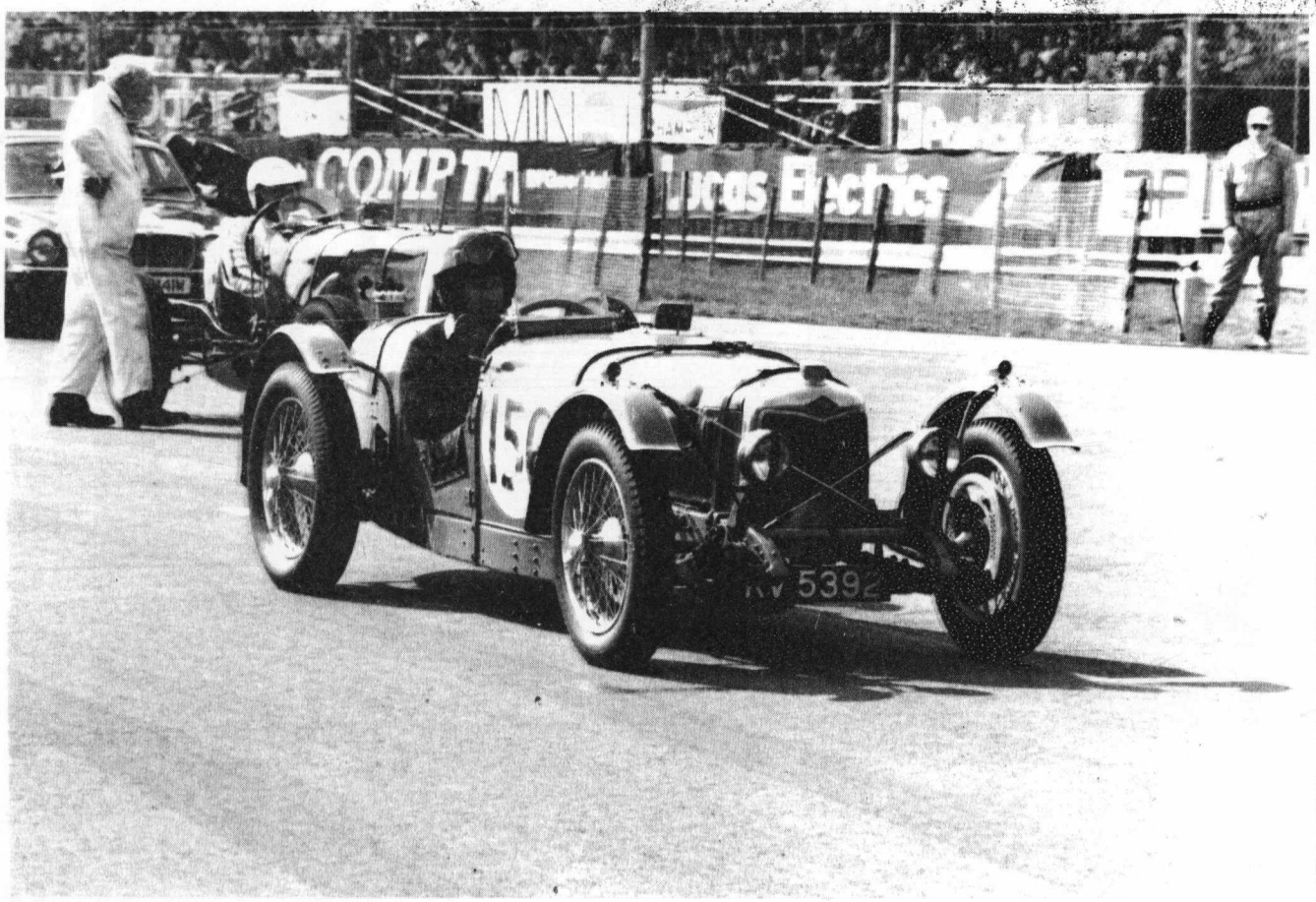
The Society of Automotive Historians

AUTOMOTIVE HISTORY REVIEW

FALL 1987 ISSUE NO. 22



1933 RILEY NINE RACE CAR *(Photo: David G. Styles)*

A PUBLICATION OF THE SOCIETY OF AUTOMOTIVE HISTORIANS, INC.

This 1906 Oldsmobile is about to ford a small stream near Bedford Springs, Virginia, carrying its driver, R. R. Owen, and party of three who left New York on a 20-day pathfinding trip to Daytona, Florida where they arrived on January 12th, 1907. Much of the trip was made on plain dirt roads, and in some places the mud was as much as 12 inches deep. (Now, 80 years later, Interstate 81 runs within a few miles to the west of this scene.)

