war, with people ready to resume consuming, advertising "took the middle class in its everyday American way of life, and illustrated a happy slice of it."[114] During the 1950s, advertising spending increased by 75

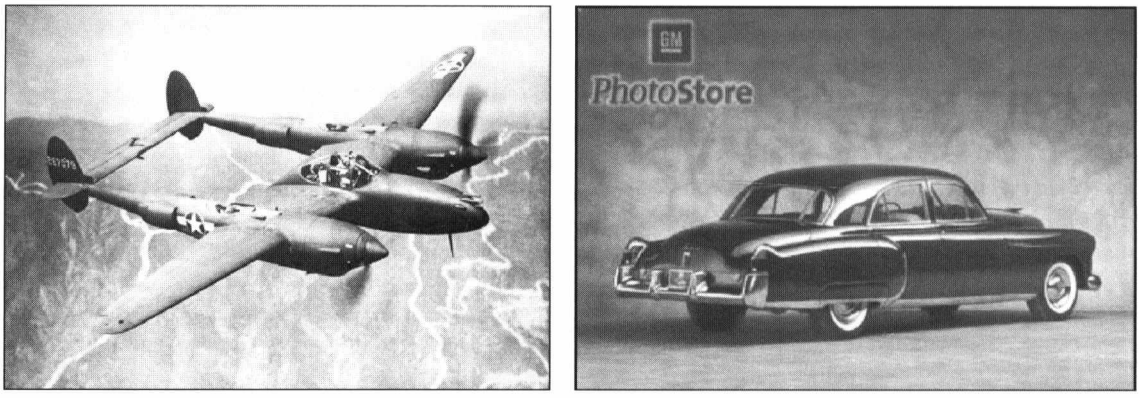
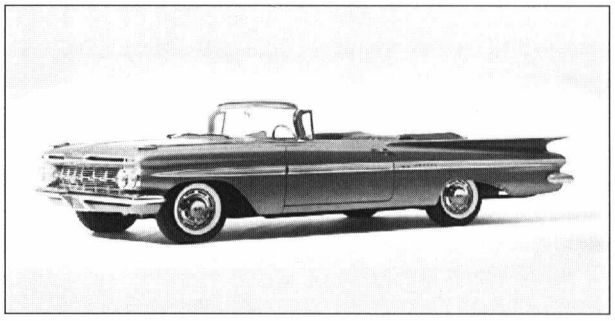



*Fig. 5 – **The Inspiration and the Products:** On the left is a picture of the Lockheed P38, a World War II fighter plane. On the right is a 1948 Cadillac, the first car designed with tail fins. You can see the slight rise in the tail lamps. Throughout the decade of the '50s, these would continue to be enlarged. Below is the 1959 Chevrolet Impala convertible, which had some of the biggest and most dramatic tail fins.*



percent, with General Motors leading the way.[115] Within automobile advertising there were two prominent themes, both derived from established product policies. The post-war era experienced great prosperity and so manufacturers, recognizing an increase in disposable income, made the new models the focus of all the ads, encouraging consumers to buy a new car every couple of years. In addition, the policy of planned obsolescence, though never explicitly stated, developed along with the annual models, and was geared at creating dissatisfaction among consumers with their old models, in order to get them to buy new ones. The second theme was that "Cars were to be personal expressions of the psyche of the owner." Automobiles took on all kinds of connotations: "mistresses, workhorses, weapons, plumes to be flaunted, or bait for sexual conquest."[116] This new theme served to reinforce what each of General Motor's divisions socially represented. Historian James M. Rubenstein outlines the ladder of production and the consumer images associated with each. First time buyers started with a Chevrolet for the new family and then "stepped up to a Pontiac, a bit sportier than a Chevrolet; or to an Oldsmobile, with its 'advanced' engineering features, such as a 'Rocket' engine and a Hydramatic transmission; or to a Buick appointed for a successful doctor or lawyer; or ultimately, to the unrivaled luxury of a Cadillac."[117] General Motors conveyed these images to the public through their advertising campaigns. Following are examples of advertisements from all the divisions to illustrate the point (Figs. 6-10).

*General Motors' Own Brand of Advertising*

The key to the success of the tail fin was its gradual implementation. Earl understood that consumers needed to be cultivated; new designs could not be hurled at them. It was also necessary to know the specific buyer's market for each division. In order to prepare the public for future new models, Earl and his team designed "dream cars" and displayed them in extravaganzas called Motoramas. Automobile shows first began in 1900 in five American cities, but they were nothing compared to the 1950s Motorama Shows.[118] Using them as a testing ground for new consumer opinion, Earl designed and built futuristic, concept cars geared at making American fantasies come to life. They were also used to introduce the consumers to designs already in production, giving an impression of technological improvement, and therefore progress.[119] Taking a standard feature, they would make it an extreme on the dream car, so then when the automobile debuted, the people saw the resemblance to the dream car and thought it was better. The first General Motors Motorama occurred in 1949 at the Waldorf-Astoria Hotel in New York attracting crowds of thousands. People from everywhere wanted to go to see these "dream cars." Through the Motoramas, Earl's true talent, the "ability to probe the psyches of consumers and turn their repressed desires into salable visual styles," was best exemplified.[120] Every year there were new Motorama Shows with new "dream cars," traveling the country and showing people things they never thought were possible, it was the future in the present.

# *The '56 Chevrolet*

*It looks high priced—but it's the new Chevrolet "Two-Ten" 4-Door Sedan.*

## For sooner and safer arrivals!

*It's so nimble and quick on the road . . .*

Of course, you don't have to have an urgent errand and a motorcycle escort to make use of Chevrolet's quick and nimble ways. Wherever you go, the going's sweeter and safer in a Chevy.

Power's part of the reason. Chevrolet's horsepower ranges up to 205. And these numbers add up to *action*—second-saving acceleration for safer passing . . . rapid-fire reflexes that help you avoid trouble before it happens!

True, lots of cars are high powered today, but the difference is in the way Chevrolet *handles* its power. It's rock-steady on the road . . . clings to curves like part of the pavement. That's *stability*—a matter of build and balance that helps make Chevrolet one of the few great road cars!

Highway-test one, soon. Your Chevrolet dealer will be happy to arrange it. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**THE HOT ONE'S EVEN HOTTER**

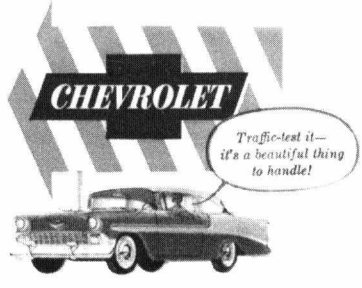



*Fig. 6 – **The Meaning Behind the Ad:** This '56 Chevrolet advertisement illustrates the beginnings of a young family and the safety and reliability of owning a Chevrolet.*

Earl's first "dream car" was the 1938 Buick "Y Job."[121] It was a testimony to all of his design ambitions (Fig. 11). The car had "electric windows, power-operated concealed headlights, a power-operated convertible roof . . . wraparound bumpers . . . flush door handles, and the first horizontal grille for the radiator."[122] Many of these features would later be incorporated into various makes and models, but at the time it was a huge leap forward in progress. World War II however halted that process, as all manufacturing shifted to aid the wartime production. Following the war, Earl emerged with renewed vigor and new inspiration.

As mentioned earlier, the jets of World War II fascinated Earl, and he incorporated more than just tail fins into the 1951 Le Sabre, named for the F86 Le Sabre jet (Fig. 12). The Le Sabre was the first dream car built since the Buick "Y Job," and it was "a phallic jelly-mould of a car with aeroplane nozzles and details."[123] The most important feature to come out of the Le Sabre and be incorporated into the general design was the wraparound windshield. Not only could engineers at General Motors at first not mass-produce it, they said it distorted the driver's vision. But that did not stop Earl; he wanted the windshield. Finally technicians at Libbey-Owens-Ford were able to produce them in large numbers, but they were never able to correct the vision.[124] The wraparound windshield in many ways was similar to the tail fin. It did not provide a tangible benefit to the consumer, actually it was a danger to them, but it was fashionable. Earl made the wraparound windshield desirable: "With a panoramic windshield you were fashionable, without it you were *démodé*."[125] Throughout his career, Earl was responsible for making hundreds of designs, both functional and frivolous, part of mainstream America's imagination.

Through advertising, automobiles were not only status symbols but also icons of American culture. Mary Cross, editor of *A Century of American Icons: 100 Products and Slogans from the 20th Century Consumer Culture*, explains: "Products become iconic when advertising and its strategies of persuasion and repetition turn them into cultural artifacts, carving them as it were into the Mount Rushmore of consumer desire."[126] She continues: "An icon whether word or picture, is, in addition, ideological in the sense that it reflects the values, needs, and aspirations of a culture. It becomes part of the story that a society tells itself, mythic in expressing cultural narratives important to that society."[127] Many products have become icons in American culture, but the automobile is unique in that its impact affected social class structure in a very major way.

***Part VI: Conclusion***

There has never been another product in the American economy quite like the automobile. In their informative study, *Middletown in Transition*, Robert and Helen Lynd documented that by 1929 the automobile was a necessity in American life and influential in American culture.[128] In a relatively short period, the role of the automobile in society transformed, just as Veblen had noted with so many previous goods once limited to only the leisure class. A presidential commission in 1933, observed the impact of the automobile on American culture, stating: "It is probable that no invention of such far reaching importance was ever diffused with such rapidity or so quickly exerted influences that ramified through the national culture, transforming even habits of thought and language."[129] The impact and influence of the automobile only continued to increase in the following decades. Besides its durable yet seemingly disposable character, the automobile is uniquely capable of implying status and therefore defining a social class structure. In *The Status Seekers*, his highly read and acclaimed book, published in 1959 at the end of the American automotive golden age, Vance Packard addressed this very issue. In the late '50s, Americans "were spending more of their total income on the family chariot than they were in financing the homestead, which housed the family and its car or cars," in an attempt to achieve status enhancement.[130] General Motors was, in large part responsible, for developing and then cementing the correlation between car and social status in American culture by the 1950s. Through its five divisions—Chevrolet, Pontiac, Oldsmobile, Buick, and Cadillac—GM ensured there was "a car for every purse and purpose." This melding of the car with national culture took root early in the 20th century but came to full fruition in the 1950s.

The decades following the 1950s marked serious changes in the automotive industry. Movie stars, for one, no longer felt distinguished buying the big American cars.[131] They turned to smaller, custom made cars from Europe and Asia. The general public, seeing their idols change their buying habits, also began looking overseas for new models. Problems with safety and a new awareness for the environment also affected American buying habits. The Japanese and then Korean cars were thought to be more reliable and environmentally friendly. Finally, economic problems such as high oil prices drove Americans to smaller, more fuel efficient cars in the 1970s, resulting in a much wider automotive industry that was no longer just dominated by the big three: General Motors, Ford, and Chrysler. In the following decades, these companies would have to fight for every market share possible, and try to convince the American people that it was better to drive an American car over something else.[132]

One of the most interesting aspects regarding the automobile and its social influence is the lack of scholarship on it. Historian James Flink asserts, "Professional historians have devoted relatively little attention to the American automobile revolution."[133] The little history we do have centers around the people who developed the automobile and the industry like Henry Ford, without much focus on the impact of the automobile on American society. It was not until December 29, 1971, that the American Historical Association formally recognized "a growing interest in automotive history by holding its first session on the impact of the automobile."[134] Seemingly such formal recognition was necessary to provide a shift in the historical study of the automobile. Following the session, historians began to study the critics of the automobile, who had begun to appear in the 1960s, in order to come to an understanding of the automobile's role in American history.[135] The automobile is a relatively new addition to America, but its impact, economically and socially, cannot be denied. Most of the recent scholarship tends to focus on the social aspects of the automobile, primarily on the negatives,

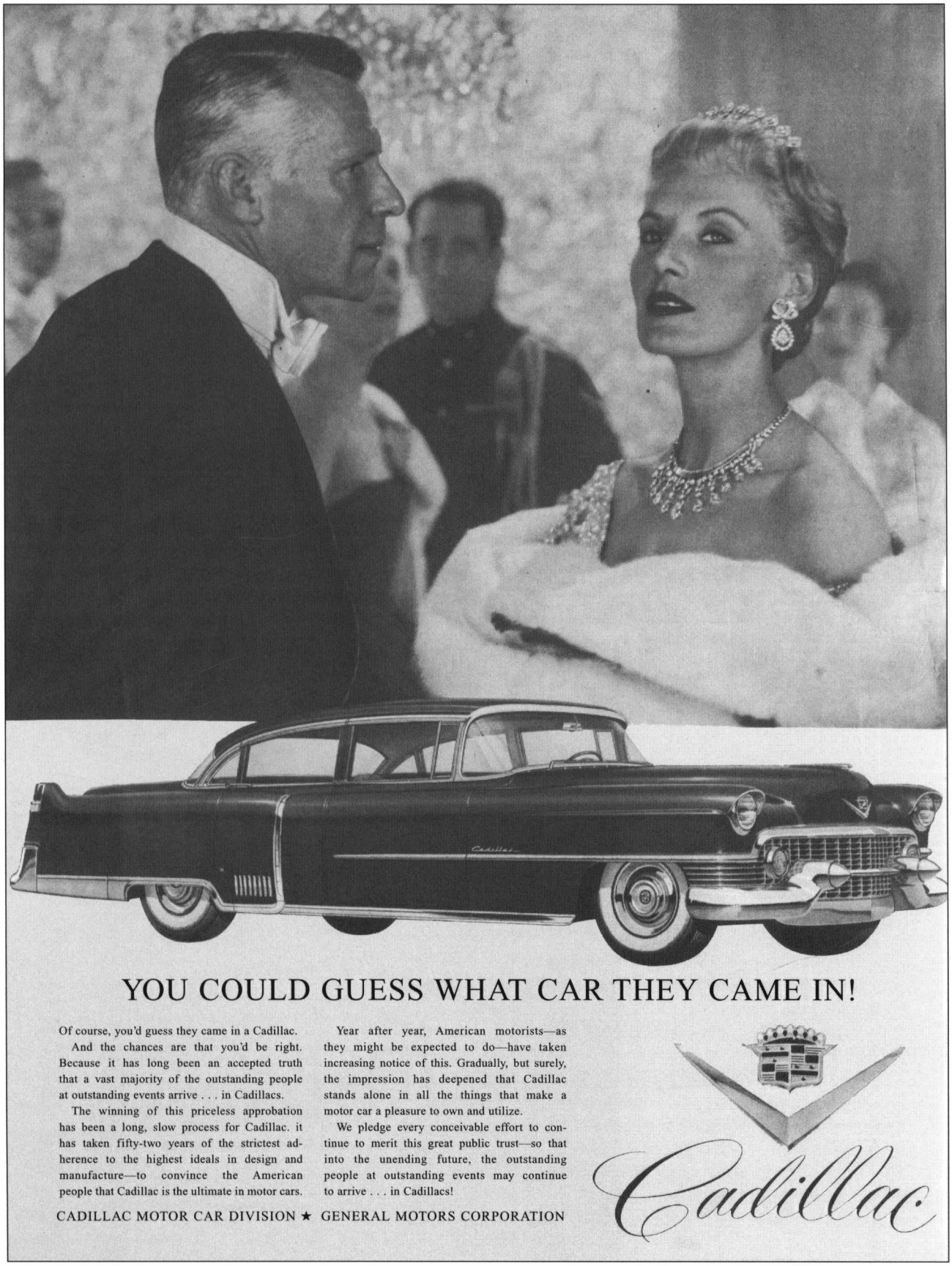



*Fig. 7 – **An Automobile for the Conspicuous Consumer:** Comparing this 1954 Cadillac ad with the 1956 Chevrolet ad (Fig. 6) it is obvious that Cadillac is appealing to a different consumer. The people in the ad look very wealthy and distinguished. This is not the everyman's car, it is the ultimate car of luxury. The purchase of a Cadillac would be an act of conspicuous consumption according to Veblen's definition. Buying a Cadillac was not simply about buying a form of transportation; it was buying a lifestyle and status.*


*Fig. 8 – **Youth Appeal:** This 1955 Pontiac ad is very different from either the Chevrolet or the Cadillac. It is much simpler and draw the reader's attention to the fun color Avalon Yellow. Pontiac is attracting a different, probably younger consumer than the other divisions. In the 1960s, under the direction of John de Lorean, Pontiac developed the idea of the "muscle car" with the production of the GTO.*

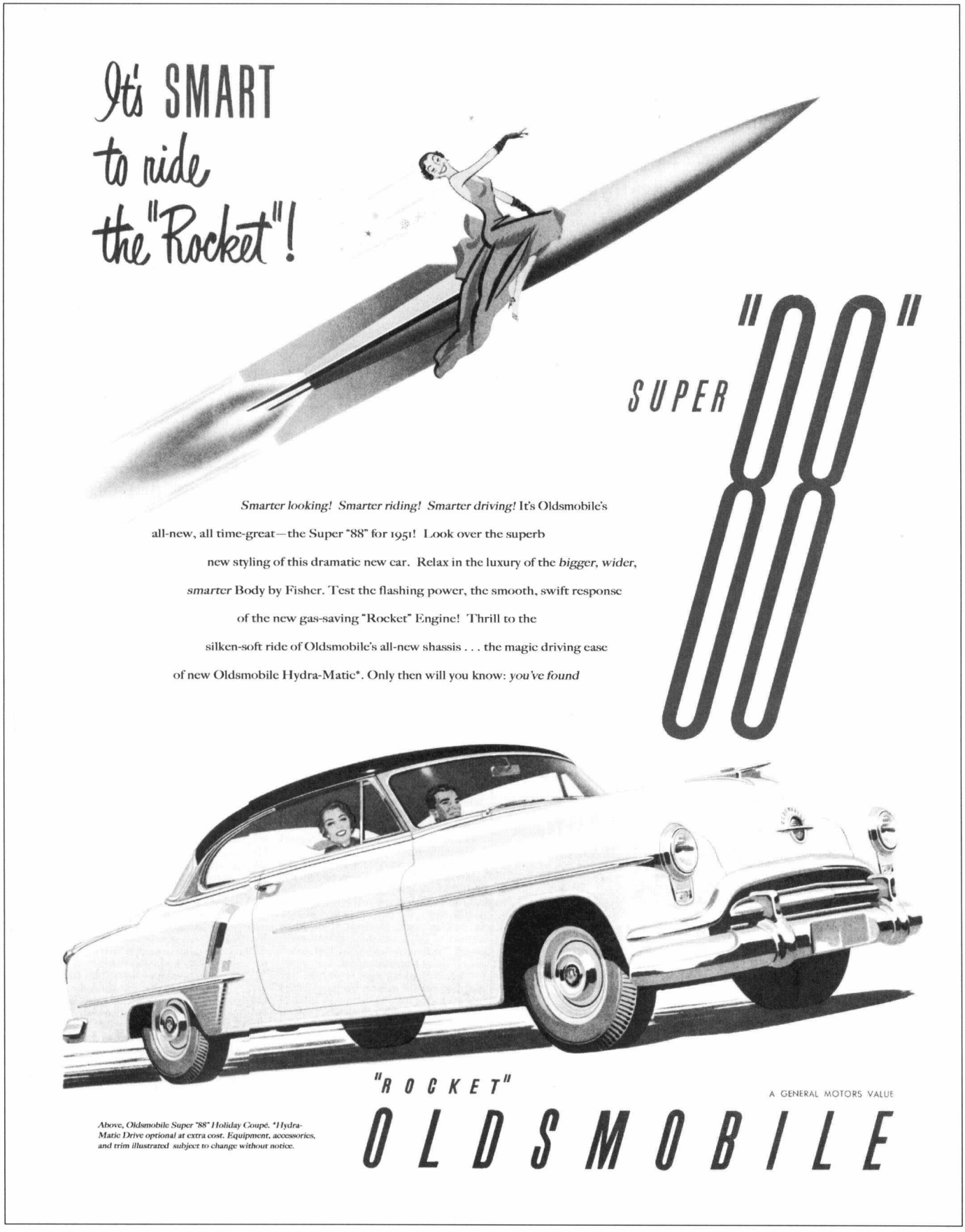



*Fig. 9 – **Innovation:** Technological improvements were important to styling. In the 1950s, Oldsmobile advertisements such as these featured technological improvements like the Rocket Engine. The technologically conscious consumer would be attracted to an Oldsmobile over another make and model.*


*Fig. 10 – **Airplanes and Cars:** Features from World War II aircraft were incorporated into Buicks. Also with the growing interest in space, stylists included space age symbolism into designs. Buicks were most famous for their three and four ports on the sides, Venti-Ports. First used for ventilation, they were later sealed off and were merely ornamental. The aeronautical influences of the 1950s represented America's military triumph and progress, contributing to a growing national spirit (Gartman, p. 162).*

seeing the rise of giant corporations like Ford and General Motors as detrimental to society.

In many ways, Americans today seem to have lost their love affair with automobiles. It is a testament to the changing desires of an evolving society. Some new way of social differentiation will surely arise, and other material products of the Information Age will provide their own social impacts that will be studied and analyzed in the coming century. The automobile's place in American history is only beginning to be comprehended, and Tocqueville and Veblen provide an excellent historical framework for analyzing its development, while General Motors serves as the paradigm of the automotive industry. Scholars and people alike continue to debate the influence of automobiles on the complexity of society, in search of what it means to be an American.

***Illustration Acknowledgements***

Some images were acquired through the Google Images search engine. Below is the URL where they can be located along with the date they were originally accessed.

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*Fig. 11 – **The First Dream Car:** Earl sits behind the wheel of his first dream car, the 1938 Buick "Y Job." Though the car was never mass-produced, many of its features were incorporated into other makes and models following World War II.*


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*Fig. 12 – **A Plane on Wheels:** Earl's first dream car following the war was the 1951 Le Sabre. It was also never mass-produced, but it did influence the appearance of cars throughout the 1950s.*


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[46]Ibid., p. 60.

[47]Ibid., pp. 59-60.

[48]Ibid., p. 59.

[49]Flink, op. cit., pp. 52-53. Sloan discusses the Model T's decreasing price as a strategy Ford repeatedly used to stimulate growth, p. 69.

[50]Sloan, op. cit., p. 60.

[51]Ibid., pp. 63-65.

[52]Ibid., p. 67.

[53]Ibid.

[54]Ibid., p. 69. Though there were two Buicks produced, the Buick 4 and the Buick 6, both were in the Buick division, so there was a total of only five divisions.

[55]Ibid. Sloan's product policy was revolutionary and all other major manufacturers eventually imitated the General Motors system. In 1922, Ford bought the Lincoln Company from Henry Leland. It was a luxury car division designed to challenge Cadillac's high-end low-volume market dominance. Lincoln and Cadillac, interestingly have the same origins. Leland founded the Cadillac Motor Company and introduced his first Cadillac in 1905; he sold the company to Durant in 1908. Not satisfied with how the new company, General Motors, was developing, Leland left in 1917. He went on to form the Lincoln Company with his son and then sold it to Ford. Lincoln was a challenge to Cadillac, but it never was able to gain the same prestige. For more information on Ford's reaction to General Motors' product policy see Collier and Horowitz, p. 114; Flink, p. 49; Rae, p. 80.

[56]Rae, op. cit., p. 179. In 1916, governments began to focus on the importance of roads, but it was not, however, until after World War II and the passage of the Interstate and Defense Highway Act of 1944 did the federal interstate systems, as we know it today, begin to develop.

[57]Gartman, op. cit., p. 69.

[58]Ibid., p. 71.

[59]Schudson, Michael; *Advertising, The Uneasy Persuasion:*

*Its Dubious Impact on American Society* (New York: Basic Books, Inc., Publishers, 1984), p. 150.

[60]Flink, op. cit., pp. 143-145.

[61]Charles Goodrum and Helen Darlymple, *Advertising in America: The First 200 Years* (New York: Harry N. Abrams, 1990), p. 10.

[62]Ibid., p. 13.

[63]Ibid., p. 17.

[64]Ibid., pp. 13-16.

[65]Ibid., p. 17.

[66]Ibid., p. 18.

[67]Goodrum outlines the change in economic theory regarding the development and shift of advertising in the mid-19th century. He does not credit it to a specific economist or group, but offers it as a general discussion before drawing the conclusion that through this shift we have modern advertising, as we know it today. pp. 18-19, p. 33

[68]Ibid., p. 35.

[69]Gartman, op. cit., p. 23.

[70]The emphasis on female drivers coincided with the realization by many manufacturers of the purchasing power of women, and they began to appeal to it more and more.

[71]Goodrum, op. cit., p. 232.

[72]Sloan, op. cit., p. 150. The concept behind a mass-class market is the production of a high volume of vehicles, which appear like expensive, luxurious custom made vehicles. This was most effectively achieved through offering a variety of makes and models, all which came with lots of options for the consumer to choose from in order to customize and individualize their vehicle.

[73]Ibid., pp. 165-167. Sloan and the Richard H. Grant, general sales manager of Chevrolet, were the two main debaters. Sloan wanted an emphasis on yearly models, while Grant thought it would be best to just continually incorporate improvements as they occurred without announcing them.

[74]Ibid., p. 167.

[75]In 1937 it became known as the Styling Division. The name was more representative of what they actually did, style automobiles.

[76]Gartman, op. cit., p. 26.

[77]Ibid., p. 23.

[78]Ibid., p. 74.

[79]Ibid., p. 75.

[80]Ibid. For more information concerning the development and failure of the cooper-cooled engine see Sloan, pp. 71- 94. He devotes a whole chapter to the debacle and how it affected the implementation of his product policy and its impact on the company as a whole.

[81]Technological improvements continued to be critical to the success of automotive styling. For instance, in 1923, du Pont chemists released the Duco lacquer. It was a nitrocellulose lacquer that produced vibrant colors and created all kinds of new options for consumers to choose in the process of individualizing. The first color introduced was "True Blue" on the 1924 Oakland. Using Duco also reduced production time. Now car could be finished in hours compared to weeks when companies used paint and varnish. By 1925 everyone in the car industry offered Duco lacquer. Gone were the days of the one color option, and Ford's infamous statement, "Any customer can have a car painted any color he wants so long as it is black." Fredric D. Schwarz, Ten Innovations that Made History," *American Heritage*, Nov. 1996, pp. 48-52; Sloan, p. 236.

[82]Jerry Flint, "When Car Guys Ran GM," *Forbes*, April 19, 2004, p. 77. This is a trend that has persisted up to today. Many argue that GM is experiencing so many problems in the 21st century because there are no "car guys" in higher management. Marketing and finance executives dominate the business

[83]All biographical information concerning Harley J. Earl and his methods in designing automobiles from this paragraph is documented in Stephen Bayley, *Harley Earl and the Dream Machine* (New York: Alfred A. Knopf, 1983), pp. 23-25; Sloan, p. 268; Gartman, op. cit., p. 79; Cray, op. cit., pp. 244-245.

[84]Cray, op. cit., p. 228.

[85]Gartman, op. cit., p. 77.

[86]Sloan, op. cit., p. 269.

[87]All the books concerning General Motors detailed Earl's dress and personality and its impact on relations within the company. Fortunately, Sloan, who most considered to be Earl's complete opposite in everything from dress to personality, saw the genius behind the guise, and gave Earl the independence to design in his own style.

[88]Earl quoted in Bayley, op. cit., p. 45.

[89]Bayley, op. cit., pp. 44-45.

[90]Sloan, op. cit., p. 265. At this time the used car market was also growing. When new models appeared in the fall, people used their current car as a down payment for the new one, and then the dealer would sell the trade in to those of lesser means.

[91]Ibid.

[92]Gartman, op. cit., p. 85.

[93]Ibid.

[94]Schudson, op. cit., p. 157.

[95]Ibid.

[96]At first they were called designers, but when the section changed names to the Styling Section in 1937, they became known as stylists.

[97]Gartman, op. cit., p. 87.

[98]Sloan, op. cit., p. 273 and Gartman, op. cit., p. 87.

[99]Gartman, pp. 92-93. Gartman explains the difference between General Motors' styling and other manufacturers' styling, in order to help understand General Motors' dominance in the industry.

[100]Sobel, Robert; *Car Wars: The Untold Story of the Giant Automakers and the Giant Battle for Global Supremacy* (New York: A Truman Talley Book, E. P. Dutton, 1984), p. 3. Yasutoshi Ikuta also refers to the 1950s as the golden age in his book, *Cruise O Matic: Automobile Advertising of the 1950s* (San Francisco, Chronicle Books, 1988), p. 18, as does Bayley, op. cit., p. 69.

[101]Gartman, op. cit. p. 141.

[102]Ibid.

[103]Ibid., p. 142. General Motors' total market share in 1955 was 55 percent, which was huge in terms of the total number of registered vehicles in America.

[104]Ibid., p. 93.

[105]Flink, op. cit., p. 42.

[106]Bayley, op. cit., pp. 59-60.

[107]Ibid., p. 61.

[108]Ibid.

[109]Ibid., p. 36. Earl carried these two principles with him for the rest of his career, and they became the foundation of his automobile styling.

[110]Howard Chua Eoan, "1948-1960: Affluence," *Time*, March 9, 1998, p. 128.

[111]Gartman, op. cit., p. 154.

[112]Ibid., p. 157.

[113]Schudson, op. cit., p. 156.

[114]Ikuta, op. cit., p. 17. Ikuta concentrated on magazine advertisements appearing in *Life*, *The Saturday Evening Post*, *Collier's*, *Look*, and *Holiday*.

[115]Mary Cross, ed., *A Century of American Icons: 100 Products and Slogan from the 20th-Century Consumer Culture* (Westport, CT: Greenwood Press, 2002), p. 111.

[116]Goodrum, p. 241.

[117]Rubenstein, James M.; *Making and Selling Cars: Innovation and Change in the U.S. Automotive Industry* (Baltimore: The Johns Hopkins University Press, 2001), pp. 192-193. Ikuta also outlines a similar ladder of production, p. 20.

[118]Flink, op. cit., p. 21 and Gartman, op. cit., p. 156. The origins of the Motorama were in the exclusive luncheons Sloan held for his financial advisors in New York each year.

[119]Gartman, p. 158.

[120]Ibid., p. 85.

[121]Bayley, op. cit., pp. 49-52.

[122]Ibid., p. 51.

[123]Ibid., p. 78. Earl loved the car and used it as his personal vehicle around the suburbs of Detroit.

[124]Ibid., p. 79.

[125]Ibid., p. 78

[126]Cross, op. cit., p. xiii.

[127]Ibid., p. xvi.

[128]Robert S. Lynd and Helen Merrell Lynd; *Middletown in Transition: A Study of Culture Conflicts* (New York: Harcourt, Brace and Company, 1937), p. 267.

[129]*Recent Social Trends in the United States*, Report of the President's Research Committee and Social Trends, 2 vols. (New York: McGraw-Hill, 1993), p. 172 quoted in Flink, p. 2.

[130] Packard, Vance; *The Status Seekers* (New York: Pocket Books, 1959), p. 281.

[131] Flink, op cit.

[132] General Motors currently is just battling to stay alive as a company. In an attempt to rectify its economical state, the company recently announced it would be closing down a number of North American plants, leaving thousands without a job. Pressure from foreign competitors coupled with high manufacturing costs, mostly from worker's health insurance (General Motors is the single largest provider of private health insurance in the nation), were some the reasons listed for the closures. For more information concerning the recent closure see Jesus Sanchez, "General Motors to Cut 30,000 Jobs," *Los Angeles Times*, November 21, 2005, Ibid.

[133] Flink, op. cit., p.2.

[134] Ibid, p. 4.

[135] Ibid, pp. 2-4. At the end of his introduction, Flink says that the importance of his work is to serve as "an opening argument in what promises to become an important historical debate over the significance of automobility for synthesizing automotive history."

# Letters

***Review* No. 45 (Spring 2006)**
**Little Cars on the Big Salt: MG and the Bonneville Salt Flats, p. 23**

There have been a number of follow-up letters to this article adding detail—but no comment on the engine used in Lt. Col. A. T. G. "Goldie" Gardner's streamlined MG record breaker in 1948. When Lord Nuffield would not provide an engine, Gardner approached William Lyons. Lyons furnished a 2-liter version of the 4-cylinder Jaguar XK 100 engine, resulting in Gardner's record of 176 mph on Belgium's Jabbeke Highway. Ref. *Jaguar Heritage* No. 25.

David Reilly
Arizona, USA

***Review* No. 46 (Fall 2006)**
**Packards From South Bend: Economic Perspectives on the "Last Packards" Decision, Part 1, p. 4**

Robert R. Ebert, one of the authors, found a typo on p. 5, Table 2. Bob wrote "The Income figure for 1959 is in parentheses indicating a loss. Actually S-P had a $28.5 million profit in 1959. So the parentheses should be removed (It was okay on the edited copy you sent me, so something went wrong in the print version)."

On page 68, it's Baldwin-Wallace "College," not "Collect."

**The Shift From Shift to Shiftless: Transmission Advances in U.S. Cars (1929-55), p. 25**

The Liquimatic reference on page 35 caught my eye. Enclosed is a diagram of the Liquimatic (Fig. 1). Even a casual glance reveals both the complexity and the lash-up that it was. There is also a chart of speed ranges which borders on the incomprehensible (Fig. 2). This information is from my *Lincoln & Continental—The Post War Years*.

I also discussed the driving techniques required:

> The driving procedure was to place the gear-shift lever in high; the car would then start in second gear and, with release of the throttle, the conventional transmission would shift to third between 12 and 23 mph. When the throttle was again released above 23 mph, the shift would be made to overdrive. Down-shifting by depressing the accelerator first took the ratio from third overdrive to second overdrive and then, upon a second punch of the accelerator, to normal second gear. Two vacuum-shifting units working in series (and dependent upon varying throttle openings) were difficult to coordinate and all too often power could be reapplied with one or both of the units midway in a shift.

*continued on page 28*

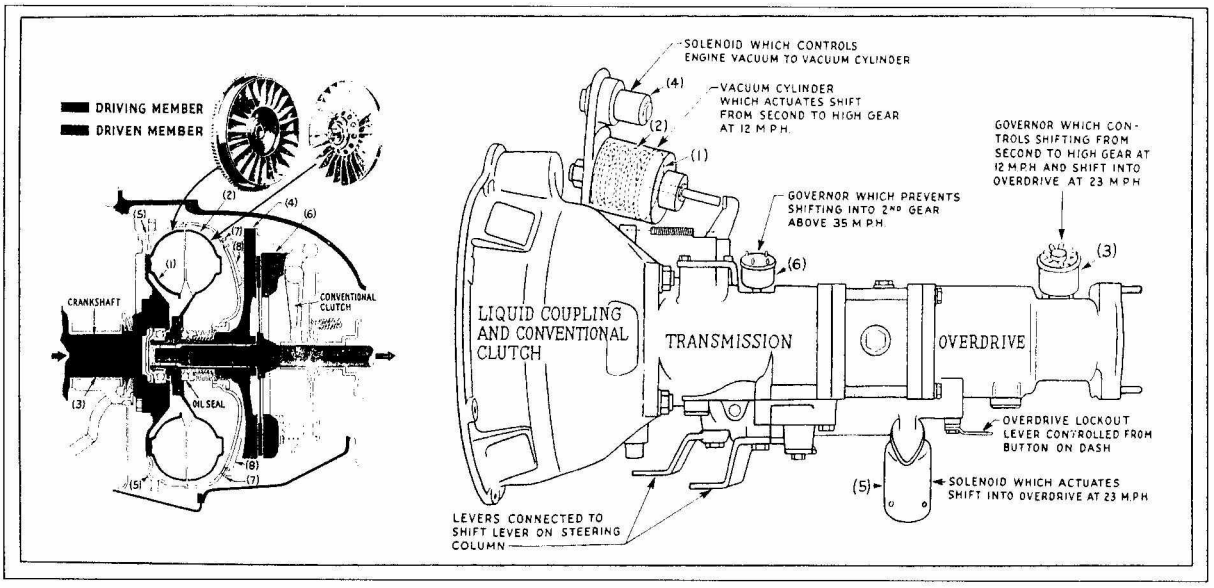



*Fig. 1 – Diagram of 1942 Lincoln Liquimatic transmission.*

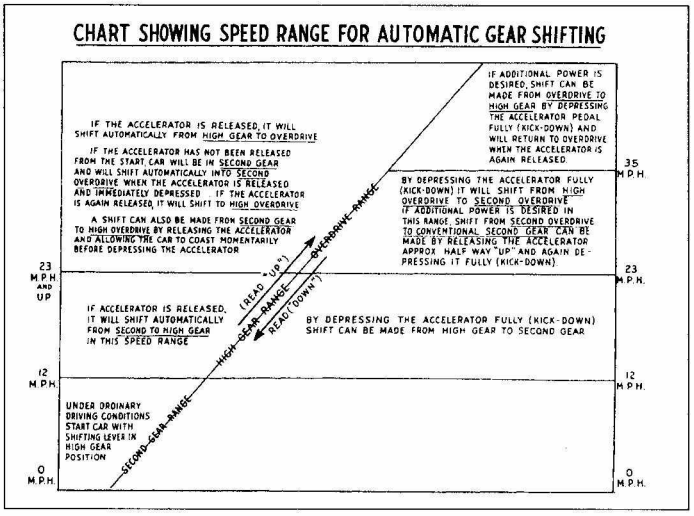



*Fig. 2 – Chart of Liquimatic speed ranges.*

Low gear was used for emergency power. The former second gear position was also usable and simply locked out the overriding clutch and the self-shifting mechanisms.

When confronted with a transmission requiring an anti-stall carburetor device, as well as two governors, two solenoids, vacuum cylinders, throttle stops and switches, few mechanics could orchestrate the whole system into any sort of permanent harmony.

My research suggested that maybe no more than 100 were ever built.

Paul R. Woudenberg
Massachusetts, USA

Double clutching was not used when engaging higher gears—only lower. What follows is edited from *Motor Car Mechanism, Management and Overhauling* by F. C. M. Shepherd, Crosby Lockwood and Son, London (2d ed., 1927).