Photo from MOTOR TALK, *January, 1907.*

A PUBLICATION OF
The Society of Automotive Historians INC

All correspondence in connection with Automotive History Review *should be addressed to: Society of Automotive Historians, Printing & Publishing Office, 1616 Park Lane, N.E., Marietta, Georgia 30066.*

Automotive History Review *is a semi-annual publication of the Society of Automotive Historians, Inc. Typesetting and layout is by Brigham Books, Marietta, Georgia 30066. Printing is by Brigham Press, Inc., 1950 Canton Road, N.E., Marietta, Georgia 30066.*

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Further information about the Society of Automotive Historians, Inc., may be obtained by writing to the Society of Automotive Historians, Inc., c/o National Automotive History Collection, Detroit Public Library, 5201 Woodward Avenue, Detroit, Michigan 48202 .

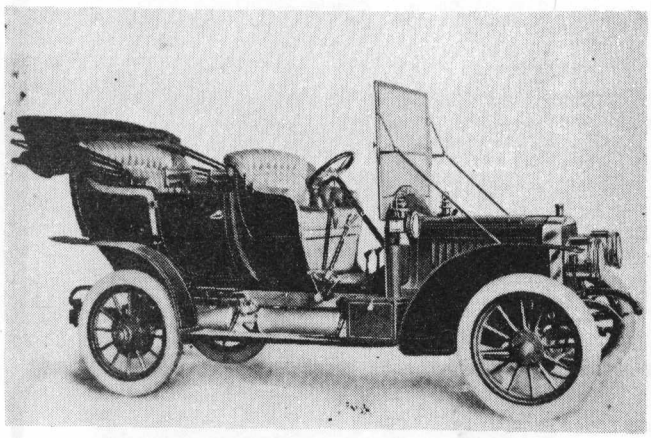
WILLYS KNIGHT'S GREAT SIX, MODEL 66

BY KARL S. ZAHM

Poppet-valve engines with their multiple valves, cams, springs, camshafts and other attendant parts are typical of nearly all contemporary cars and commercial vehicles. And they are largely reliable, but it was not always thus. At the turn of the century, such engines were heavy, slow-turning, noisy and largely inefficient. Their rudimentary valve action evidenced several drawbacks including excessive clatter, spring failure and burnt valves or seats. Often the valves failed to fully open or close due to improperly tensioned springs. Cams and even upper cam surfaces were frequently exposed to large volumes of dust and road dirt, thereby requiring constant adjustment or replacement after only a few hundred miles of operation.

Experience with such problems in his Knox automobile prompted Charles Yale Knight (a printer and publisher by trade) to devise a uniquely different engine idea based upon internal sleeves. Knight's approach featured two cast iron, precision-ground, concentric sleeves with machined slots at the upper ends fitted within each cylinder. Superimposing at intervals, the slots functioned as valves. The sleeves themselves were actuated by short connecting rods driven by an eccentric shaft geared to the crankshaft. Not only was the timing precise, the engine in operation was virtually noiseless compared to conventional engines.

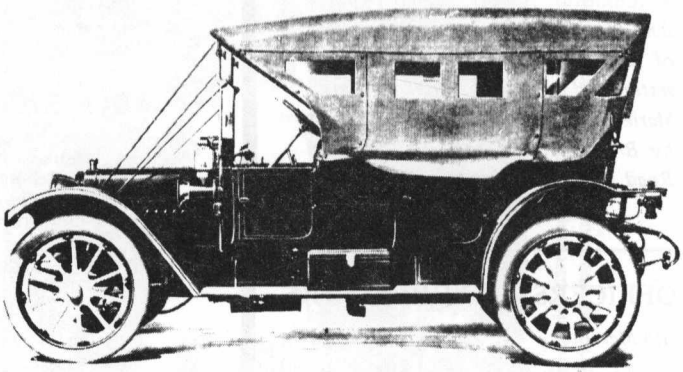
To prove his concept outside of his workshop, Knight prevailed upon a wealthy Chicago business acquaintance named Lyman Kilbourne to invest in a jointly-owned company to manufacture both engines and complete automobiles based on his designs. Founded in mid-1905, the Knight-Kilbourne Auto Company began production of a car aptly named the Silent-Knight, which made its debut at the 1906 Chicago Auto Show. Although rather ordinary in most other respects, the car did serve to demonstrate Knight's sleeve-valve engine, and was later exhibited to several established automobile makers in the hope of obtaining engine orders, but with no success. In what was to be a vain attempt to prove the stamina of the engine, a lone Silent-Knight was entered in the gruelling Glidden Tour of that year. When the car failed to complete even the first day's run, interest in Knight's engine evaporated.



This is the Silent Knight 35-40 hp touring car, built to demonstrate the Knight engine in actual use. About 40 of these cars were built during 1906-1908. They were the first automobiles ever built with Charles Knight's sleeve-valve engine.

Undaunted, Knight took his Silent-Knight to England. There he was successful in impressing Percy Martin, the managing director of the prestigious Daimler Motor Company, who was so taken by the car's silence that Daimler acquired a license to build engines based upon Knight's patents. When this engine also won the highly coveted Sir Thomas Dewar Trophy, awarded annually by the Royal Automobile Club, Knight had little difficulty persuading Mercedes, Panhard-Levassor, and Minerva to also obtain licenses.