Changing up can be summarized as follows: Reduce gas, push clutch right out, and at the same instant slide gear lever into neutral. Pause, move gear lever into the required gear. Let in clutch, increasing gas supply at the same moment. On some cars only a very slight pause or no pause at all need be made to bring about a noiseless change." Changing down can be summarized as follows: "Reduce the gas slightly, and throw the clutch out half-way and move the gear lever into neutral. Let in the clutch, slightly increasing the supply of gas at the same time. Give the clutch pedal a jab with the foot, putting the gear lever into the low speed at the second the clutch is depressed. Let in the clutch the second time, and carry on. Make sure, when giving the jab to the clutch that the clutch is only pushed down half-way so as not to bring the clutch stop into operation. This method is known as double clutching, and it is the only method that will give a silent change on the majority of cars.

That being covered, perhaps the author or another member could explain a question I have had for many years: Why Overdrive? A 3-speed manual transmission with overdrive (O. D.), as I had on a 1953 Mercury, is essentially a 4-speed gearbox—which existed at that time. The 4-speed gearbox with O. D., as on my current 1967 Jaguar, is essentially a 5-speed gearbox—which existed in the '60s. Was it economics, technology, marketing or what (?) that led manufacturers to add O. D. rather than build/acquire a gearbox with one more speed?

David N. Reilly
Arizona, USA

As a new member of SAH, I . . . particularly enjoyed Byron Olsen's article on automotive transmissions. The description of the Reo Self-Shifter is the best I have seen yet. However, Mr. Olsen's description of the Packard Ultramatic was rather sketchy in its details. The original Ultramatic used by Packard from 1949 through 1954 was, except for the converter lock-up to mechanical drive, essentially the same as Buick's Dynaflow. This is, in Drive range it used only the torque converter for torque multiplication, and there was no shifting of gears; Low range used a planetary gearset for additional multiplication.

Thus, like the Dynaflow, acceleration from a standstill was very smooth, but rather sluggish, and was accompanied by a lot

of revving from the engine. The option of shifting to Low range manually was available for quicker acceleration, as it was with Dynaflow and Chevrolet's Powerglide.

In 1955, Packard released a new Twin-Ultramatic. This transmission had two Drive ranges (hence "Twin"). One of these worked like the original Ultramatic, using only the torque converter for acceleration; the other Drive range started from a standstill using the planetary gearset for quicker acceleration, then shifted to the torque converter alone. I am not certain, but Packard may have eliminated the torque converter lock-up feature at this time. This transmission was also used by Nash and Hudson for the V-8 models which used the Packard engine, and by Studebaker for its Golden Hawk, also with a Packard V-8.

My sources for this, besides my own personal experience, include *Consumer Reports*, Vol. 19, No. 5 (May 1954) and Vol. 20, No. 5 (May 1955); Chilton's *Automotive Repair Manual*, 27th ed. (1956), and *MoTor's Auto Repair Manual*, 22d ed. (1956)

*Robert J. Staneslow*
*Connecticut, USA*

*After Issue No. 46 went to print, the editor discovered that the October 1950* Motor Trend *had diagrammed seven different automatic transmissions in a simplified, easy-to-understand manner (Fig. 3).*

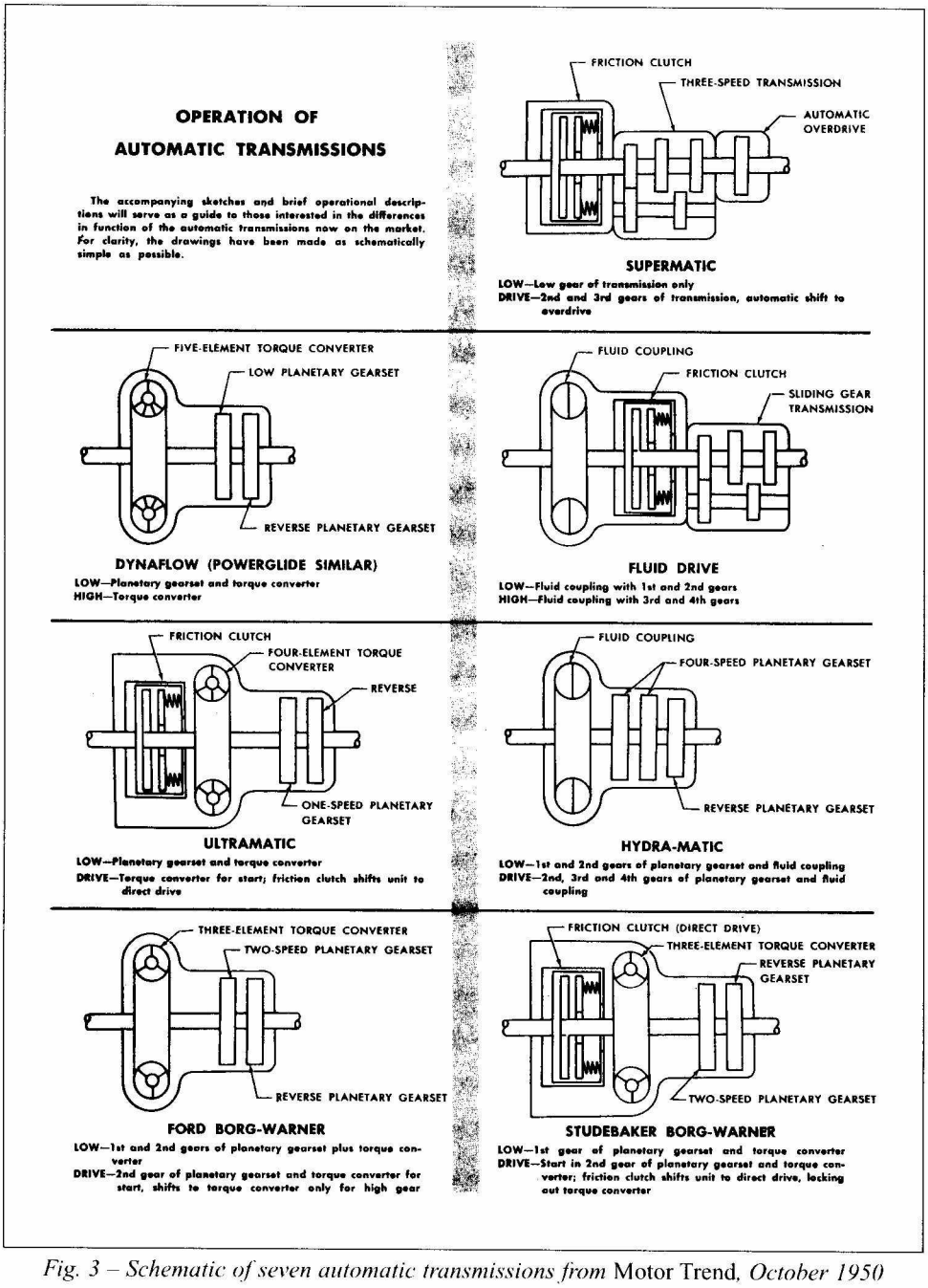



*Fig. 3 – Schematic of seven automatic transmissions from* Motor Trend, *October 1950* (from the Editor's Collection).

**The Effect of Record Breaking and Racing on M.G. Sales in the 1930s, (p. 58)**

Note the caption on the photo of the Magic Magnette (K#3 023). It is certainly not owner George Eyston at the wheel. This is one of several oft-reproduced photos taken at the factory at the same time, with one of the mechanics seated in the car. I have never seen him identified but it is most likely Bert Denly.

*Michael Jacobsen*
*California, USA*

*Alas, this is a mystery to the editor as well, who now cannot locate the original artwork that accompanied the article; the photo is certainly not in the January 1935 issue of* The MaGazine.

**Elwood Haynes—**
**Hoosier State Auto Pioneer (p. 62)**

The one area . . . that [Gray] did not explore [in *Alloys and Automobiles* was] Haynes' claim to have been the first to use aluminium in automobile engines, perhaps that should have in parenthesis after it, "in America." The whole story of the production and subsequent use of aluminium ran in parallel in France and America, with those in neither country apparently being aware of what was going on outside their borders. It would be interesting to know if Haynes' claim of the 1895 date is valid, and in the American context if it is a "first," and how this compares with what was happening in France. Regarding the latter, I think that the very first De Dion Bouton petrol engines of 1895 used bronze for the crankcase, but very soon afterwards the change to aluminium was made.

*Malcolm Jeal*
*Wiltshire, England*

# Packards From South Bend: Economic Perspectives on "The Last Packards" Decision, Part 2

by Robert R. Ebert, Ph.D. and Niccole M. Pamphilis

***Promoting the Last Packards: Advertising***

The Packard advertising slogan of "Ask the Man Who Owns One" was well recognized through most of its history and even enjoys recognition today. Although Packard has not been produced for almost half a century its slogan and memory as *the* luxury car to own still lives on for many people. That slogan is evidence of the historical power of Packard advertising. Here we explore the question of whether the advertising expenditures and strategy of the Studebaker-Packard Corporation demonstrated a commitment to promote aggressively the 1957 and 1958 Packard cars.

In the automobile industry there is considerable emphasis on product differentiation. While there are differences in the design of automobiles, Joseph Bain argued a half century ago that control of the retailer, the customer-service system and advertising are important in differentiating automobiles to consumers (Bain, 124). It is the advertising strategies and promotions that take a car which has as its basic function the providing of transportation and which could be supplied by any car on the market, and makes that car unique and superior in the minds of the consumers.

While we will make some normative judgments on Packard advertising for 1957 and 1958, we focus principally on the relative quantity of advertising for the company's two car lines, the Studebaker and the Packard. Studebaker-Packard spending on advertising will also be compared with that of its competitors as a measure of the relative aggressiveness of the company's 1957 and 1958 ad campaign. Concluding this section will be an analysis of whether or not Studebaker-Packard Corporation in the 1957-1958 period made a good faith and serious attempt to promote the Packard line or if Studebaker-Packard gave up on the Packard line after the closure of the Detroit plants in 1956 and considered Packard a lost cause and put its emphasis on the Studebaker line in its advertising.

***Packard Pre-merger Advertising Strategy***

In order to determine whether or not the Studebaker-Packard Corporation attempt to market the Packard line in 1957 and 1958 represented a serious effort to promote Packard cars, we need to pay attention to the style of advertising before the merger. By comparing the pre-merger and post-merger efforts by the company we will be able to analyze if the corporation gave Packard a chance to be a successful line.

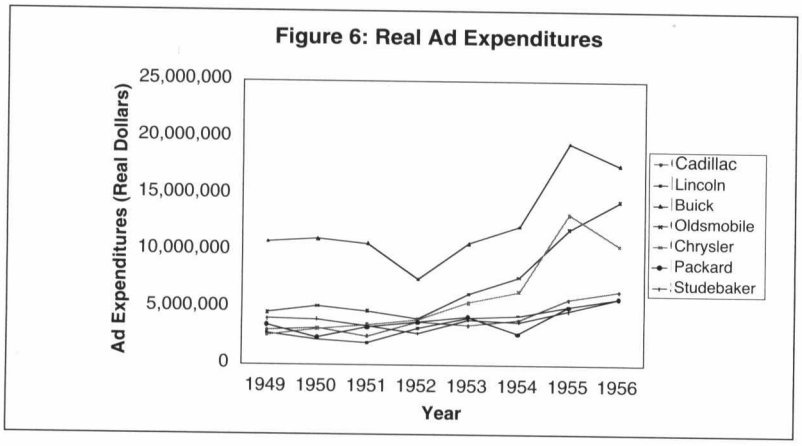
For most of its history before World War II, Packard cars were owned by the upper class and were longed for by others. One reason was its advertising campaigns. In ads at that time Packard cars were paired with regal and royal images to bind the company's image so implicitly with elite ideals that the Packard line became synonymous with affluence. An example of an ad of this type can be seen in the February 1917 *National Geographic*, where Packard cars are coupled with Roman imagery along with the caption, "Strong men express themselves in their personal equipment." The ad suggests that owning a Packard car is on the level of being a heroic Roman charioteer or soldier. Such an idea allows the buyers to see themselves as a modern day hero in their Packard cars.

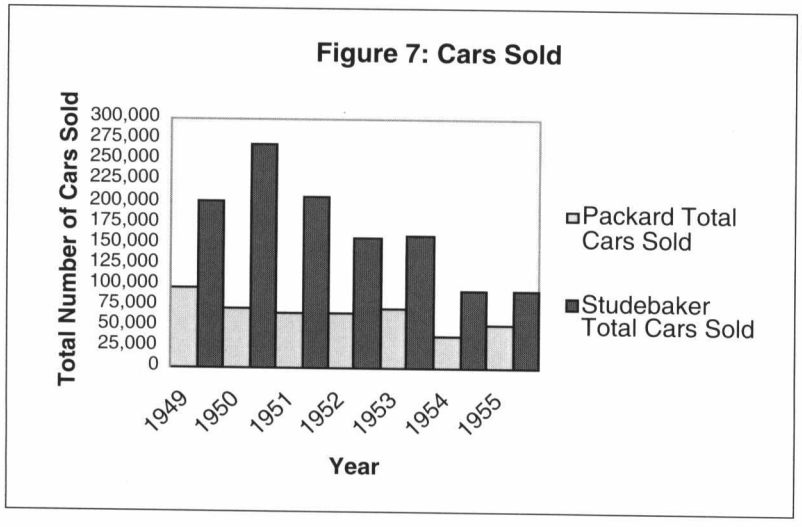
Packard continued to promote its line to the upper class in the style it had established in prior years. The ads pictured very elegant people and romantic images from the past. Packard had found a formula that worked in the 1920s.

However, in reaction to the Depression of the 1930s Packard altered its product and advertising strategies to keep consumers buying. There were several steps that brought about the change in advertising strategy. The first was the introduction of the junior series Packards in 1935 which were lower priced vehicles than earlier Packards. The junior series included at first the Packard 120 (eight cylinder) and then later, in 1937, the Packard 110 (six cylinder). In the beginning there were separate ad campaigns for the junior series and higher-priced senior series (Super Eights and Twelves). The separate ad campaigns by Packard's agency, Young & Rubicam, were aimed at keeping a distinction between the senior and junior series. Senior ads ran in magazines aimed at an exclusive audience such as *Vogue*, *Fortune*, and *The New Yorker*. On the other hand, ads for the lower-priced cars were placed in popular periodicals such as *The Saturday Evening Post* and *Time* (Ward, 33). After a time the two campaigns were merged into one due to the large level of confusion the dual advertising strategies caused with the public.

The elite status of the senior Packard line was jeopardized in 1941 with the introduction of the Clipper. Priced between the junior (110/120) and senior (160/180) Packards, the Clipper blurred the line of separation between the two to the point that, in due course, the upper class no longer felt envied and distinguished in owning a senior Packard (Ward, 34). In fact, the Clipper became the junior line in 1942, and the entire line after the War, when the 1942 160/180 was not revived. As time passed, Packard found out through diminished sales that it was easier to lose status than it was to gain it, and in the eyes of those who could afford their top end models there was no longer anything special in the Packard car.

By the late 1940s Packard ads used were no longer pushing the elitism of owning a Packard car but were instead pushing its historical renown to sell the cars to the middle class. The advertising strategy of Packard had evolved over the years into something completely different in an attempt to sell cars to the postwar consumer. The campaigns were no longer focused on status and quality but instead sought to show off the function




and advancements in the Packard car. In this cross-over of strategies Packard lost the buyers who could afford the highly profitable top-of-the-line cars, now called the Custom Super Clipper.

Examining the actual expenditures on Packard advertising gives insight into how aggressively Packard promoted its line of cars prior to the merger with Studebaker in 1954. Historically, Packard was in the lower-middle of the pack when it came to the actual amount of money spent on its advertising campaign (See Fig. 6 for a comparison of Packard and competing makers real advertising expenditures, that is, adjusted for inflation, to enable a comparison across years of the level and volume of advertising). Between 1949 and 1956 Packard appropriated an average of $3,814,373 a year towards its advertising while the industry average for medium and high-priced auto makers was $5,935,133.

Source: *Advertising Age*, issues from 1950-1960.

### *Studebaker Pre-merger Advertising Strategy*

Unlike the suave and refined style of the early Packard ads Studebaker took a more direct and to the point approach capturing more blue-collar and lower middle-class consumers. Early Studebaker ads featured quips such as, "a common sense car, containing only those devices which experience has demonstrated to be thoroughly trustworthy and practical" (1905 ad) which emphasized function and use over the luxury and high status of the automobile. Studebaker differed even more from the Packard advertising style by filling its ads with prices on all models available whereas with the Packard ads prior to the late 1930s (besides the occasional fine print which would list a general price for a model) Packard seemed to say if you had to ask the price you probably could not afford a Packard.

As time progressed into the 1920s Studebaker ads began to change and take on a feel more like the Packard style. Ads switched to drawings of more wealthy and "well-bred" individuals spending leisurely time outside their mansions with their Studebaker cars. While the ads took on a more refined touch the writing accompanying the ads was still lackluster and appealed to the middle class man aspiring to be a person of status.

Through the 1930s Studebaker ads still emphasized the functionality of the automobile rather than its reputation by pointing out features such as its shatter-proof glass and duo-servo hydraulic brakes. The 1940s gave Studebaker an opportunity to use its wartime production experience in its advertising campaign. To use the heightened patriotism of the time Studebaker ads featured comments like "for America's defense" and "Mighty allied armies mass in India and Studebaker trucks help transport them." When the war was over and persons bought Studebakers they could feel a sense of duty and patriotism to their country.

However, after World War II ended, Studebaker had to revamp its advertising strategy again to convince people a Studebaker was the car to own. Taking a few pages out of luxury car ads Studebaker started to omit prices in its ads and used dreaminess to appeal to people's more idealistic sense of what a car could represent. Throughout the early 1950s Studebaker cars were placed in juxtaposition with mansions and romantic icons such as the Eiffel Tower in the background to showcase the cars' new style and appeal. Studebaker even promoted what it called "European style" for its cars to try and draw in new buyers who were trying to stand out from their peers. Although Studebaker tried to increase its desirability to the upper class it was a short-lived campaign once the Studebaker-Packard merger occurred.

While Studebaker took a different path towards advertising than Packard, the Studebaker Corporation was in the same grouping as Packard with its level of real (inflation adjusted) spending on advertising between 1949 and 1956 and averaged $4,048,614 a year. Even though Studebaker spent only slightly more that Packard when it came to advertising its sales surpassed that of Packard. Studebaker sales were almost twice Packard's for most of the years prior to the merger (Fig. 7). Therefore, Packard per-car advertising costs were approximately twice that of Studebaker's.