Knight returned to America in 1910, more determined than ever to promote his sleeve-valve engine to selected automobile manufacturers. Because of his successes abroad, enthusiasm ran high, in stark contrast to the reception a few years earlier. First Pierce-Arrow, then Packard, Locomobile and Peerless expressed an interest in evaluating Knight engines. In the final analysis, however, all declined to accept it. By year's end, Knight had succeeded in licensing only the F. B. Stearns Company of Cleveland, Ohio. An inauspicious start to be sure, but one which would ultimately lead to many more American licenses in the years ahead.

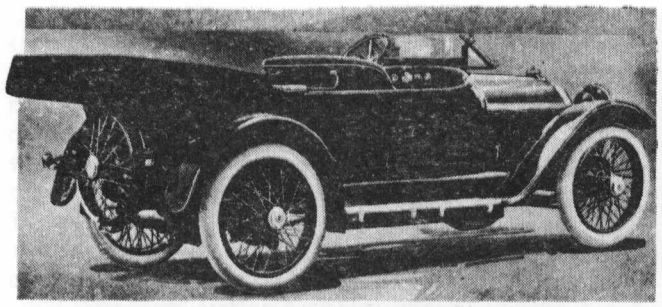


1912 Stearns-Knight touring car. In 1911 the F.B. Stearns Company, Cleveland, Ohio, became Charles Knight's first American licensee.

And what of the Silent-Knight? Promoted haphazardly, very few cars were sold before the make was discontinued in 1908. The company itself survived a bit longer, building a handful of engines as demonstrators for potential customers.

Early on, Knight determined that selling licenses, then sitting back and collecting royalties on each engine built by others was far more rewarding than the risks involved in operating a large manufacturing complete himself. With Stearns' adoption of Knight's engine, the Knight-Kilbourne Company was dissolved; it had served its purpose.

Charles Knight's fortunes took a turn for the better beginning in 1911 when Stearns unveiled the first of what would ultimately be a thirty-year span of luxury cars powered by sleeve-valve engines. Of greater importance, Columbia and Stoddard-Dayton each acquired a license to manufacture the Knight. Atlas Motors of Indianapolis also came on board to provide Knight engines "for the trade" and later, in 1912, Atlas announced its own car, the short-lived Lyons-Knight. Benjamin Briscoe's United States Motors, a sort of mini General Motors, gobbled up Stoddard-Dayton and Columbia, only to go broke itself and see its license pass to New York's Edwards Motor Car Company that same year. When the Edwards-Knight car also failed two years later, a fast-moving John North Willys not only bought the concern's remaining



This Model K-19 was the first automobile to carry the Willys-Knight name. Actually it was a slightly modified Edwards-Knight, probably among the last of its kind built in 1913. The first Willys-Knight designed by Willys engineers was the Model 84-4 which appeared in late 1914.

assets but snapped up its Knight license for his growing Willys-Overland Company of Toledo, Ohio. Among what would ultimately be nearly a dozen different American cars to use Knight's sleeve-valve design in the years ahead, only Willys-Overland would mount any real challenge to the eventual supremacy of poppet-valve engines.

Meanwhile, European cars embracing Knight-type engines were on the rise. Sigma, Peugeot and Rover obtained licenses, subsequently claiming their cars to be among the quietest running ever offered in their respective price classifications. However popular, Knight-engined cars overseas, together with those offered by American Stearns and other small U.S. producers, were quickly eclipsed by the Willys-Knight, a new make from Willys-Overland that appeared in 1914. Initially selling for $2,500, its price was substantially reduced the following season to as little as $1,045. Sales of the prosaic four-cylinder Willys-Knight exceeded 5,000 units two years later—more than the sales of all other Knight licenses combined.