Source: Data Book

### *The Post-Merger Studebaker-Packard Advertising Strategy*

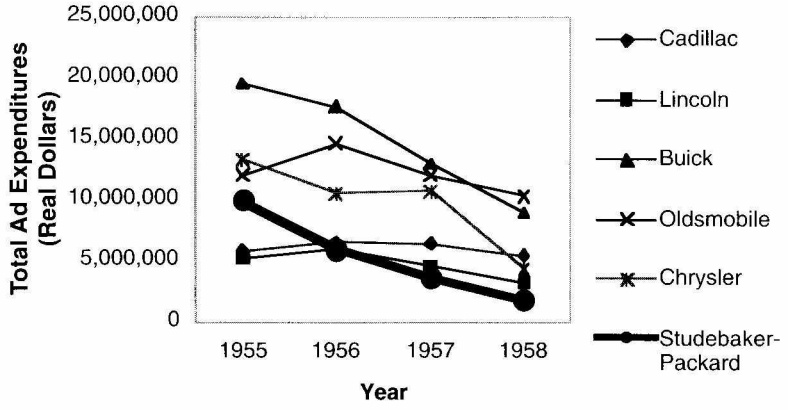
After consolidation of Packard production into the South Bend Studebaker plants, the question must be raised whether the 1957 and 1958 Packards were promoted in a manner consistent

with a good-faith effort to sell the cars. When the merger took place the Studebaker-Packard Corporation attempted to work its way into all corners of the market by creating a full line of automobiles. Following the merger, in 1955 and 1956 Packard was to maintain its position in the high-priced car field while the Packard Clipper line was to cover the corporation's medium-priced car line. The Studebaker line was to be for the low-priced and low-medium priced car field. A new advertising arrangement would have been necessary to meet the demands of the full automotive line the Studebaker-Packard Corporation was now carrying.

Although there were advertising demands to be met for the newly established full line there was no increase seen in the advertising expenditures after the merger. In 1954 and 1955 Packard advertising expenditures were $2,672,156 and $5,074,480 respectively while Studebaker spent a comparable sum of $3,751,632 in 1954 and $4,747,608 in 1955. Although the merger was completed in 1954, both the Studebaker and Packard-Clipper Divisions were still running their advertising campaigns separately for a large part of 1955. After the merger, while attempting to promote its full line of cars, Studebaker-Packard's advertising expenditures increased only modestly to $5,859,772. After 1955, individual advertising expenditures for the separate car lines (Studebaker and Packard) are not available; however, the total corporate ad expenditures show a drop in advertising for the corporation from 1955 through 1958 (Fig. 8). An argument can be made that the overall drop in total advertising was counter to what was needed to effectively promote the fully integrated line. After adjusting for inflation, the data shown in Figure 8 indicate how a decrease occurred in the actual volume of advertising for several medium and high-priced cars between 1956 and 1958. Even though there was a general drop in automotive industry ad spending, it is apparent that the financially constrained Studebaker-Packard Corporation could not be competitive in terms of volume of advertising at the time, even if either the Studebaker or Packard line alone were to have received the entire budget.

Source: *Advertising Age*

**Figure 8: Ad Expenditures**




In 1957, the meager Studebaker-Packard budget for advertising was spread out over various marketing campaign strategies. Although the corporation attempted to diversify its advertising strategy it was only able to promote the 1957 Packard line for six to seven months due to the Packard line being introduced late in the model year, on January 20, 1957. Data provided by Packard advertising historian Robert Zimmerman show that Studebaker-Packard spent $198,430 of its advertising budget in 1957 on popular magazines (the spending excludes local newspapers and magazines, overseas advertising, and other various media). A small portion of that magazine advertising budget was spent on the 1957 Packard at the time of its introduction. Full page ads for the 1957 Packard using the same photo image of the front of the car but with slightly different text appeared in several magazines. According to Zimmerman's records, the magazines in which these ads ran one time were *The Saturday Evening Post*, *Life*, *Newsweek*, *Business Week*, *U.S. News & World Report*, and *Macleans*.

Studebaker-Packard also produced an elegant showroom catalogue featuring the 1957 Packard line. The catalogue attempted to present the car in a prestigious light. On one page a Packard is rendered in an artistic pencil drawing and, on another page, delivering gentlemen to a fox-hunting outing. The general mood set by the catalogue is that of both class and practicality which would appeal to both the basic needs and self-image of a driver. The text stated that with the 1957 Packard a "new age of functional elegance has arrived."

In addition to the magazine ads and catalogue there were also a few newspaper ads put out promoting the 1957 Packard line. Some featured only the 1957 Packard and others the Packard in combination with the Studebaker line.

Not only did Studebaker-Packard attempt to increase public interest in the Packard through the use of popular media, it also attempted to pique the interest of its dealers and potential dealers in the Packard line. Starting late in 1956 the company advertised the 1957 line in *Automotive News*, pushing the Packards. In the *Automotive News* ad in the December 31, 1956, edition the Packard cars were not only at the top of the page but were the largest cars featured on the page. Likewise the text in the center features the new Packard Clipper. The company continued to market its line of cars to prospective dealers in subsequent issues of *Automotive News*, (see the issues of January 14 and January 28, 1957). All the 1957 *Automotive News* ads showed the Packard in a prominent position along with the Studebaker line. By marketing the car to dealers, Studebaker-Packard was not only going directly after the attention of the consumer, it was attempting to make sure the product had wide distribution. In so doing, the company appeared to view the Packard line as an attraction for dealers.

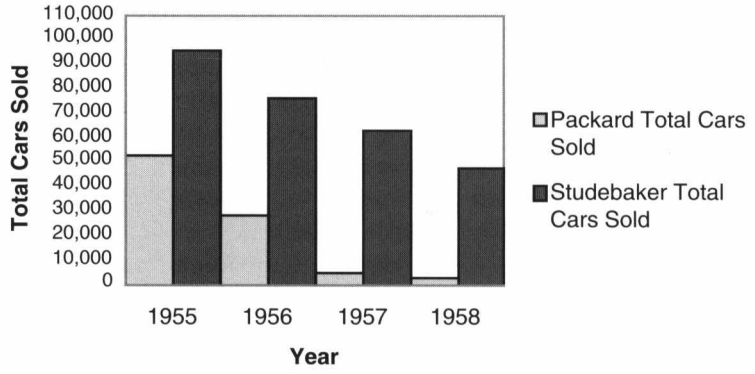
While it may be argued that the limited time available to promote 1957 Packards was a factor in the fall of Packard calendar year sales from the previous year at 28,396 cars to 5,189 cars in 1957, our purpose here is to determine if the Studebaker-Packard Corporation made an honest attempt to market the 1957 Packard once it decided to produce


*Fig. 9 – Cover of the advertising supplement of December 8, 1957, promoting Studebaker, Packard, and Mercedes-Benz automobiles* (from the editor's collection).

the car. While financial means and the time period the corporation had to work with were limited, the magazine ads, the sales catalogue, newspaper ads, and promotion to dealers demonstrate that within the constraints of a limited budget the corporation made a reasonable effort to make the 1957 Packard line a success.

Studebaker-Packard further exemplified good-faith in its attempts to market the Packard line through an aggressive advertising strategy adopted for the 1958 model year. It would not have been rational to continue aggressive marketing of a car line that had dropped in sales by over 23,000 units from 1956 to 1957 if the corporation had intentions of discontinuing the line when it could have allocated the money to the more successful Studebaker line. The advertising moves undertaken by Studebaker-Packard suggest that initially at least, the corporation was optimistic in its outlook for the 1958 Packard as it prepared to introduce and promote the car.

**Figure 10: Cars Sold**




Source: *Automotive News: The 100 Year Almanac* and *1996 Market Data Book*

Sydney Skillman, corporate vice president for sales, discussed with the board of directors on December 20, 1957, an aggressive advertising plan that was under way for the 1958 model year. This focused on a Sunday supplement insert which was published on December 8, 1957 (Fig. 9). The campaign involved distribution of 5,000,000 copies of the supplement to five leading newspapers whose combined readership was 16,000,000 (Minutes, Nov. 15, 1957). The supplement contained 16 pages of advertising devoted to the 1958 Studebaker, Packard, and Mercedes-Benz lines (Minutes, Dec. 20, 1957), fairly evenly distributed among the three brands. The cover and the first page featured all three lines in addition to two pages being dedicated to the specifics of the three lines. The Studebaker line filled seven pages, the Packard line three pages, and the Mercedes-Benz two. Considering that Packard sales at this point were less than ten percent of Studebaker's (See Fig. 10) it received a disproportionate amount of advertising space (taking volume of sales into consideration) with Packard receiving almost half the space that Studebaker was given.

The strategy behind the supplement was summarized by Studebaker Packard director Morris Strauss the next month: "the Corporation gets more results from three or four campaigns a year than from an equivalent amount of newspaper advertising" (Minutes, Jan. 30, 1958). The positive response to the supplement led to a another but somewhat scaled down Spring 1958 advertising campaign for the Studebaker-Packard Corporation, which resulted in a decrease in regular newspaper advertising but the production of another Sunday supplement in April.

In the April 1958 Sunday supplement, half of its eight pages were devoted to Packard advertising. The Packard received more than its share of the spotlight relative to its sales performance which had fallen (Fig. 10). Given the space devoted to Packard compared with that given to Studebaker and Mercedes-Benz, it is reasonable to conclude that each supplement reflected a concerted effort by the company to try and continue promotion of the 1958 Packard line in apparent hopes of significantly increasing sales.

Promotion of the Packard line was continued outside of the Sunday supplements and extended to some magazines including *Life Magazine International Edition* in 1958. The Packard hardtop was featured solo in the *Life* ad in an attempt to promote it to international markets without the car being overshadowed by the Studebaker line. In addition the Packard line was also featured in Sunday supplement newspaper inserts such as *THIS WEEK* and *Parade*. In November 1957 the Packard Hawk received a full page ad in the Sunday supplements, showing both the front and rear of the automobile. In subsequent editions in January 1958, the Packard was featured in varying combinations with the Studebaker line.

The Packard line was also featured in car enthusiast magazines during the 1958 advertising campaign, such as *Car Life*, *Motor Trend*, and *Road & Track*. The focal point of these ads was the Packard Hawk which was promoted alongside a Studebaker car. Even in the less aggressive magazine advertising Packard was still showcased at a generous level.

The advertising strategies adopted by Studebaker-Packard during the 1957 and 1958 model years, relative to expected sales, gave disproportionate emphasis to the Packard line. Ironically, after Studebaker-Packard decided to discontinue Packard, apparently in early spring 1958, a significant amount of the 1958 advertising of the Packard line occurred. The paradox of discontinuation of the line and increased advertising of promoting it leaves the following unanswerable question on the table: What would the Studebaker-Packard Corporation have done about Packard for the 1959 model year if the spring 1958 advertising campaign had been successful in promoting Packard to the public?

Through studying the corporation's advertising strategies it is evident that Studebaker-Packard made an honest attempt to market the 1957 and 1958 Packards to the public and the dealers. While a concerted attempt was made to promote the "Packards from South Bend," the corporation was not in a sound enough financial position to commit a large amount of money to its advertising to compete with the Big Three at the time. Therefore, in spite of committing a proportionately large amount of advertising space to the Packard line, Packard was not able to reestablish a strong enough consumer following to

support its continued production. Curiously, one of the most famous advertising slogans in automotive history, "Ask the Man Who Owns One," did not appear in the advertising for 1957 and 1958.

### *The Dealer Issue*

The suggestion has been made by other commentators that the 1957 Packards, based on Studebaker body shells and mechanical components, were built to meet franchise requirements to avoid lawsuits by Packard dealers who would have had no cars to sell if the Packard line was discontinued (see, for example, Bonsall, p. 319). At the top management level there was some concern that dealers might take legal action if the Packard was discontinued. Therefore, it is helpful to examine the Studebaker-Packard dealer picture as it evolved through 1956.

Decline in the Packard dealer organization began to be a major problem for the corporation early in 1956. In February, Nance told the board that deterioration of the dealer organization began after the corporation's third quarter 1955 loss was announced. In January and February 1956, Packard dealers representing five percent of Packard and Clipper sales were lost and not replaced (Minutes, Feb. 27, 1956). In an attempt to stimulate sales, Nance met with the 100 largest Packard dealers in February and agreed to their request for a price decrease by reducing the factory prices to include Torsion-level ride. Then, in April 1956 management began to develop a program to dual Studebaker and Packard dealers to strengthen the organization. However, that plan was not immediately implemented because of a lack of a definite program for continuing in the automobile business (Heller).

Because the continuation of the corporation was tenuous, in April 1956 management instructed the automobile sales departments at Studebaker and Packard to franchise no new dealers until further notice because of potential liability indicated by counsel in the event the company was liquidated (Heller).

The uncertainty about the future of Packard created by the ending of Detroit output in June 1956 and the uncertainties surrounding the Curtiss-Wright agreement took its toll on the dealer organization. In August 1956, Churchill acknowledged that many dealers had written and telephoned him regarding the fate of Packard. One former Packard dealer told *Automotive News* that there was sentiment among some Packard dealers to take action, perhaps a lawsuit. The legal action would have involved the alteration in the "buy-back" clause in the Packard sales agreement (Lockwood, Aug. 27, 1956).

When the 1957 Packard line was presented to the Packard-Clipper Dealer Council on August 28, 1956, the general dealer reaction seemed to be one of relief. One member of the Council stated "We were going to have a car. It may not be quite the car we hoped for, but it will be a lot better than what we feared. We'll go along." Another member of the Council stated: "We'll go along. It will tide us over the rough spots. It means the Packard owner will have the resale value of his car buoyed up" (Lockwood, Sept. 3, 1956). Churchill summed up the meeting with the Packard-Clipper Dealer Council by telling the board of directors that while he "could not say that the Packard dealers were enthusiastic, they did appreciate the forthrightness of the Corporation in presenting its problems to them and many of the Packard dealers indicated they would go along with the dualing program" (Minutes, Sept. 10, 1956).

Among the announcements made by Churchill at that August 28, 1956 meeting with Packard dealers was the consolidation of the Studebaker and Packard sales organizations under Carl K. Revelle, a 21-year Studebaker sales organization veteran. Revelle announced that the Studebaker and Packard sales would be combined at both the factory and dealer levels (Lockwood, Sept. 3, 1956).

To make the dealer organization effective posed a major challenge for Revelle. At the time of the merger of Studebaker and Packard the company claimed it had 4,000 dealers (*Annual Report* 1954, p. 14). When the company began its program of dualing the full Studebaker car and truck and Packard car lines in single dealerships wherever it was feasible, the number of Studebaker and Packard dealerships had declined significantly. As of September 1, 1956, the company had 1,360 dealers selling Studebakers but not Packards, 686 dealers selling Packards but not Studebakers, and 732 dealers handling both, for a total of 2,778 dealers (Heikkinen).

In 1956, the defection of Packard dealers was in large part due to the rapid decline in new car sales volume from 33 units per dealer in 1955 to 12 in 1956 (Edwards, pp. 226-28). Packard dealer sales were only a fraction of the average of 175 for all auto dealers in 1955 and 152 in 1956 (*Auto Facts and Figures 1956*, p. 68). Therefore, given the reduced volume potential of the 1957 Packards, it was in the self-interest of most Packard dealers to either dual with Studebaker or drop the franchise and take on another line of cars.

Overall, the dualing of the dealers made sense. However, the company found 414 dealer locations where both an exclusive Packard and an exclusive Studebaker dealer existed and where the sales potential would not justify both dealers handling the full line of Studebaker and Packard cars and trucks. Therefore some Studebaker and Packard dealers would have to be eliminated in the so-called "conflict points." The company did anticipate legal exposure in deciding to terminate either the Studebaker or Packard dealer involved in such locations. By September 1, 1956, 32 Packard dealers had threatened suit or demanded that the company repurchase their inventories and similar action was expected from 25 or 30 more Packard dealers (Heikkinen).

Although the company was confident it would prevail in most of the cases, the board agreed to set up a reserve of $250,000 against which the costs of any settlements could be charged to avoid expensive and protracted litigation. In fact, it was expected the costs of settlement would not exceed $120,000, but the other $130,000 was needed to settle possible claims which were not anticipated as of September 1, 1956 (Heikkinen).

At the completion of the dealer dualing/consolidation program, the company projected it would have 2,160 dualed dealers, 90 dealers handling Studebaker exclusively and another 90 dealers handling Packard exclusively, for a total of 2,340 dealers (Heikkinen). However, through most of the rest of the existence of the Packard car the size of the corporation's dealer organization declined. At the beginning of 1957 the company had 2,212 dealers. By July 1957 that number had declined to

2,171 dealers (Minutes, July 25, 1957). Further attrition occurred just as the 1958 Studebaker-Packard lines were being introduced and, by the end of October 1957, there were only 2,050 dealers (Minutes, Oct. 31, 1957).

One of the problems confronted by Studebaker-Packard at the start of the 1958 model year was that many of its dealers were weak or inactive. Sydney Skillman, vice-president, stated there were 200 inactive dealers the corporation intended to terminate for nonperformance (Minutes, Dec. 20, 1957). The weakness of the dealers through the 1958 model year was evident in May 1958 when Churchill noted that in 1953 the company's dealers averaged sales of 5.2 cars per month but in 1958 that figure had declined to 2.1 cars per month (Minutes, May 8, 1958).

When the company began to plan for introduction of the Studebaker Lark compact car for the 1959 model year, it decided to dual Studebaker with Big Three (General Motors, Ford and Chrysler) dealers to increase the company's exposure as well as to increase the effectiveness of its existing dealers (Minutes May 8, 1958).

Once the dualing of most dealers to handle the complete Studebaker-Packard line of cars and trucks was completed, the franchise was promoted aggressively in the 1957 model year as a "Balanced Volume" franchise as the company attempted to build (or rebuild) its dealer organization. As discussed in the preceding section on the advertising program for Packard in 1957 and 1958, the Packard car was prominently displayed in *Automotive News* ads as an important and attractive factor in the "Balanced Volume, single-line operation" giving a dealer a single merchandising program of fine cars, sports cars, low and medium priced cars, and trucks.

We conclude that the legal issues surrounding the possible termination of Packard dealers if the Packard line of cars was discontinued may have had some influence on the decision to build the 1957 Packard. However, the evidence suggests the company was prepared legally for such an eventuality and it was not the principal motivating factor behind the "last Packards" decision.

### *Conclusion*

The question that has guided the research presented here was whether the decision to produce the 1957 and 1958 Packards by the Studebaker-Packard Corporation was economically rational and whether it was in the best interests of the company's stockholders and other stakeholder. We answer that question in the affirmative. We find that the evidence supports the following conclusions:

> At the levels of production of Studebaker and Packards being attained after the merger in 1954, it would have been imprudent and economically inefficient to continue output in both South Bend and Detroit;
>
> The cost in labor hours to produce the 1955 and 1956 Packards in Detroit was significantly higher than the cost in labor hours to build the 1957 and 1958 Packards in South Bend;
>
> The projected and realized output and sales of the relatively high profit-margin 1957 Packards were in the range needed to recover the development and tooling costs and variable costs of production for that model year and, from the vantage point of 1957, justified the introduction and production of the 1958 Packards;
>
> Given the relative sales of Studebaker vehicles compared to Packard cars, a disproportionate amount of advertising was committed to the Packard line in both 1957 and 1958, signaling the intention of the company to vigorously promote the cars;
>
> While relations with dealers, and especially Packard dealers, were not irrelevant in the decision to build the 1957 Packard, possible dealer legal action was hedged against by the company and must be considered a minor consideration in the decision.

The evidence suggests, therefore, that the decision by the Studebaker-Packard Corporation to produce the 1957 and 1958 Packards in South Bend was economically rational for a profit-seeking corporation endeavoring to maximize value for its stockholders. The decision to discontinue the Packard line after the 1958 model year reflected a sharp decline in sales of Packards in 1958 to a level which would not have justified the tooling and development costs necessary to build a 1959 Packard.

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***A note on Board of Directors Minutes of the Studebaker-Packard Corporation:***

The Minutes are part of the archival collection of the Studebaker National Museum in South Bend, Indiana. Because of the number of references to minutes in this paper, a full citation to each entry is omitted and the following three categories of Minutes are listed below:

Board of Directors, Studebaker-Packard Corporation, Minutes: Volume I.

August 19, 1955, Utica, Michigan
November 12, 1955, South Bend, Indiana
March 18, 1955, South Bend, Indiana
January 20, 1956, New York City
January 21, 1956 New York City
February 27, 1956, New York City
March 23, 1956 New York City
April 16, 1956 Detroit
May 2, 1956, New York City
May 8, 1956, New York City
June 2, 1956, New York City
June 4, 1956, New York City
June 7, 1956, New York City
June 27, 1956, New York City
June 28, 1956, New York City
July 25, 1956, New York City
July 26, 1956, New York City

Board of Directors, Studebaker-Packard Corporation Minutes, Volume II

September 16, 1957, New York City
July 25, 1957, New York City
August 6, 1956, New York City
August 20, 1956, New York City
March 20, 1957, New York City
October 4, New York City
February 28, 1957, New York City
September 10, 1956, New York City
November 28, New York City

Board of Directors, Studebaker-Packard Corporation, Minutes, Volume III

November 15, 1957, New York City
December 20, 1957, New York City
February 24, 1958, New York City
April 24, 1958, New York City
May 8, 1958, New York City
March 27, 1958, New York City
October 31, 1957, New York City
December 20, 1957, New York City
May 8, 1958, New York City

[a]Attachments are options and accessories above the base price of the vehicle.

***Footnotes***

[1]Economists do acknowledge the existence of the "principal-agent problem." This condition exists when management (agents) operate a corporation in their own interest at the expense of the stockholders (the principals). Often when the "principal-agent problem" exists, managers will try to maximize their own returns (salaries, bonuses, stock options) while keeping stockholders simply "satisfied" with a reasonable level of profits (Pindyck, pp. 627-632). The "principal-agent problem" in the Studebaker-Packard case in late 1956 through 1958 did not exist because the evidence discussed in this paper suggests management was actively attempting to save the firm and preserve value for stockholders. Whether or not those attempts were ultimately successful or strategically sound does not detract from the intent of preserving stockholder value.

[2]As shown in Table 3, the direct labor hours per vehicle spread for the company was great in 1958, from 48 hours for the Studebaker Scotsman to 83 hours for the Packard Station Wagon. With the elimination of the Packard and Golden Hawk lines and with the introduction of the Lark for 1959, the direct labor hours spread narrowed to 44 to 60 hours (Minutes, March 27, 1958).

[3]The 1956 Packard Executive was introduced in March 1956 as an upgraded Clipper Custom with Packard front end and modified side trim but with Clipper tail lights. It sold for $3,465 for the four-door sedan and $3,560 for the hard top. The price was $400 more than a Clipper Custom but $650 less than a senior Packard Patrician or 400 hardtop (Kimes, p. 612).

[4]Churchill's cost-cutting efforts and the benefits of retrenchment and consolidation at South Bend are evident here when compared to the Studebaker break-even estimates of 208,747 units in 1955 (Minutes, June 20, 1955).

[5]Richard Teague was not pleased with the 1957 Packards although he did not blame Duncan McRae because of the constraints under which McRae was working. Teague said McCrea was a good designer but had no money to work with. He stated: "It [the 1957 Packard] was patchwork. . . . It was an abortion-absolute abortion" (Teague, pp. 88-89).

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# Funny Stories About the Ford, Vol. 1

*With the centenary of the Model T Ford fast approaching, automotive historians will recall that the "Tin Lizzie" was the object of affectionate derision in its day. With that in mind, the reader may enjoy the following excerpts from* **Funny Stories About the Ford, Vol. 1**, *"collected and compiled," and published in 1915 by the Presto Publishing Company of Hamilton, Ohio, if only to judge how humor has changed in 90 years. As the publisher observed, "We can joke all we want about the Ford car, and the Ford owner, being a good fellow, laughs along with us. At the same time, though, he pats his checkbook, lets in his clutch, and rides serenely on his way, proud of his possession and confident of his own good judgment."*

***The Formula in Poetry***

A little spark, a little coil,
A little gas, a little oil,
A piece of tin, a two-inch board—
Put them together and you have a Ford.

***The Twenty-third Psalm***

The Ford is my auto; I shall not want another.
It maketh me to lie down beneath it; it soureth my soul.
It leadeth me into the paths of ridicule for its namesake.
Yea though I ride through the valleys I am towed up the hill,
For I fear much evil. Thy rods and thy engines discomfort me;
I anoint my tires with patches; my radiator boileth over;
I repair blowouts in the presence of mine enemies.
Surely, if this thing followeth me all the days of my life,
I shall dwell in the bug-house forever.

***Deserved a Change***

Three automobile owners died and began their joy-rides to Heaven. Arriving at the pearly gates, the first one boldly applied to St. Peter for admittance. "How did you get here?" demanded the gate-keeper. "In a Pierce-Arrow" was the proud reply. "You go straight to Hell" was the heartless command.

Soon the second arrived, and begged to drive through. "How came you here?" asked the old saint. "In a Packard," replied the applicant with a glow of pride. "And I made the trip in -----" "You go along with that other fellow" broke in St. Peter.

The third arrived, and offered the same entreaty. "How did you get here?" St. Peter asked again. "I made the trip in a Ford," he said, and heaved a sigh. "Come right in," was the cordial response, "You had your Hell on earth."

***Accessory Manufacturers Please Note***

A new device that would be a handy thing on a Ford is a cuckoo-clock arrangement on the radiator, to come out and sing, when the machine is going 25 miles per hour, "Nearer, My God, to Thee."

***Everything is Comparative***

An old-time Ford owner drove up to the corner last Fall in a brand-new Saxon. "Where's the Ford?" called out a fellow Ford enthusiast in surprise. "Oh," came the response, "I've laid up the big car for the Winter."

***Also—Because it Could Take San Juan Hill on High***

Three friends had just purchased automobiles, and decided that appropriate ceremonies were in order to christen the machines. On the date set for the christening, the three machines were lined up in a row—a Packard, a Buick, and a Ford. The owner of the Packard broke a bottle of champagne over the radiator of his machine, at the same time exclaiming "I christen thee George Washington, first in war, first in peace, and first in the hearts of his countrymen." The owner of the Buick then broke a bottle of grape juice over his machine with the words "I christen thee Abraham Lincoln—honest all through." Then the Ford owner stepped forward, broke a bottle of beer over his machine, and exclaimed "I christen thee Theodore Roosevelt, you rough-riding son of a gun."

*continued on page 55*

# The Aluminium Piston Story

by Graham Orme-Bannister

***Introduction***

The development of the motor car engine has been mainly an evolutionary process, driven by such things as improvements in metallurgy and fuel quality, and a better understanding of the combustion process. There have however been a few large steps, the first perhaps being the move from hot tube to electric ignition, and the most recent the advent of electronic engine management driven by ever tougher emissions legislation. One of the smaller, but nonetheless crucial, steps was the move from cast iron or steel pistons to lightweight aluminium alloys.

The time frame we are talking about is the period from just before World War I until the late '20s. This change has received little written attention and some of what has been said is misleading. This article is an attempt to draw together the various threads of the story and present it as a coherent whole, albeit from a British perspective.

***The Bentley Story***

If the subject of aluminium pistons is raised in a group of vintage car enthusiasts or motoring historians in Britain, one story that will almost certainly be told is the one about W. O. Bentley and the D. F. P. car. It is perhaps appropriate therefore to begin with that story.

In 1911, W. O. Bentley, then 22, was looking for a new business challenge after his railway apprenticeship and a short period looking after the maintenance of Unic taxicabs for the National Motor Cab Company. He was hooked on motor cars but craved something a little more exciting than Unic cabs.

The London firm of Lecoq & Fernie were concessionaires for the French D. F. P. car, named for Messrs. Doriot, Flandrin and Parant. The firm was advertising for a new director with money to invest. W. O.'s brother, H. M., was also interested and they tossed a coin for who would take up the directorship. For the sum of £2,000 W. O. became a director of Lecoq & Fernie, but the personal relationships did not work. For another £2,000, W. O. and his brother then bought the remaining shares and changed the company name to Bentley and Bentley. It is worth noting at this point that the incumbent sales manager was one Geoffrey P. H. de Freville, who will feature later in this story.

The Bentley brothers decided that competition was the best method of sales promotion, and the two-litre 12-15 D. F. P. was considered to have tuning potential. At the first outing, at the Aston hill climb in June 1912, W. O. recorded the fastest time of the day in his class and was declared the overall winner on Formula. For W. O., a love affair with motor sport had started.

The competition program was widened to include racing at Brooklands and class speed records. Things went well but more speed was constantly needed to stay ahead; W. G.Tuck in a factory Humber became the arch rival. It became clear to W. O. that something more fundamental than conventional tuning was required and in June 1913 he visited the D. F. P. factory in France for some serious discussions.

Relationships with the factory were excellent and management was very impressed with what W. O. had achieved; it was also receptive to the idea of a new sports version of the 12-15 for the British market. While talking to Auguste Doriot, W. O. noticed a small piston being used as a paperweight which Doriot told him was made of aluminium. Nothing was further said at the time but that piston stuck in W. O.'s mind. The racing D. F. P. had suffered piston failures above 80 m.p.h., as cast iron pistons cracked and lightweight steel ones broke their rings. It occurred to W. O. that lightweight aluminium pistons might be a way through that barrier.

W. O. Bentley's autobiography records at this point that both his brother and Doriot were dismissive of the use of aluminium in such a highly stressed application, but that Maxime Corbin et Cie., the French foundry who had made the paper weight piston, were cooperative and agreed to make a trial set of pistons for W. O.

Another source, however, suggests that Corbin had been making aluminium pistons since 1910, and supplying them as standard equipment in cars before 1914 to such companies as Chenard et Walcker and Panhard (Letter from C. F. Caunter, *Vintage & Thoroughbred Car*, Nov. 1954, p. 603). The fact that these companies specified that they should use an alloy of 12 percent copper and 88 percent aluminium, a formulation later adopted by the British Air Ministry as Specification L8, would support this suggestion. Certainly, Corbin was exhibiting "aluminium castings for automobiles" at the Paris Salon as early as 1907. We do not know whether Corbin was already a supplier to D. F. P., so it is tempting to think that the paperweight piston was an attempt by Corbin to gain business with D. F. P.

One also has to believe that W. O. personally did not talk to Corbin, otherwise he would surely have been told that the company had considerable experience of aluminium pistons. This is the first unresolved mystery in the story.

Whatever the truth, the pistons cast for W. O. were a great success. When first run in the D. F. P. engine, but with increased clearance, the power increased. Step by step the pistons were lightened and the compression ratio increased, and each time the power increased. This "straight from the box" success again supports the view that Corbin had considerable experience with aluminium pistons. After further testing W. O. was convinced, and he proposed to Doriot that the new D. F. P. 12-40 Speed Model should have aluminium pistons as standard equipment. For some unexplained reason, however, this pioneering move, claimed subsequently by W. O. as the first car in Britain to be so equipped, was not advertised at the time. It is not at all clear why W. O. would want to keep this technical advance secret.

That the pistons were successful is a matter of record. In 1914, in an escalating effort to demonstrate the performance of the engine of the 12-40 Speed Model, W. O. built a stripped-out single-seat car to attack the Class B records and established a new flying half mile record of 89.70 mph. at Brooklands. This represented the end of a rapid period of development as shown

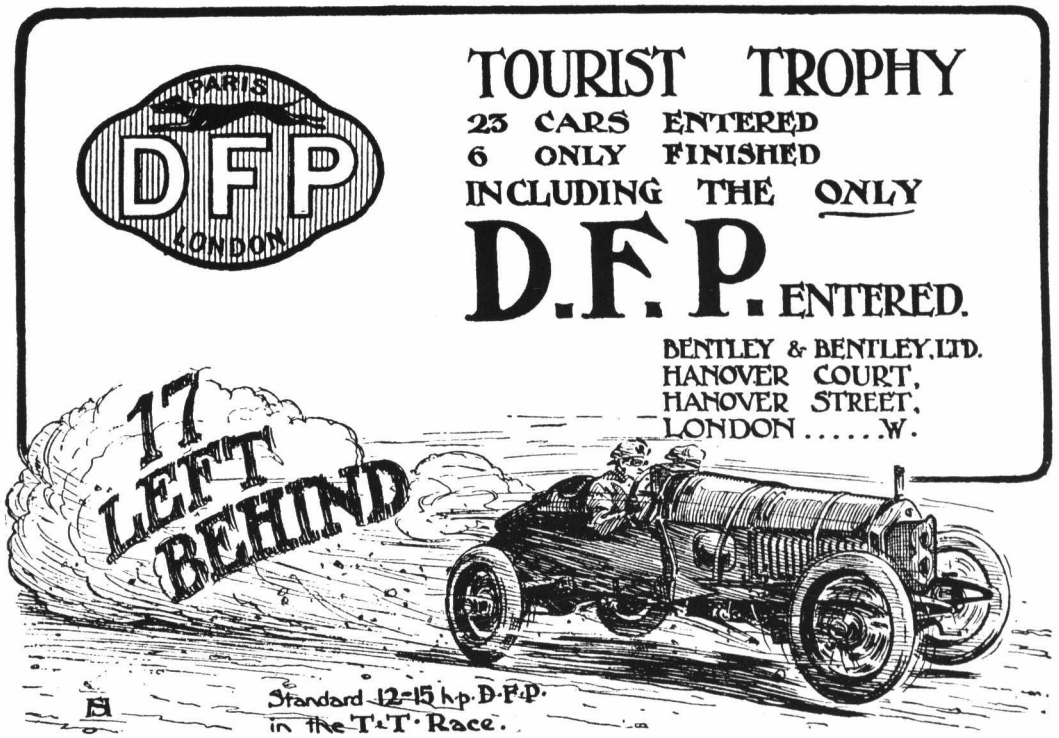


*Fig. 1 – The D. F. P. demonstrated the durability of aluminium-alloy pistons in the 1914 Tourist Trophy race* (*The Autocar*, supplied by the author).

by Brooklands lap times. In 1912 the D. F. P. lapped the track at 66.78 mph, in 1913, 78.67mph, and by 1914 this had risen to 84.29 mph.

Encouraged by this success, W. O. decided to enter the Tourist Trophy race on the Isle of Man. He figured that, as a comparatively small touring car against factory racing cars, he only had to finish to get good publicity. The lone car was one of only six finishers out of 23 starters in this grueling 600-mile two-day endurance race, and led to the introduction of the D. F. P. 12-40 Tourist Trophy mode (Fig. 1). The actual T. T. car survives and has recently been restored to working order; advertising at the time described the car as "absolutely standard" which is belied by subsequent accounts of the degree of preparation.

At this point in time a significant event in our story took place. Bentley and Bentley acquired the British agency for Corbin pistons and set up a new company, called The Aluminium Piston Co., to market them.

### *First World War Aero Engines*

Europe was then plunged into a bloody war and civilian motor car production virtually ceased. The other side of the coin, however, was that, with government money, production of vehicles and aircraft for military purposes exploded, and probably gave a bigger impetus to engine technology and production facilities than would ten years of civilian development.

W. O. saw a role for himself in promoting the use of aluminium pistons in aero engines as he believed (according to his autobiography) that no existing British engine manufacturer was aware of this new technology. This seems an extraordinary statement in view of the fact that he already owned a company, The Aluminium Piston Co., devoted to promoting that very same technology. He engineered an interview with Commander Wilfrid Briggs, who had a temporary office in a wooden hut on top of Admiralty Arch in Whitehall. Cdr. Briggs' job was to build up an engine department for the new Royal Naval Air Service (R.N.A.S.). W. O. showed Briggs one of his aluminium pistons and described his experiences with D. F. P. cars. Briggs was clearly impressed and told W. O. to go and sell the idea to the engine builders. To give him some official status, W. O. was given a commission in the R.N.A.S. in June 1915 with the rank of Lieutenant.

His first call was on E. W. Hives of Rolls-Royce, which was already building air-cooled Renault engines under license but was also designing its own engines. The first was to be the 200 h.p. water-cooled Eagle, which had aluminium pistons. His next call was on Louis Coatalen at Sunbeam. All Sunbeam aero engines, initially based on car engines, had aluminium pistons.

The chronology here, however, is difficult. These visits took place in 1915 and yet it is recorded elsewhere that Rolls-Royce fitted aluminium pistons to its 1913 Alpine Trial cars after experiencing piston failure in the 1912 event. It is also recorded that Rolls-Royce had itself done considerable development work on light alloys; there is even one tantalizing reference in *A Technical History of the Motor Car* by Newcomb and Spurr to Royce experimenting with aluminium pistons as early as 1903. This has not been verified however, and it seems likely this is a misprint for 1913. Sunbeam had also used aluminium pistons in racing cars in 1914. It also seems likely that The Aluminium Piston Co. would have previously canvassed both companies and that W. O. was not therefore really breaking new ground.

Lt. Bentley's next call was more problematic. Gwynne at Chiswick was not yet making motor cars, but had a good reputation for pumps of all description. However W. O. was sent there because Gwynne was building French Clerget aero engines under license. The Clerget was a rotary, as distinct from a radial, engine and W. O. could immediately see the inherent benefits of light weight and balance. There were, however, serious cooling and distortion problems on the trailing edge of the finned steel cylinders. The French solution was a light

bronze obturater piston ring, but it was very fragile and lasted only some 15 hours in service. W. O. spent a lot of time at the front in France seeing the problems at first hand.

Gwynne reluctantly accepted what eventually became Lt. Bentley's virtual order to fit aluminium pistons, but strongly resisted his idea of steel-sleeved aluminium cylinders to cure the uneven cooling problem, despite the fact that one such experimental cylinder had worked well on testing.

At this point W. O. went back to Cdr. Briggs and asked to be given facilities to design and build his own aero engines. Ironically he was given facilities at his old arch-rival Humber, where he designed the successful BR1 and BR2 engines. These were of similar layout to the Clerget engine but of much improved design. W. O. was falsely accused of copying the Clerget design, but that is another story.

It is impossible to overestimate the importance of the First World War to the infant aircraft industry. Before the war, flying was essentially a rich man's sport and there was no British aircraft industry to speak of. It is astonishing to contemplate that the British Government alone bought over 58,000 aero engines between 1914 and 1918.

This, however, placed Lt. Bentley in a difficult position, since he was both the prime advocate for aluminium pistons and a potential supplier through the Bentley and Bentley agency for Corbin. In particular this applied to his own BR1 and BR2 designs.

As the war intensified, supplies from France became increasingly difficult and W. O. solved both problems in June 1916 by setting up a new company, called The Aerolite Piston Co., to make aluminium pistons in Britain. They were to be cast at the Rowland Hill foundry in Coventry. Neither W. O. nor his brother were directors of this company until after the war. Thus during the war the Bentley name was distanced from the supply of aluminium pistons for military contracts. Aerolite was nevertheless the main source of income for Bentley and Bentley during this period. The company is not mentioned at all in W. O.'s autobiography.