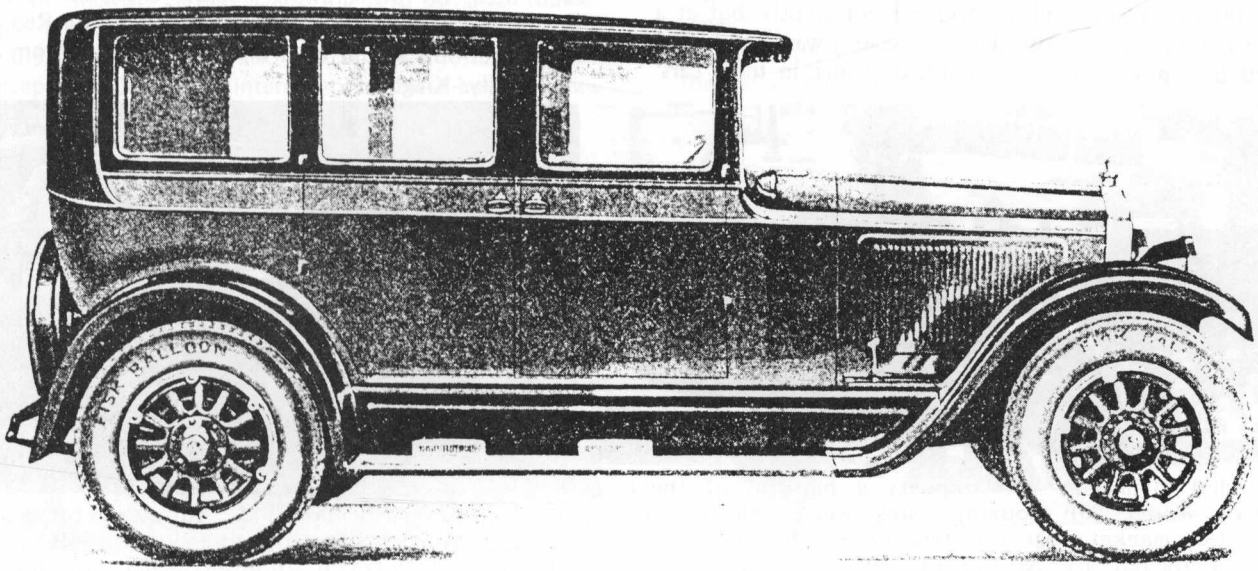
Charles Knight continued to make improvements to his original design, many of which were incorporated into successive Willys-Knight models. Early on it was discovered that continued operation of sleeve-valve engines resulted in a quantum increase in both power and performance. This was traceable to a buildup of carbon between the pistons and sleeves resulting in higher compression ratios. Capitalizing on this, Willys-Overland was able to claim something few other auto makers dared; an engine that actually improved with use.

Throughout the early twenties, Willys-Knight widely advertised that "The Day of the Knight Is Here." With numerous testimonials from satisfied owners as to the longevity and dependability of sleeve-valve engines, one wonders that poppet valve types were being sold at all. If little else, Charles Yale Knight more or less forced other automakers to concentrate on making engines run smoother and quieter. By the middle twenties, powerplants from such diverse makers as Pierce-Arrow and Durant were not only far more silent but also produced greater power than ever before. Poppet-valve engines were cheaper to manufacture and maintain in the field than Knight's sleeve-valve counterparts. During the preceding few years, automobile engines had come of age; they featured poppet, not sleeve valves.

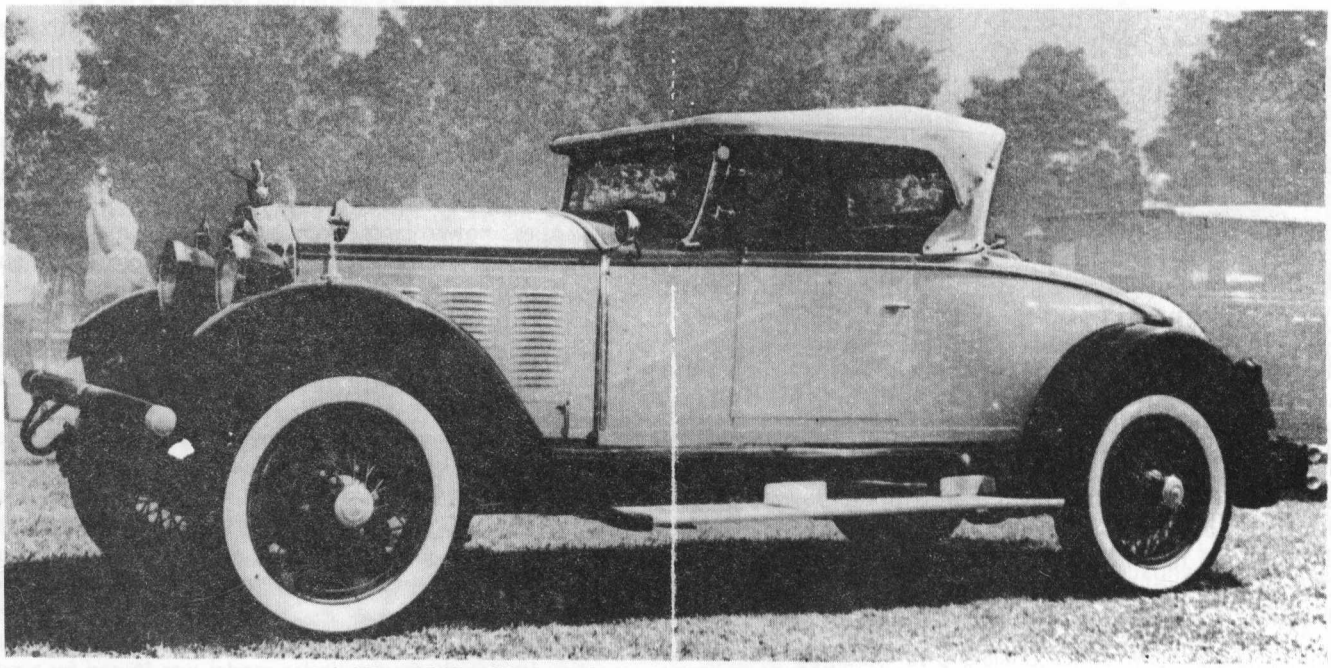
Notwithstanding the limited future for sleeve-valve engines, John Willys unwisely purchased the ailing F.B. Stearns Company in 1925. Stearns' later product line would consist of exceedingly costly, ultra-luxurious cars powered by both six- and eight-cylinder Knight-type engines and would be operated as a separate entity until its demise in December of 1929.