The Aerolite Piston Co. eventually went into liquidation in January 1925, but the name survived as a brand for the Light Production Company, which acquired the assets. The Light Production Company belonged to Martin Valentine Roberts, who was a director of Bentley Motors, the company registered in January 1919 to manufacture cars designed by W. O. Bentley.

### *The Alvis Connection*

Geoffrey P. H. de Freville was born in Kent in 1883. In 1902 he joined the Long Acre Motor Car Company, and then in 1906 transferred to Lecoq & Fernie as manager of its D. F. P. agency, where his fluent French was of value. When the Bentley brothers bought out Lecoq & Fernie in 1912 they inherited de Freville and made him Sales Manager of Bentley and Bentley, which later included The Aluminium Piston Co. selling imported Corbin pistons.

When supplies from France became difficult because of the war, it was de Freville who was tasked with setting up the British manufacture of aluminium pistons. While this work was still in the experimental stage, however, de Freville resigned from Bentley and Bentley and set up his own company called The Aluminium Alloy Piston Co. with offices at Wandsworth. This company was initially blacklisted by the government purchasing agencies because de Freville's defection from Bentley and Bentley caused further delays in supplies from The Aluminium Piston Co. No rationale is recorded as to why de Freville deserted Bentley and Bentley, so we must assume it was sheer opportunism.

De Freville also set up a company called Ware & de Freville, who were up market motor car dealers. A. F. C. Hillstead worked for Ware and de Freville during the war and then, just to complete the merry-go-round, he left after the war and joined the newly formed Bentley Motors doing virtually the same job de Freville had done for Bentley and Bentley before the war.

One of de Freville's piston customers during the latter part of the war was Siddeley-Deasy which was making Puma aero engines. The chief engineer at Siddeley-Deasy at that time was the Welshman, Thomas George John. Through the Aeronautical Inspection Directorate, de Freville was also working with George Thomas Smith-Clarke. These three men would be instrumental in establishing the Alvis car after the war.

In 1919 T. G. John bought the British arm of the American carburetor company, Holley Brothers, and changed the name to T. G. John Ltd. The stated intention was to build engines of all description. Late in 1919 de Freville showed John the drawings of a 1.5 litre, 4-cylinder, side-valve engine with aluminium pistons and pressure lubrication. John was impressed and offered to pay a royalty for the engine design, and the use of The Aluminium Alloy Piston Co. trade mark, which from 1916 had been the word "ALVIS" inside a triangle. The first version of the new badge had wings on the triangle and was held to be an infringement of the Avro Aeroplane Co. trade mark. De-winged, and with the triangle inverted, it was considered acceptable and is the badge we know today. There has been much speculation about the origins of the word "ALVIS," largely fuelled by the fact that the first two letters are the chemical symbol for aluminium. De Freville, however, is on the written record saying that the word was entirely made up.

With a made-to-order Scottish chassis, and open coachwork by the Morgan Company of Leighton Buzzard, the prototype 10/30 Alvis car was running by March 1920, exhibited at the Scottish Motor Show, and on sale to the public by July the same year (Fig. 2). Despite the high price of around £800, the car was a success and production facilities in Coventry rapidly expanded. In December 1921 the company name was changed to The Alvis Car and Manufacturing Company.

### *The American Scene*

In a letter to *The Automobile* magazine in August 1915, Charles E. Duryea claimed to have experimented with aluminium pistons in 1897; he had also tried to make aluminium cylinder heads, water jackets and rear axle housings. In all cases, however, his experiments failed due to poor quality, porous castings.

There are other earlier references, such as The Detroit Aeroplane Co. in 1909, but the pioneer of aluminium pistons for motor cars in America seems to have been Harry Miller, though Duryea and Haynes used aluminium in their engines well before

*Fig. 2 – W.G.H. Hedges in an Alvis 10/30 winning his Class at the South Harting Hill Climb in 1922* (courtesy of LAT Photographic).

1900. The son of a German immigrant, Harry Miller was born in Wisconsin in 1875. He was an instinctive engineer and built himself what is thought to be the first motorcycle in America in 1896. He had already registered several patents in his own name when he started developing a new type of carburetor which he patented in 1909. He later designed an even better carburetor which he patented in 1913; he then incorporated The Master Carburetor Company in California to make them. This was so successful that an Eastern financial syndicate bought out the manufacturing and marketing rights east of the Rockies. A unique feature of the Miller carburetor designs was that the bodies were cast in aluminium rather than the traditional bronze. Miller had himself developed an aluminium alloy containing copper and nickel which he called "Alloyanum." His fertile mind realized that this material might also make good pistons, and by the end of 1913 he was making and selling them. His workshop became a magnet for any car enthusiast pursuing performance on the west coast of America.

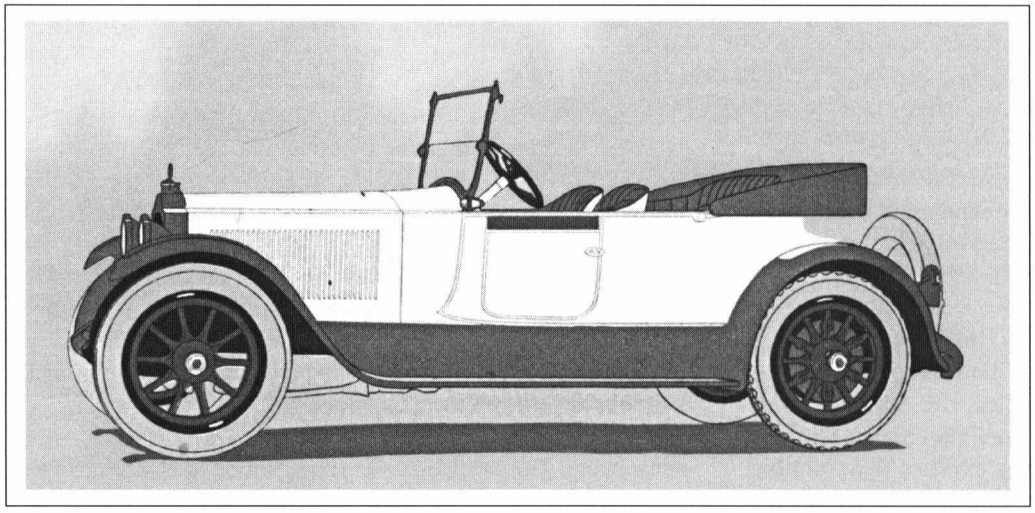

*Fig. 3 – The 1915 Packard Twin Six was one of the first American cars to have an engine with aluminium-alloy pistons. This is the 1917 model 3-25 four-passenger runabout* (from the editor's collection).

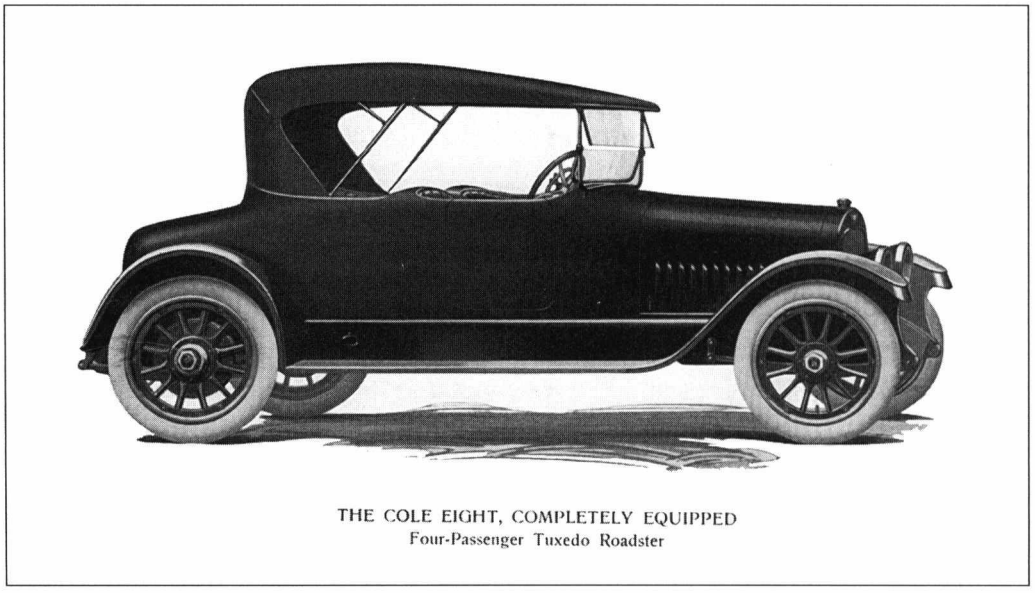


*Fig. 4 – The 1915 Cole V-8 was also one of the first American cars whose engine had aluminium-alloy pistons. Shown is the 1917 Model Eight, four-passenger Tuxedo roadster* (from the editor's collection).

Miller completely rebuilt the engine of the 1913 Peugeot Grand Prix car which "Wild Bob" Burman had comprehensively blown up in a race in January 1915. He also fitted aluminium pistons and a Master carburetor and manifolds to the Dario Resta 1914 GP Peugeot to make it ready for the 1915 season. The Peugeot Import Company announced that its three cars for Indianapolis would also be equipped with Miller "Alloyanum" pistons. By 1916 Harry Miller was designing and building complete engines in his own name, albeit heavily influenced by his experience with Peugeot. "The father of American racing" was on his way.

There were other claimants to the title of "pioneer" however. Writing in 1915, Joseph Leopold claimed that his company, the Walker M. Levett Co., had been "the pioneer foundry making a specialty of aluminium alloy for piston purposes." He further claimed that this expertise was gained by developing aluminium cylinders for an unnamed high speed, lightweight aero engine. These had been so successful that the engine manufacturer asked for the cast iron pistons to be made in aluminium as well. The 6 lb. weight cast iron pistons were

replaced by 2 lb. weight aluminium ones. Thus was born the Magnalite piston; the Magnalite alloy was based on an earlier German alloy called Magnalium. Fred Duesenberg is recorded as an early enthusiast for Magnalite pistons.

One contender for the first American production car to be equipped with aluminium pistons as standard was the Packard V-12 Twin Six introduced in 1915 (Fig. 3); another would be the Cole Eight introduced in the same year (Fig. 4). The V-8 Cole engine used Lynite pistons made by the aluminium Casting Co. using the Cothias process, which was an early development of permanent metal mould die casting. This had the twin benefits of reducing both porosity and machining losses. In the development of multi-cylinder engines it was crucial to reduce the reciprocating masses; and high quality, cheap to produce, die cast aluminium pistons were a key enabling technology. In the American motoring press in 1915 there was a heated debate between Cole and Packard engineers about the relative merits of V-8 and V-12 engines.

Initially the Cole Eight had some problems with aluminium pistons, mainly in relation to cold slap and seizure. "Cold slap" means that, when the engine is cold and the clearance between the aluminium piston and iron liner is maximum, the piston makes an audible slapping noise when the engine is cranked and run cold. These problems were solved in 1921 with the introduction of the Constant Clearance Piston. In this design the piston skirt was relieved around the pin bosses and isolated from the crown on the thrust face by partial circumferential slots below the lower ring, creating what was effectively a sprung slipper design. In an impressive A.A.A.-observed test involving three standard Cole Aero-Eight cars, where pistons were randomly exchanged during the test, it was even found that pistons that were a drive fit cold would run at full power with no hint of seizure. "Drive fit cold" occurs when there is zero clearance between the [sprung] piston and cylinder when they are cold and the piston has to be "driven" to move it.

Marmon is credited with producing the first composite piston in 1918. An aluminium crown and trunk was bolted to a cast iron lower skirt. This expensive solution prevented cold slap while retaining the weight and thermal conductivity benefits of aluminium.

### *The Italian Job*

W. O. Bentley claimed that the D. F. P. 12-40 Speed Model was, in 1914, the first production car to be sold in Britain with aluminium pistons. This claim is not borne out by the facts, and it certainly was not the first production car in the world to be so equipped. The earliest recorded production car with aluminium pistons was the Aquila Italiana in 1908.

From 1905 to 1908 Guilio Cesare Cappa was the technical director of an engine development company in Turin of which he was a co-founder. By 1908 that company had begun to make complete cars but went into liquidation with heavy debts after the death of the other founder; under bank supervision a new company was formed to make Aquila Italiana cars. The 4- and 6-cylinder cars that this company then produced were technically very advanced with monobloc cylinders, overhead valves, roller bearing crankshafts and aluminium pistons. Since the cars were production ready in 1908 we must assume that Cappa had been developing aluminium piston technology in the previous company.

Cappa stayed with Aquila Italiana until 1914 when he moved to FIAT, where he achieved fame for the racing FIAT in 1922. In 1924 he was appointed technical consultant and general manager to the ailing Itala company where, in 1926, he designed the revolutionary Tipo 11 racing car with a V-12, ohc supercharged engine and front-wheel drive. Exorbitant costs killed the project but the prototype survives in the Biscaretti Museum in Turin.

Another early Italian connection is the 1913 11.9 hp N. B. Newton & Bennett were a British engineering company based in Manchester which was the sole British Empire concessionaires for the Italian SCAT and Nazarro cars. The engineering brains at Newton & Bennett belonged to Robert Harper, who designed his first engine in 1904. Harper developed and patented many improvements for the SCAT which were incorporated by the Italian factory. In 1910 Harper designed a complete 2-cylinder car which SCAT was asked to manufacture for Newton & Bennett. Only two were ever made as the SCAT factory was overcommitted, so Harper and Mr. Newton went to Italy to look for an alternative factory. In 1911 they bought the struggling car maker VALT, which had a small factory in Turin. The first of the "new" 11.9 hp N. B. cars exported in 1912 were basically rebadged VALTs. These cars were fitted with aluminium pistons and went on sale in England before the D. F. P. 12-40 Speed Model.

Harper continued to develop the car and changed the flat Italian radiator design to the more familiar N. B. deep V shape. He clearly also took a dislike to the aluminium pistons as the "improved" 1914 model had steel pistons machined from solid bar. No connection has been found between VALT and Aquila Italiana.

### *The German Way*

The approach in Germany seems to have been altogether more cautious. Daimler and others had experimented as early as 1911, and the Basse & Selve company is recorded as having developed efficient aluminium pistons by 1912. The influential 1914 GP Mercedes engine, designed by Paul Daimler, had a viable aluminium piston design but the choice for the actual race cars was left to the drivers, who were mostly factory-employed mechanics. For the first race, the French Grand Prix, they all opted for the more conservative, but proven, cast iron pistons. They still took the first three places. There is an ironic twist to this story. The winning car from the French Grand Prix was later shipped to the Milnes-Daimler London showroom where it promptly became stranded by the outbreak of war. At the instigation of W. O. Bentley the engine was shipped to Rolls-Royce for examination as W. O. was aware of the advanced technology of this engine and the close relationship between aero engine and racing car design at Daimler. How might his thinking have been changed if the drivers had opted for the aluminium pistons!

Whereas Lt. Bentley had been encouraged to promote the use of aluminium pistons in First World War aero engines in Britain, the German authorities were more cautious. In an open

competition in 1913, called the "Kaiserpreis für Flugmotoren," Basse and Selve entered an engine with aluminium pistons but its entry was refused on the basis that the technology was not safe. Aluminium pistons for military aircraft were not adopted until very late in the war after the famous prewar German pilot Hellmuth Hirth had carried out extensive tests. After the war Hirth shared his experiences with Karl Schmidt, who had foundry expertise. They entered another official competition in 1921, this time more prosaically sponsored by the new Ministry of Transport. Thirty-two different lightweight piston designs were represented, made in 16 different alloy compositions. First and fourth prizes were awarded to engines with forged magnesium alloy pistons, but Schmidt and Firth won second and third prizes with pistons cast in aluminium copper alloys.

At this point Hirth changed technology and set up his own company to make forged magnesium alloy pistons. He employed Hermann Mahle as commercial manager and his brother Ernst as technical manager. Magnesium alloys, under the commercial name Elektron Metal, proved to be a temporary diversion due to corrosion and wear problems and Ernst Mahle developed high silicon aluminium alloys to replace them. Hirth had by now been pushed out of his own company during a takeover battle, but Mahle on went to become one of the world's largest piston manufacturers. Hirth later set up his own engine manufacturing company, the descendant of which, Gobler-Hirthmotoren, still exits.

The Schmidt company meanwhile had also converted from aluminium copper to aluminium silicon alloys, and in 1927 negotiated the German manufacturing license for the American Nelson-Bohnalite invar strut piston. Karl Schmidt GmbH and Mahle KG became the main driving forces behind the development of piston technology in Germany through the '20s and '30s. As an aside, forged magnesium pistons survived until 1930 because of their dramatic weight advantages, for instance in the Mercedes-Benz SS sports car, but eventually the practical problems proved too much. Even W. O. Bentley tried "Miralite" magnesium pistons in one car in the 1923 Georges Boillot Cup in Boulogne but they burnt out on the second lap.

### *The French Connection*

In *La Vie Automobile* for March 1930, in an article about how to increase engine efficiency, the major topic is piston design and metallurgy. There is a picture of an aluminium piston with the caption "section of the first aluminium piston, which was fitted to a racing car (not identified) in Strasbourg in 1902."

As noted above, the French company Maxime Corbin et Cie. is credited with supplying Chenard et Walcker and Panhard with aluminium pistons as early as 1910. The French-built Hispano-Suiza Alfonso used them in 1911. Another earlier French connection is the Peugeot-Huber two-stroke engine reported in *The Motor* in April 1908.

The Automobile Club de France held trials for two-stroke engines in that year, which attracted seven entries. The winner by a wide margin was the Peugeot-Huber entry. This was a single-cylinder demonstration engine but it was claimed that the principle could be scaled up to any number of cylinders. The piston in this engine was a complex aluminium casting with a raised baffle crown and five transfer ports in the skirt. The underside of the piston accumulated the fresh charge on the upstroke, the crankcase being isolated by a sliding seal around the connecting rod. Who was Huber, and did the engine ever go into production?

Another early claim from France concerns the 1913 Cyclecar Grand Prix held at Amiens in July of that year. In third place was the delightfully named Violet-Bogey; the two-cylinder, 1088cc engine in this car developed 22 hp at 2,400 rpm and had aluminium pistons (Fig. 5). Were they supplied by Corbin?

### *Meanwhile in Britain*

Back in Britain the Riley company had also been involved in the manufacture of aluminium pistons during the war. The company was a sub-contractor to Gwynne in the building of the Clerget engine and, among other things, made aluminium pistons for Gwynne. Riley had some previous experience of aluminium pistons when experimenting with the Le Gnome et Rhone rotary engine, and also some radical aero engine designs of their own. Given the less than friendly relationship between Lt. Bentley and Gwynne, it is perhaps not surprising that Gwynne turned to Riley rather than The Aerolite Piston Co. as a supplier. In 1919 Riley specified aluminium pistons for its new 11 hp side-valve car. Riley also took out patents on new designs of split skirt aluminium pistons which still had scraper rings at the bottom of the skirt.