The turning point for the Willys-Knight came in 1925 when its dowdy four-cylinder model was joined by a new and larger six-cylinder, 60 horsepower companion. Longer (by virtue of a 126-inch wheelbase) than any previous Willys-Knight, the Model 66 boasted an aluminum cylinder head, seven main bearings and a Lanchester vibration damper. This same model with few real changes was continued into 1926, the same year that saw the end of the four-cylinder car, and an inexpensive, price-conscious Six (Model 70) added to the lineup.

Willys-Knight's Model 66A, dubbed "Great Six" for 1927, had evolved into a real beauty compared with its predecessors. To emphasize the car's lowered roofline and sleeker proportions, both made possible by a new double-drop frame, three groups of horizontal hood louvers replaced the former vertical types. No less than twelve body styles by such makers as Robbin and Anderson were available, including a custom-built town car, extremely rare even then. The latter was Willys-Knight's most expensive at $3,950. Offered at mid-season was the chic Varsity roadster, a singularly attractive open job that differed markedly from its stablemates. Painted



Introduced in 1925, this six-cylinder Willys-Knight was the first of the "66" series.



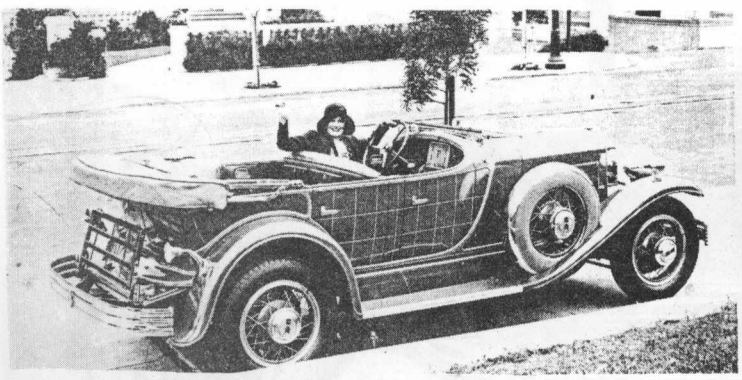
The 1927 Willys-Knight Model 66A Varsity Roadster.

gray below the belt line and a pale gray-green above, with black fenders and red Buffalo wire wheels, the Varsity sported a lower-than-standard windshield, surcingle-mounted cowl lamps, quad running board step plates, fender mounted mirrors and Balcrank bumpers. As with other 66As, the Varsity was fitted with an unusual auxiliary "ditch" light below the radiator tie bar controlled from the steering column. Also new that year was a longer 135-inch wheelbase for deluxe models and, on all Great Sixes, a boost in horsepower to 65. These cars achieved a far smoother ride because of their use of the newly-patented Belflex suspension system—rubberized spring shackles which totally eliminated metal-to-metal contact. Nearly 40,000 Willys-Knights reached buyers in 1927, and of these 6,706 were the more costly Model 66As.

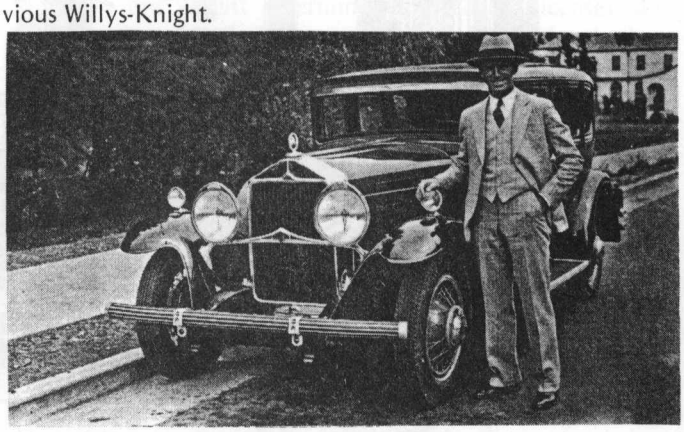
In August of 1927, the Great Six for 1928 made its debut and carried on the Model 66A designation. The town car was dropped, but most other body styles were continued. Added was a limited production five-passenger coupe built by Robbins and priced at $2,295. The same identical body was also found on the Stearns-Knight Deluxe Eight chassis, but at a hefty $5,600 price tag. Also new that season was a larger 255 cid, 70 horsepower engine. A marked change in these cars' top speed was achieved by changing the final drive ratio from 5.1 to 4.7. A switch to full crown fenders was only one of several minor revisions made to the Model 66A during the year. Interestingly, the 66A's improved engine and chassis was directly adopted for the Stearns-Knight Models N and M for 1928 and 1929.

Willys-Knight's other lines consisted of the 70A (called the Special) and an even cheaper Standard (Model 56) priced as low as $995. The latter had previously been marketed under the Falcon-Knight badge and, although ostensibly an independent concern, the company was, like Stearns, owned entirely by Willys-Overland. During the remaining five-year existence of the Willys-Knight, there would be several inexpensive companion models to the Great Six derived from these two cars and built to sell in large volumes.

The 1929 edition of the Great Six was announced in August of 1928. Virtually identical to its predecessor, it was available in nine body types priced from $1,850 to $2,595. Behind the scenes, however, a new generation Model 66 was, even then, on the drawing boards. Designed by Amos E. Northup, (later responsible for the trend-setting Reo Royale), the Model 66B would be a distinct departure from any previous Willys-Knight.



Intended primarily for export, a handful of these sporty Model 66B touring cars were sold on the domestic market. Of the two known to be extant, one is owned by Al Copsetta of Lindenwold, New Jersey, who is a member of the Classic Car Club of America and the Willys-Overland-Knight Registry.



Equipped with optional tubular bumpers, this factory-built Willys-Knight Model 66B dates from the period between June 14, 1929 and mid-December of that year.

To gauge public response to Northup's new design, several special show cars were hastily constructed for display at the major auto shows held in January. In its annual review of the national show, *Autobody* reported the new Great Six to be of "exceptional interest." Further, the Model 66B was "noteworthy for its high degree of originality and pleasing effects of line and proportion." Three body types were exhibited. The roadster (built by Griswold Motor Body) was particularly eye-catching because of its unusual side panel motif. Later dubbed "Plaidside," complementary colored moldings in bas-relief formed squares on each side of the body and this effect was repeated on the inside door panels by piped leather trim. Replacing the usual body moldings on each side of the rear deck, a centrally located single spear extended gracefully rearward from the seatback and tapered to a point just over the concealed fuel tank. Six wire wheels, automatic radiator shutters, door-type hood louvers, trunk racks, variable steering ratio, Watson Rubberflow Stabilators, Bijur chassis lubricators and combination stop lamps with separate backup lights were standard equipment on this and all other Model 66B's. Equally pleasing was the Baker-Raulang five-passenger coupe which, like the factory-built sedan, featured a novel contrasting color treatment. The division line separating the two main body colors also marked the offset of the cowl and body panels. The raised effect of the cowl and hood had a distinctive line; its length was greatly accentuated by omitting the usual chrome cowl band and mounting the auxiliary lights on the front fenders. The 66B achieved a far more substantial appearance through the use of massive triple-bar bumpers similar to those employed on the Kissel White Eagle cars.

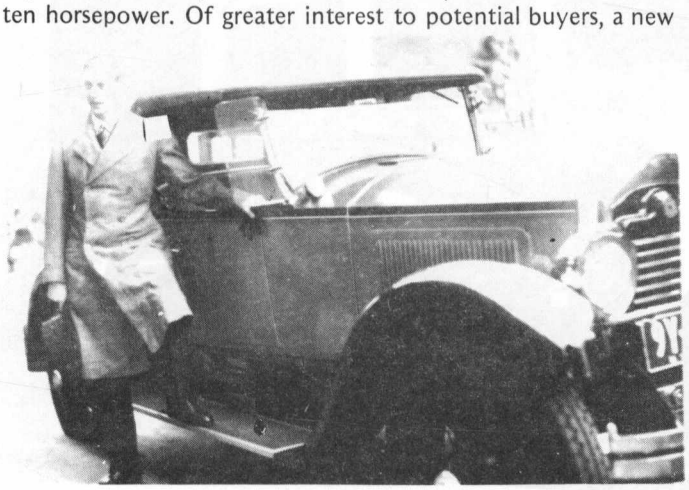
Under the hood was Willys-Knight's venerable 255 cid six-cylinder engine boosted to 72 horsepower. Detail revisions included invar steel-strut aluminum alloy pistons, and improved Skinner oil rectifier, air cleaner and gasoline filter. To support the coachwork, an entirely new chassis on a wheelbase of 120 inches was provided. Gone forever was the beetle browed, bolt-upright look; in its place, a trim but no less spacious design that borrowed little from the past.

Willys-Overland intended the 66B as a 1929 model; however, because serious production didn't get underway until June 14th, it was promoted as an early 1930 model. By the time dealers began receiving the cars in late July, several changes had been made since its somewhat premature showing nearly eight months earlier. These included optional tubular bumpers, improved internal-expanding Bendix brakes and a higher 5.5:1 compression ratio which yielded an additional ten horsepower. Of greater interest to potential buyers, a new four-passenger coupe with a rumble seat by Baker-Raulang brought to four the number of body types, all priced at $1,895. A fifth type, a five-passenger touring car by Griswold and with the same unusual plaidside design as the roadster, was also produced. Only a handful were ever sold in the U.S. since the touring car was intended primarily for export and thus was not publicised or mentioned in Willys-Knight's domestic advertising.