*Fig. 5 – One of the two Violet-Bogeys entered in the 1913 Cyclecar Grand Prix, their engines using aluminium-alloy pistons* (supplied by the author).

The Lanchester Motor Company, true to its reputation, was also a pioneer in piston design. As early as 1905 it was using lightweight steel pistons in its 20 hp 4-cylinder engine. The Company's first recorded use of aluminium pistons was in the

40 hp 6-cylinder engine in 1919; a 1925 source however states that Lanchester had been experimenting for six years, which means it was already working with aluminium pistons when W. O. Bentley tried them in the D. F. P. In 1925, Lanchester, in pursuit of quiet running, changed from all-aluminium to two-piece composite pistons, as pioneered by Marmon in America. A domed aluminium crown was attached to a very thin steel skirt. This expensive solution produced a piston that could be lighter than an all aluminium piston, but retained good heat conduction from the crown.

That other great British pioneer of engine technology, Harry Ricardo, was also an early advocate of aluminium pistons. In 1915 he was introduced to Cdr. Briggs of the R.N.A.S., the same man who was already employing W. O. Bentley. Cdr. Briggs' pet project was a "flying destroyer," a long-range flying boat. He had already convinced himself that the correct layout was one large engine in the hull of the aircraft chain-driving two propellers mounted in the high wing. It had been calculated that this would take an engine developing 600 hp; no aero engine remotely as big as this was even on a drawing board in Britain. Harry Ricardo demonstrated his stratified-supercharged engine to Briggs and his advisors at his small workshop in Walton-on-Thames. Briggs was impressed and commissioned Ricardo to design and build an enlarged version, and to do this he was given facilities at the Peter Brotherhood factory at Peterborough. For the prototype engine Ricardo specified pistons cast in an aluminium alloy containing 12 per cent copper. Unfortunately for posterity the British Admiralty canceled the project.

Since Harry Ricardo and W. O. Bentley were both working for Cdr. Briggs developing aero engine technology in 1915 it is difficult to believe that they did not meet and discuss mutual problems. Yet in Ricardo's very readable autobiography W. O. is not mentioned, nor is Harry Ricardo mentioned in W. O.'s autobiography. There is evidence that the two men fell out later, in 1930, over the Bentley 4-litre engine design, long before either wrote their life stories.

In 1919 Rolls-Royce introduced the new 6-cylinder 40/50 model with aluminium pistons as standard, although by the company's extreme standards for quiet running this led to some early problems. Also in 1919 AC first ran its classic 6-cylinder ohc engine with aluminium pistons, but it did not go into production until 1922. It then remained in production until 1963.

The claim to be the first British production car with aluminium pistons would therefore seem to be between Riley, Rolls-Royce and Lanchester, all of which introduced new models using them in 1919.

### *From Innovation to Standard Practice*

The ubiquitous Model T Ford never did have aluminium pistons as standard, although the weight


*Fig. 6 – Touting the virtues of Specialloid aluminium-alloy pistons* (*The Brooklands Gazette*, May 1925, supplied by the author).


*Fig. 7 – Laystall cast iron pistons, "as light as aluminium"* (*Motor Sport*, September 1925, supplied by the author).

of its cast iron pistons was halved during the life of the car. However, many Model T's in Britain, as elsewhere, did run on aluminium pistons in the '20s because companies such as Specialloid (Fig. 6), Hepolite and The Light Production Company (Aerolite), were selling them as replacement equipment, and not just for Model T's. Laystall initially promoted its De Luxe Lightweight Cast Iron Pistons as "light


*Fig. 8 – A different story from Laystall two years later* (*Motor Sport*, July 1927, supplied by the author).

**Table 1—Increase in Piston Speeds When Using Aluminium.**

| CAR | PISTON MATERIAL | STROKE MM | RPM | HP PER SQ INCH PISTON | PISTON SPEED |
|---|---|---|---|---|---|
| 1911 Fiat | cast iron | 190 | 1650 | 1.45 | 2060 |
| 1912 Peugeot | steel | 200 | 2200 | 2.43 | 2880 |
| 1913 Peugeot | steel | 156 | 2900 | 3.06 | 3000 |
| 1914 Mercedes | cast iron | 65 | 2800 | 2.73 | 3050 |
| 1920 Ballot | aluminium | 112 | 3800 | 2.61 | 2800 |
| 1922 Vauxhall | aluminium | 132 | 4500 | 3.66 | 3900 |
| 1922 Fiat | aluminium | 100 | 4500 | 3.00 | 3420 |
| 1924 Sunbeam | aluminium | 94 | 5500 | 4.20 | 3400 |
| 1927 Delage | aluminium | 76 | 8000 | 5.80 | 4000 |

as aluminium with all the advantages of cast iron. Piston Slap impossible" (Fig. 7). However, in 1926 Laystall introduced the De Luxe Sports Aluminium Piston but still retained cast iron for normal road use (Fig. 8).

There was much experimentation with new designs to overcome the cold slap and oil pumping problems inherent with some of the earlier aluminium pistons. This all led to some very lively correspondence in the British motoring press as the quality, not to mention the standard of fitting, of replacement pistons varied enormously. By 1930, most of these issues had been resolved and aluminium alloy pistons had become standard equipment on the majority of European cars. At the 1923 Amsterdam Exhibition, 38.5 per cent of the engines had aluminium pistons; by 1925 this had already risen to 69.4 per cent. In America, with its bigger slower revving engines, the changeover was also slower. By 1930 some two-thirds of American cars had aluminium pistons. Also in America the motor industry flirted longer with lightweight steel pistons as a replacement for cast iron, but that is an expensive option however they are made.

***With Technical Hindsight***

There are references in the British vintage car literature making the general statement that the move from cast iron to aluminium pistons allowed piston speeds to increase from 1,500 to 3,500 feet-per-minute. This is a gross over simplification. It is difficult to choose representative data, but easy to pick data to prove whatever you wish to prove. In an attempt to be objective, I have taken the following sequence of engines from Laurence Pomeroy's standard work, *The Grand Prix Car*. He picked these significant engines to demonstrate development over the period 1911 to 1927 (Table 1).

It is difficult to read more than the very broadest of trends into this table. What it clearly does not demonstrate, however, is a jump in piston speed to accompany the change from ferrous pistons to aluminium alloy. What it does perhaps demonstrate is that the primary trend was to increase engine speed (rpm), and that shortening the stroke and reducing the piston weight were two ways of achieving this. It should be noted however that piston speeds exceeding 3,000 feet-per-minute were achieved with cast iron pistons. The table does reflect racing practice, where cost is not a major factor. The engines however do reflect absolute technical trends more clearly than cost conscious production engines. This broad conclusion is borne out by Karl Ludvigsen's excellent book *Classic Grand Prix Cars*. Comprehensive data is tabulated on 155 engines covering a time span from 1903 to 1960. One figure included is a function of piston speed adjusted for bore/stroke ratio, and if this is plotted against the year what we see is a linear increase with some scatter from a figure of 1,049 in 1903 to a high of 4,753 in 1957. There is no significant discontinuity at any point.

The primary limitations on piston performance are maximum acceleration and maximum crown temperature. Piston acceleration, rather than piston speed, determines bearing stresses for a given piston weight and the main variables determining piston acceleration are rpm, and the ratio of the stroke to the connecting rod length. Piston acceleration figures can be as high as 50,000 feet per second per second, compared with 3,000 feet per minute average speed. Hence basic engine geometry is as important as piston material.

The initial attraction of aluminium alloy for pistons was weight, as the easiest way to reduce the inertia of the reciprocating parts is to lighten the piston. The extent of this weight reduction is illustrated in Table 2 below from Heldt's book, *High Speed Combustion Engines*, which shows the comparative weights of interchangeable 3.5-inch pistons made in different materials. Because of the brittle nature of the material, there are limits to how thin walled you can make a cast iron piston. One way forward is to use a thin-walled steel piston instead of cast iron, but this is an expensive option whether you machine from solid, cast or forge them. An aluminium alloy piston will typically have a weight between one half and two

**Table 2 – Comparative Piston Weights**

| MATERIAL | WEIGHT IN LBS. |
|---|---|
| cast iron | 2.3 |
| lightweight cast iron | 1.8 |
| aluminium copper alloy | 1.3 |
| aluminium silicon alloy | 1.1 |
| magnesium alloy | 0.6 |

thirds of the iron piston it replaces. This can reduce the inertia forces by a half. Inertia force times acceleration determines bearing load. Another related but less obvious benefit of lower piston weight is lower out-of-balance forces, made evident as reduced engine vibration.

Whereas the initial attraction of aluminium alloy pistons was weight, the initial concern was the low melting point. It was not at first recognized that the higher thermal conductivity of aluminium meant that pistons would run cooler. Thus the other major benefits derived from aluminium alloy pistons are the lowering of maximum crown temperatures and the reduction of local overheating.

Aluminium has five times the thermal conductivity of iron; the thermal conductivity of aluminium actually increases with temperature whereas that of cast iron decreases. Thus heat is carried away from the piston crown much faster; typically an aluminium piston crown was found to run 200 deg. C. cooler than a cast iron piston crown in the same engine. This means that, for a given crown temperature, the compression ratio can be raised which in turn increases the power output. The logical extension of this argument is to use aluminium alloy cylinder heads as well, which is now common practice. Pursuing this route any further, such as all-aluminium engines, gets you into complicated heat-balance equations trading off higher specific power output against lower thermal efficiency. Modern engines dump much more heat (energy) than vintage engines. Perversely, in the early days of aluminium pistons, one of the main counter arguments was that they would cause the engine to run too cold and therefore lose efficiency. This was, of course, before engine knock was understood, and high octane fuels developed to permit compression ratios to rise above 5.5.

Another significant contribution of the aluminium alloy piston compared with cast iron or steel is lower friction losses. Aluminium-to-iron is a much better bearing combination than iron to iron, and seizure, should it occur, will hopefully only damage the piston and not the liner. Early cast iron pistons were sometimes tin plated to improve the frictional characteristics.

A further significant advantage of cooler-running aluminium pistons, in those pre-detergent oil days, was fewer carbon deposits in the combustion chamber and ring zone.

The main disadvantage of early light alloy pistons was the difference in coefficient of expansion between aluminium and iron, which is a factor of two. This meant that pistons had to be run with high cold clearances to avoid hot seizure, and this led to the dreaded cold slap. The other expansion effect was that the ring groove clearance increased with temperature and caused oil pumping; ring groove wear was also aggravated by cold slap. Many mechanical solutions were tried, such as elliptical sections, side relief, offset piston pins, split skirts, scraper rings at the bottom of the skirt, Invar struts, steel bands, two-piece composite pistons, and the Ricardo slipper. Hepolite and Aerolite developed "compensating" pistons which were based on similar principles to the Cole "Constant Clearance Piston."

In 1924 Bentley Motors was again involved by developing the BHB (Bentley-Hewitt-Burgess) piston, which was later picked up and developed by the AE Group. This design used the same "compensating" principle. Some of these design features survive, but the main solution to cold slap was found in alloy development.

***Metallurgy***

Pure aluminium would be much too soft and weak for a stressed component such as a piston. The first aluminium alloys were developed by adding copper. This has two effects, firstly a simple solution hardening effect but also a response to heat treatment known as age hardening. To achieve this hardening the metal needs to be quenched to suppress the normal crystallizing of the aluminium/copper compound, which then precipitates slowly and hardens the alloy. Aluminium/copper alloys, however, are not easy to cast in sand moulds without porosity and blowholes.

The two most common aluminium/copper alloys contain 6-8 per cent and 12 per cent copper respectively and were first known in the British Engineering Standards system as L11 and L8. The Brinell hardness of annealed pure aluminium is below 30, that of fully heat treated L11 can be 95. The L8 composition is basically the one used by Corbin to cast the pistons for W. O. Bentley, but it is not clear from the literature whether Corbin or W. O. were aware of the age hardening potential of the alloy. They certainly knew about the porosity problems.

Adding magnesium to aluminium/copper alloys enhances the heat treatment response. An alloy containing 4 per cent and a 1/2 per cent each of magnesium and manganese is the material we still know commercially as duralumin, which was first developed as long ago as 1911. The same 4 per cent copper, but with 1.5 per cent nickel and 1.5 per cent magnesium added is the so-called alloy, developed during the First World War in Britain by the National Physical Laboratory. This alloy has been widely used for cast and forged components, including cylinder heads and pistons. It is harder than duralumin and has better corrosion resistance.

After World War I, it was discovered that addition of silicon to aluminium reduces the coefficient of expansion as well as lightening and hardening the alloys. This addition also had the great advantage of being much easier to cast giving the molten metal great fluidity and low shrinkage. They can also still respond to heat treatment.

The first silicon alloys, developed soon after World War I, contained around 12 per cent silicon plus small amounts of nickel, copper and magnesium. It was also discovered that small additions of sodium, called "modification," improved the casting and mechanical properties further. Similar alloys are still widely used today. Silicon alloys have long been the backbone of the aluminium foundry business.

Silicon contents above 13 per cent give rise to the so called hyper-eutectic alloys. These alloys have a matrix of pure silicon nodules and are very hard and difficult to machine. The silicon nodules are sometimes exposed by etching to produce an exceptionally wear resistant surface. Heat treated they can be stronger than cast iron. The most common alloy contains around 17 per cent silicon, 4.5 per cent copper and 0.6 per cent magnesium. Such alloys have also been used for linerless cylinder blocks, particularly in Germany. Piston material then becomes problematical as aluminium on aluminium is not a good bearing combination. Low friction piston coatings have been tried, not entirely successfully, to solve the problem.

Hand in hand with alloy development, aluminium piston production technology developed through the sequence from sand casting, through die casting to forging. This development was initially necessary to overcome the early problems of porosity and blowholes in sand cast pistons. Die casting in chilled, permanent metal moulds solved the problem and also reduced machining losses and, as the raw material also became cheaper, brought aluminium pistons into near cost parity with cast iron. Strength and quality were greatly improved again later by forging, which is now virtually the universal method of mass manufacture.

### *In Summary*

The modern high-speed internal combustion engine would not have evolved the way it has without the change from cast iron to light weight aluminium alloy pistons. The change however was not just the simple step change in piston speeds sometimes referred to in the literature. Weight, thermal conductivity, expansion and friction were all part of a complicated design equation, of which perhaps the most important aspect is lower crown temperatures allowing higher compression ratios.

That said, this article started out to produce a coherent story about the development and introduction of the aluminium alloy piston, albeit from a predominantly British perspective. In this respect it is incomplete; there are still too many gaps in the story and too many inconsistencies in the written record. Some of these inconsistencies stem from W. O.'s autobiography. Since he did not write this until 40 years after the events, it is perhaps not surprising if some of the memories became blurred. Nearly 50 years on again it is difficult to judge if W. O. put any deliberate spin on events.

We still need to know more about the French pioneer Maxime Corbin and his relationship with Chenard et Walcker and Panhard; no connection has been found between him and the Philip Corbin who was making cars in America around the same time. It is like an old and incomplete jig-saw puzzle, which perhaps even contains a few pieces which should not be there at all, hopefully the missing pieces will be found eventually.

### *Acknowledgments*

The following individuals and organizations have kindly supplied valuable information;

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# Mobilizing the Nation: an "Interview" with Howard E. Coffin

By D. J. Kava

***Introduction***

A nut can fall off your 90-year-old antique car on tour and you can stop at virtually any hardware store in America and find a replacement that fits. You can credit Hudson Motor Car Company's founder Howard Earle Coffin for this fortunate situation. He was the driving force, through the Society of Automotive Engineers, in the standardization of many automotive parts and specifications including steel types, tubing, and nuts and bolts. When the storm clouds of war started brewing in Europe, he turned his attention to the country's inability to react quickly to the industrial demands of war. Despite being a Quaker by birth he perhaps was the quintessential warmonger in the days proceeding World War I. Even after charges of widespread unethical conduct by his committees tainted his public service career, (later exonerated by the Hughes Commission of any personal wrongdoing) he continued his government work. He was a member of a subcommittee in the Naval Consulting Board and the Aircraft Production Board. It is here we find him in 1919.

***Background***

Coffin's story is familiar to most Hudson fans and to readers of my article "George W. Dunham: Twentieth Century Engineer" in *Automotive History Review* Issue No. 25 (Spring 1990, p. 2). Coffin's widowed mother moved to Ann Arbor so he could attend Ann Arbor High School, then considered a preparatory school for the University of Michigan. She ran a boarding house to support the family, where the future owners of the Hudson Motor Car Company, Roy Chapin and R. B. Jackson would gather. They both worked first at Oldsmobile (Fig. 1) and then with the E. R. Thomas-Detroit Company which they helped organize (Fig. 2), Chalmers Detroit, and finally, Hudson in a management buyout.

In 1912 Coffin was featured in the famous Hudson "48 Engineers" advertising campaign giving him comparable national stature with Henry Ford or Ransom Olds (Fig. 3).

As early as 1915 he started parlaying that fame into a major role in World War I preparedness by conducting a National Industrial Inventory of major manufacturing companies. A November 1915 speech led to a *World's Work* article in May 1916 called "Industrial Organization For National Defense" that noted many defense shortcomings. It was more fuel

*Fig. 1 – Howard E. Coffin in the first 4-cylinder car produced for the market by the Olds Motor Works. The picture was taken in front of the factory in Lansing, Michigan, in 1905.*


*Fig. 2 – left to right, James J. Brady, Fred Bezner, Howard E. Coffin, and Roy D. Chapin, in a Thomas-Detroit 40 hp car, c. 1908.*

for the war mongering fire that resulted in Congress establishing a cabinet-level advisory group in August 1916. Part of the Army Appropriation Act, it was called the Council of National Defense "to recommend policies for improving the nation's preparedness in the event of war." (Vinson, "The Coming of War: How Government Regulated the Production of Passenger Cars," *Automotive History Review* No. 28, Winter 1993-94, p. 2). Coffin took a position on the Advisory Committee of the Navy Consulting Board (NCB) on November 17, 1916.

After the declaration of war on April 6, 1917, the armament money flowed. Five days later the Dayton-Wright Aircraft Company was incorporated. Col. E. A. Deeds of Delco fame sold his airport and land for the factory in a Dayton, Ohio suburb and many automotive executives invested, including Coffin and Roy D. Chapin. In August Deeds was appointed in charge of aircraft procurement and soon had contracts for 4,000 De Havilland DH-4 two seat fighters and 400 J-1 training planes.

In January 1917 Coffin "lent" his name to the organizers of the nation's first aircraft show. As a member of the Aircraft Production Board he helped manage the Liberty V-12 aircraft engine program which benefited mostly Packard but Hudson was involved with a V-4 prototype. By late 1917 artist John Gutzon de la Mothe Borglum started complaining of insider deals and profiteering after his July offer to build 80 planes was refused. Borglum blamed Deeds for the loss of a large sculpture commission in Dayton after the 1913 flood, so he became a natural critic. President Wilson permitted him to investigate. In March 1918 the *New York World* spent two days detailing Deeds' misdeeds, but only after he'd already been replaced. As a result the Council of National Defense was reorganized into the War Industries Board in the spring of 1918. Military aviation procurement was gradually separated from the Signal Corps.

Coffin seems to have slid through the Wilson administration's Hughes Commission hearings by claiming all his decisions were countersigned by the military and that he had no personal responsibility. In early July 1918 Coffin wrote the Naval Consulting Board that he would be in Detroit until further notice and took a 10-day vacation at his home on Sapeloe Island, Georgia. He missed the August meeting due to "pressing matters" in Detroit.

All must have turned out well, for in November 1918 he was off for the winter in Europe on a government-sponsored American aviation delegation. Our interviewer finds him stateside only a couple of months after that trip.

Many years ago I wrote the National Archives looking for a copy of the National Industrial Inventory only to find it was never published. The Archives did, however, have a few hundred pages of Coffin's correspondence which I had copied. These suggest that the inventory only existed in 20 filing cabinets passed to the War Industries Board which ignored it. The Archives described the rest of the collection as "jumbled" because many of file names had broken off. If the automotive inventory files can be found, they would provide a gold mine of statistical information on factory sizes and machine tools available at that time, and capabilities of the era.

The Coffin files had some May 1919 transcript replies requested by a Captain Lloyd N. Scott, who was preparing a history of the Naval Consulting Board. Unfortunately Scott's questions were not included and Coffin's dictated answers were disjointed requiring at least one set of follow up questions. A secretary must have deleted every "I" and replaced it with "we." Fortunately, the supporting correspondence helped clarify many issues and offered an irresistible opportunity to fabricate an interview almost entirely in Coffin's own verbose words.

Members are perfectly correct in challenging this histo-literary concept but I offer it only to once again promote the Society's own oral history goals. The "I's" have editorially returned and replies are often assembled from several paragraphs but keep the context correct. Wanton paraphrasing is noted by parenthesis. Otherwise may I introduce the Howard Earle Coffin of May 1919.

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*Q. Mr. Coffin for starters would you give us a quick rundown of your experiences of standardization?*

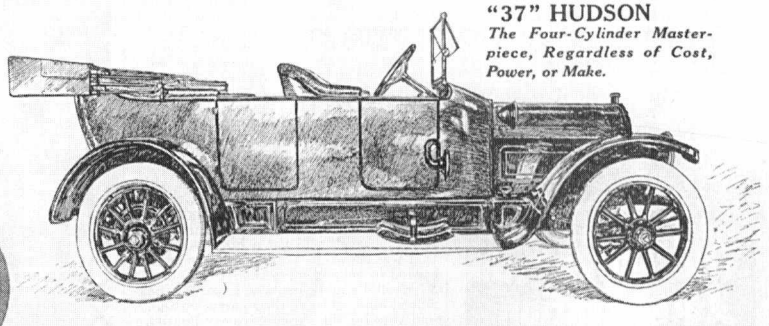
**Coffin:** The motor car industry supplies perhaps the best example of what may be accomplished by cooperation and certainly the best example of what may be accomplished by standardization of any of the American industries or even any of the industries of the world, because nothing approaching the industrial cooperation of the motor car manufacturers has been done in any of the foreign countries. [This is a typical Coffin sentence; the reason for editing . . . djk.]

This work was begun pretty early by the Association of Licensed Automotive Manufacturers, which was organized in 1903. They got their engineers and shop men together but not a great deal was done in a practical way until 1909. Meanwhile, the industry had grown at a tremendous rate and while the men controlling it had remained very friendly because of their close business association, they had not attempted to do many of the practical things which have since been done.

In 1909 the situation became such that it was almost impossible to obtain even the simplest kinds of material for the construction of motorcars. This situation had been brought about because of a lack of standardization either in specification, designs, or materials in the industry, and a committee which we created early in 1910 found a very amazing situation.

The output of motor cars and the growth of the industry was being restricted because of inability to purchase materials, and an analysis of these difficulties led to the discovery that nearly all of them could be traced to the fact that every concern in the country, and in many instances different departments of the same concern, were ordering for identical purposes widely different materials. For instance, [at] the Shelby Steel Tube Company we found 1,700 different specifications for tubing. The steel industry was being called on for special brands and for special analysis almost as varied as engineers in the industry. Even in such minor items as lock washers, we found that the Standard Lock Washer Company was being asked to supply to the motor car industry over 800 different specifications for lock washers between the sizes of 5/16 and 5/8 inch. [Similar problems were noted in the tire and rim industry.]

The results of this multiplicity of specifications were two-fold, both tending to work disaster to the growth of any industry.

**"37" HUDSON**
*The Four-Cylinder Masterpiece, Regardless of Cost, Power, or Make.*

# The 48 Engineers Who Designed the HUDSON

The 48 engineers whose portraits are reproduced on these pages make up the staff who combined in designing the HUDSON "37" and the "54" HUDSON—a six.

These men have had experience as engineers, designers, etc., in 97 of the best known American and European automobile factories; combined they have had a hand in building more than 200,000 cars.

We should like to publish in this advertisement the complete engineering record of each of these experts. Space will not permit that, but we will send such a report to anyone upon request.

Each man has exerted the influence in designing these cars to which his experience and ability entitle him. Some are not exclusively identified with this company, but because of their unusual knowledge of some feature of design have been utilized in a consulting and advisory capacity.

The foremost engineer in the industry, the leader of these experts, is Howard E. Coffin, builder of six famous cars and creator of devices used on 80 per cent of the leading American automobiles.

Some of these men were engineers with famous European factories such as the Fiat, Panhard, Renault, Napier, De Dion, Mercedes and others.

Two members of this staff have served as President of the Society of Automobile Engineers. One has headed the Rules Committee of the Manufacturers Contest Association and was Chairman of the Committee on Tests of the Association of Licensed Automobile Manufacturers.

Another man is now consulted in the building of United States Submarine boats, because of his expert knowledge of gasoline motors. He raised a 1000 horsepower motor to 1300 horsepower and thereby increased the speed of the boat eight knots an hour.

This body of engineers, trained in the leading schools of technology, as apprentices to famous engineers, and in the leading shops, combined know practically all that is known in motor car building.

They all join in saying "these are the best cars we know."

Do you think it likely that cars built under such conditions are apt to lack any detail essential to the performance, comfort, quality, or general satisfaction?

Don't you think it much more likely that cars built by such skilled men are more apt to be the standard of the future?

See the HUDSON, for in either the "37" or "54" you will find what 48 experts have declared to be their masterpiece.

***See the Triangle on the Radiator***

ELECTRIC SELF-CRANKING

*Fig. 3 – The portion of the ad "The 48 Engineers Who Designed the HUDSON" featuring Howard E. Coffin,* Saturday Evening Post, *September 28, 1912* (supplied by John O Halloran and the HET Club Library).

First, since each manufacturing concern was ordering special material through its engineering department, its purchasing department would have to await delivery until such time as the material could be manufactured. Second, the producers of raw materials or other parts were unable to manufacture in quantities or in advance of the actual needs, as evidenced by the orders upon their books, because there was no assurance that even the same concern would reorder.

*Q. How did you become involved in the Society of Automotive Engineers?*

**Coffin:** In January, 1910 I was elected president of what is now the Society of Automotive Engineers. I had had no connection with the SAE's work and, in fact, did not know that there was any intention of electing me president until I was notified over the phone from New York that was the case. This organization had been founded several years before but had never been active because of the work of ALAM.

This organization had on its books the names of some 275 members, very few of whom had paid their dues, and search for books or financial statements failed to reveal any such documents. However, there were several of us who believed that the Society could be made to serve a most useful need in the industry. After consultation with Henry Souther, later a major in the Signal Corps, who has since died in the service; Mr. A. L. Riker of the Locomobile Co.; H. M. Swetland of the Class Journal Company and others, it was decided to put the Society upon a new footing. Mr. Coker F. Clarkson, then acting as general manager of the ALAM, was employed beginning at a salary of $5,000 a year. He was authorized to organize the New York office upon a business basis. As there were no funds available, I guaranteed the finances necessary for the operations contemplated under Mr. Clarkson's management, including salaries for two years.

The first step in attacking the problem of material supply was to bring home to the industry a realization of the causes of the difficulties. It was necessary to point out that the work of the engineer lay at the very foundation. If design or specifications were faulty or foolishly varied, there existed no way for any other department to correct the difficulties.

The practical solution, following an educational campaign, was the formation in 1910 of the General Standards Committee consisting of 125 men chosen from among the most capable engineers, not only in the motor car industry proper, but in the allied industries as well. The committee was divided into a large number of sub-committees, each dealing with some specific phase. Each sub-committee was called upon to meet once a month or oftener and reports accompanied by definite recommendations were required at stated intervals. I was ex officio member of each sub-committee.

It was freely predicted by many of the older organizations such as the American Society of Mechanical Engineers, that no practical results could be obtained from committee work of this kind. However the engineers of the SAE were enthusiastic and were sure that much good could be done. Without going into detail the result is that every draftsman and engineer in the industry now has on his desk a technical guide of standards of design, specification and material available for quick delivery for vehicle construction.

*Q. How and why did the Society of Automobile Engineers become the Automotive Engineers?*

**Coffin:** In June 1916 occurred one of the mid-summer meetings of the SAE, held during a three-day trip on the Great Lakes, a steamship being chartered for the purpose. It is the policy of the organization to get from 700 to 1,000 of its members together twice a year and in the case of the mid-summer meeting to keep them together for three or four days for the purpose of accomplishing some practical work and the building up of a cooperative spirit, possible only through close acquaintance.

Mr. Henry Souther had shortly previously to this time upon my recommendation, been taken into the military as chief engineer of the Army Air Service, and the proposition was made at the June meeting by Major Souther and myself that the name be changed and that the activities of aircraft, motor boat, motor tractor, motor truck and passenger vehicles be included. The object of this move was to furnish to the government through a single point of contact, the engineering and industrial ability and advice of all these allied industries.

*Q. The Naval Consulting Board (NCB) was your first government appointment. Would you tell us about it?*

**Coffin:** At first the NCB had no legal status in the government machinery. It was merely an advisory group of civilians appointed by the Secretary of Navy without congressional authorization or any appropriations to meet its expenses. It was formed in October 1915 with Thomas A. Edison as Chairman; Peter Cooper Hewitt, First Vice Chairman; William L. Saunders of the Ingersoll Rand Company, second Vice Chairman; Thomas L. Robins of Robins Conveyer Belt Company as the Secretary. The secretary served as the general manager of the Board and worked out of his company office while the Board maintained offices in the Engineering Societies Building at 29 West 39th Street in New York City. The Board generally had 24 members. I was appointed chairman of the Committee on Production, Organization, Manufacture and Standardization. It met only once initially and broke into sub-committees. The name was soon shortened to the Committee of Industrial Preparedness.

The NCB did far more work than its members are willing to give themselves credit for because the Board became a channel both direct and indirect, of contact between the offices of the Navy Department and to some extent of the War Department, with the outside world, with scientists in general and with the organized industrial and scientific brains of the country. Many of the Navy Department problems were presented to industrial concerns and scientists, who eventually solved them through the NCB. There existed no legal means through which the officers of the War and Navy Departments could properly utilize the industrial and scientific knowledge of the country. The officers were so circumscribed by the legal limitations governing the methods of the procurement of supplies that they dare not call in the business talent of the country, as had been done by the European countries. I had

many conferences with men such as General Crozier and Admiral McGowan, head of purchase division of the Navy, etc. The purport of these conversations especially in connection with the army, which was the biggest benefitter, was to the effect the officers in every instance were anxious for assistance and were anxious for legislative action or any other improvement of the situation which would free their hands and permit them to do the things that we all knew must be done.

*Q: You were credited with being a "Dollar a Year" man and financing the Inventory. How much did you spend?*

**Coffin:** I operated for about a year without any government funds. All the engineering societies donated their time and expenses. During the summer of 1916 we had about 25 clerks processing the incoming forms. Those salaries and other expenses probably totaled $28,000 plus another $10,000 for my own personal expenses. Much later after the NCB received appropriations I received about $3,000 in expenses. It has been estimated over a quarter of a million dollars were involved in this work.

*Q: You have traveled back and forth to Europe ever since your honeymoon in 1907. Did you see anything there to prompt you to get involved with war preparations?*

**Coffin:** The events of the European war prior to the entry by the United States has clearly proven that sooner or later practically every resource of the nation became involved in some degree or at some angle with the activities necessary for the conduct of the struggle. It became necessary therefore for us here to consider some plan which would facilitate the conversion of the peace-time activities and resources in producing and manufacturing equipment and in man/woman power to meet the national need in the event of war. We had had before us in the lesson of Germany for instance, which through a preparation over a period of 40 years had been able to convert a nation of 70 million people and of great manufacturing and scientific resource to the purposes of military and naval offense almost overnight. We had for two years before us the picture of the difficulties which had beset France and England in their effort to overcome the great lead which Germany had shown in the thoroughness of her preparedness. It seems only common sense therefore that the United States should adopt some method of continuing policy of industrial organization for national defense.

Naturally the first step in any organization of resources must lie in the direction of a determination as to what those resources were. Hence the idea of an industrial inventory to establish the fact upon which an intelligent organization for governmental purposes might be based.

*Q. How did you organize the Inventory?*

**Coffin:** At the October 7th, 1915 meeting Robins, Saunders and myself were asked to bring in a working arrangement based upon the sub-committee idea. This resulted in the Committee on Production, Organization, Manufacture and Standardization which was adopted the next month while I was on the West

# HOW OFFICIAL APPROVAL WAS OBTAINED

*THE PRESIDENT'S SIGNATURE*

*[Secretary Thomas Robins' reminisces were also available. Here are his own words how they cut through the Wilson Administration's red tape.]*

> When the plan for the Industrial Inventory was completely organized it only remained for us to obtain official approval, and Coffin and I decided that the best form would be a letter from the President of the United States to the president of each one of the technical societies inviting their assistance. We accordingly, with Mr. Saunders' help, drew up such a letter and sent it to Secretary of War Daniels in order that he might obtain the President's signature. For some weeks there was no action. For some reason which we could not learn, Secretary Daniels had not shown our letter to the President.

*One weekend in January, 1916 Coffin "disappeared" and visited Col. Roosevelt at Oyster Bay in order to obtain his support. There Coffin met Henry A. Wise Wood, who invited him to address the National Security League later in the month. Coffin asked me whether I thought it would be proper for him to address the League, which had been criticizing the Wilson administration for its inactivity in matters of Preparedness. I told him that his question suggested a plan whereby we might be able to start a fire under the administration, and I suggested that he at once telegraph Secretary Daniels asking his permission to address the League, then I sent the Secretary a telegram suggesting that if Coffin were to make his address before the Secretary had induced the President to announce the plan for the Industrial Inventory, the National Security League would likely to steal all the "thunder." The next morning Daniels' aide telephoned me that the Secretary greatly appreciated my telegram and that the Secretary would obtain the President's approval that day at noon, which was done. The letters were sent out on January 13th, 1916.*

Coast, getting an estimate of the sentiment in that part of the country. When I returned we called a meeting and discussed the ways and means for accomplishing the industrial inventory and as a result of the deliberations it was decided to call together the presidents of the five general engineering organizations of the country: the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, The American Institute of Electrical Engineers, and the American Chemical Society. The first meeting took place at Delmonico's with four of the presidents, Saunders, Robins and myself. They were asked to consider this proposition for the utilization of the membership of their organizations and report at an early meeting. This was held a week later with all five presidents. The unanimous approval of the project was voted and arrangements made for a third meeting at which were present the secretaries of the various organizations. At this meeting selections were made from the membership of each society of one man in each state, amounting in all to some 250 men, the leading industrialists or scientists with each community. At the time of this meeting it was decided to request Mr. Walter S. Gifford, at that time chief statistician of the American Telephone and Telegraph Co., to undertake the management of the campaign. Mr. Gifford and I had breakfast the next morning at the Biltmore and arrangements were made with AT&T to lend Mr. Gifford for a period of several months to the committee for this work.

The reason for the selection of the engineers of the country to make this inventory should be apparent. These men engaged in the work were in large measure the very men who had themselves been responsible for the creation and conduct of those industries which must be relied upon by the government for all war supplies.

I contended that the only basis on which the country could be prepared for war was one of territorial consideration; that you must depend upon the local interests to achieve results; that you couldn't expect the men in Portland, Oregon, to feel particularly related to something that was going on in Washington, D.C. Consequently you must decentralize, keep your governing string leading out of Washington but that the results must be achieved by organizations within Oregon itself, where the man of Portland was familiar with the personnel and had the psychology of his surrounding working on his mind to make him interested and get him to work. Gifford objected and many others, saying the thing must be handled in Washington, but they lost out. Later we organized State Councils of National Defense along similar lines.

***Postscript***

After the war Coffin started the National Air Transport airline to carry mail between Chicago and Dallas. It survived long enough to evolve into United Airlines. Heavily invested in aviation, he lost much of his fortune in the 1929 Crash. However he did retain some of his Georgia land holdings including the Cloister on Sea Island and experimented with rice production. He also owned a textile sales company and later served on the governor of Georgia's staff before dying in 1937, a suicide shortly after his second marriage.

John Gutzon de la Mothe Borglum also remained a national player, starting and abandoning a large work at Stone Mountain, Georgia. He died in 1941 aged 73, known worldwide for his sculptured heads of four Presidents on Mount Rushmore, South Dakota.

*For further information on Howard E. Coffin, see "A Pioneer of Detroit: Howard E. Coffin of the Hudson Motor Car Company," by Maxwell Taylor Courson,* Antique Automobile, *Vol. 62, No. 5, September-October 1998.*

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**FUNNY STORIES**—*continued from page 38*

***But It's a Vain Hope***

"Have you heard the last Ford story?" someone asked an official of the Ford Motor Co. "I hope so" was the prompt reply.

*"Funny Stories About the Ford, Vol. I" was so popular in 1915 that, later that year, Vol. II followed. The publisher claimed that the writer Ring W. Lardner, and cartoonists Bud Fisher ("Mutt and Jeff") and H.T. Webster ("Out Our Way," if I remember correctly) had contributed to Volume II. Each of the volumes was available for 15 cents. Here are some stories from the second volume.*

***Second-Class Mail Box***

It is related that Upton Sinclair, the author, bought a new Ford and had his initials painted on the door in large letters. On his first trip downtown, he left the car standing in front of the bank on a prominent corner. When he came to get the car he found many other Fords lined up beside it, but he quickly distinguished his by the big letters ---"U.S." Then he tried to start the motor but cranked without avail until almost exhausted. Upon lifting the hood, he found, to his surprise, that half a dozen letters and three parcel post packages had been deposited there.

***A Hot One***

HIS SATANIC MAJESTY (to visiting motorist): Help yourself to any of these cars and take a ride around Hades:

V. M.: "But, your Majesty, these are all Fords."

H.S.M.: "Sure --- that's the Hell of it!"

***Lots of Sand in That Girl, Too***

The elopers were rushing over the roads in a Ford. "Forty miles an hour," the man shouted, "Are you brave?" "Yes, dear," replied the Sweet Little Thing, "I'm full of grit."

***Playing Him For a Sucker***

Another chance to economize has been suggested to Ford tourists—get up behind a big 6- or 8-cylinder car on the road, and let the suction pull you along.

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