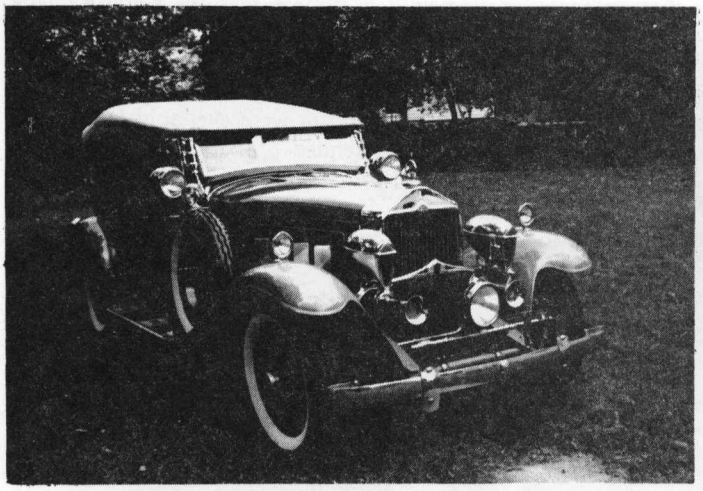
The Model 66B was continued into the 1930 calendar year with only minor changes. A reworked intake manifold and timing change permitted the company to claim 87 horsepower. There was no exaggeration to Willys-Knight's claim that the 66B's engine "offered more power and torque than any other six-cylinder engine of comparable size in the industry." In fact, it was also more powerful than some of the competing eight-cylinder engines including the Jordan 90, Hudson Greater Eight and Elcar 8-96. Overall, the closed model's appearance suffered a slight setback when the previously standard wire wheels became optional at extra cost and natural finish wood artillery wheels took their place.

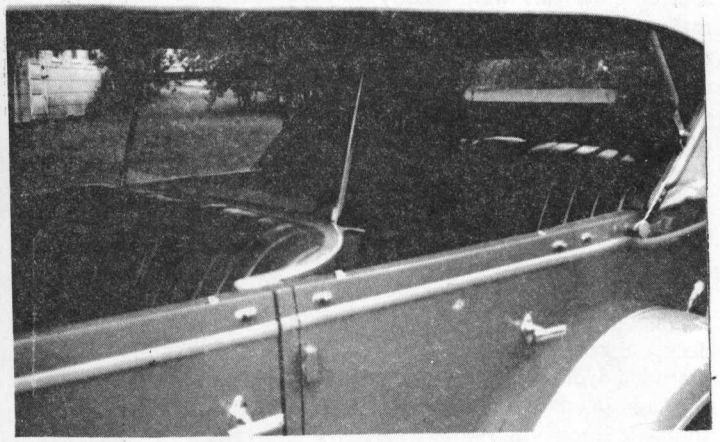
Despite the Model 66B's smart design and a $100 price reduction, sales failed to reach expectations. Only 5,820 Great Sixes were sold through August of 1930. The car's poor showing reflected not so much on the car itself, but rather upon the rapidly failing economy coupled with devisive internal policies within Willys-Overland. An additional 1,590 cars reached buyers during the fourth quarter of the year. These final 66B's, billed as early 1931's, were really only continuations of the existing line.

It was during those waning days of 1930 that a most unusual dual windshield phaeton was built. The car's custom built Baker-Raulang body had originally been designed expressly for the short-lived Ruxton automobile. Three bodies were constructed, but only two were mounted on Ruxton's front-wheel-drive chassis at the nearly moribund Kissel works in Hartford, Wisconsin. The remaining body languished at Baker-Raulang in Cleveland, Ohio, largely forgotten in a back corner of the shop. Earlier that year, Clifford Cornell, president of the Cleveland Flux Company, and a supplier to Baker-Raulang and Willys-Overland, had purchased a new Model 66B coupe. During a visit to Baker-Raulang, Cornell spotted the phaeton body and arranged to have it transferred to his 66B's chassis. When completed, the car sported such niceties as twin sidemounts, windwings, dual external horns, step plates, running board spotlights and a rear windshield that could be raised or lowered into a well behind the front seat. As built, the car carried conventional Great Six headlights. Woodlites

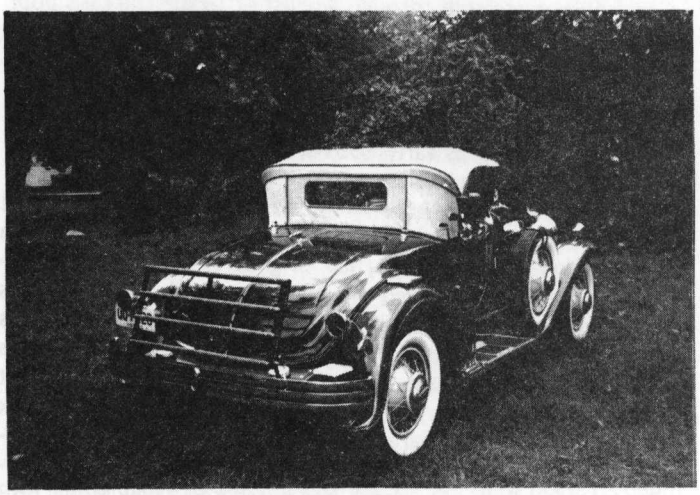


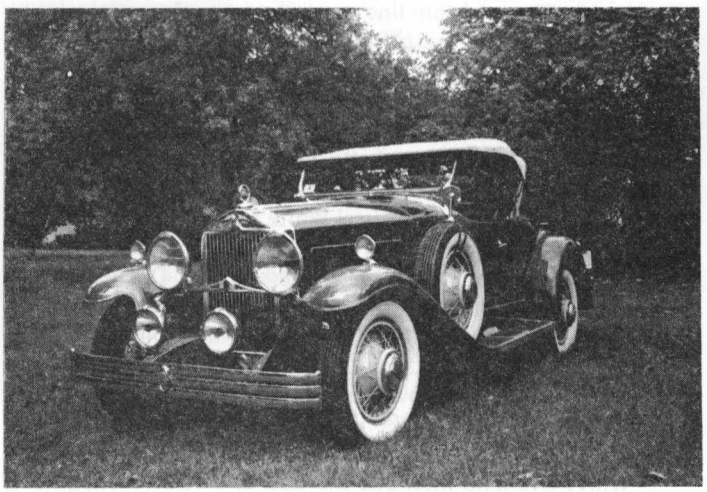
Prince Nicholas of Roumania with his 1927 Willys-Knight Model 66A Roadster, which was presented to him by John North Willys. (The device covering the car's radiator is a Pines Automatic Winterfront. a popular and much imitated accessory popular in the 1920's.) *Photos courtesy of Henry Austin Clark, Jr.*



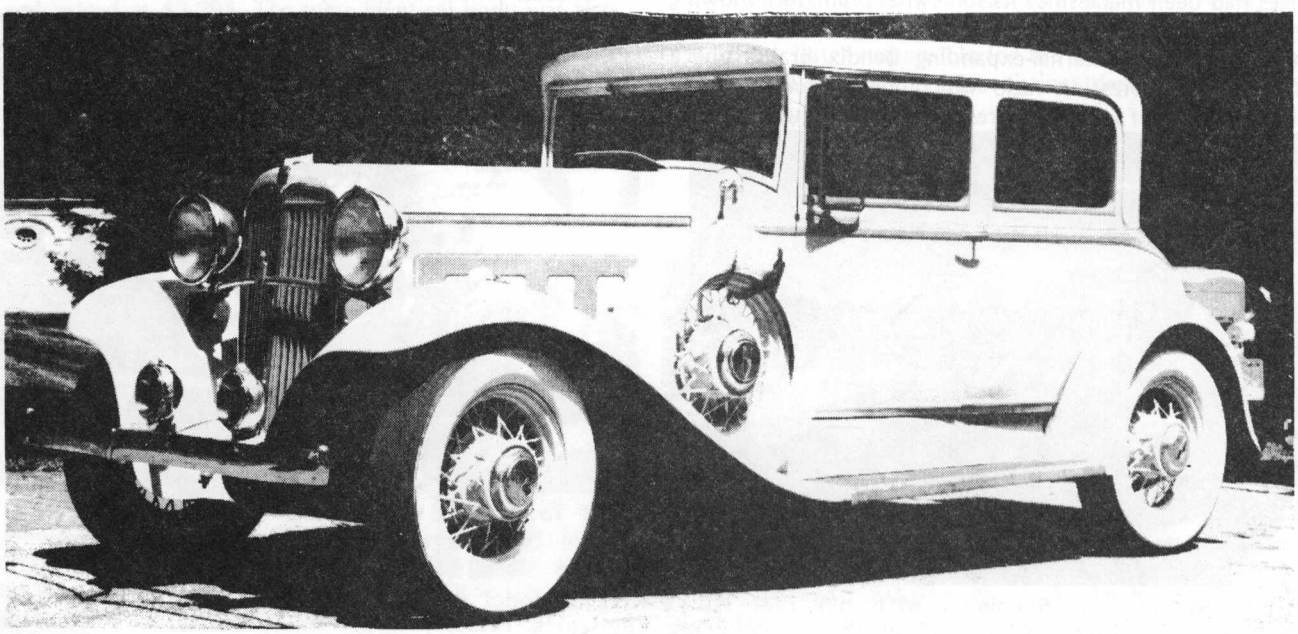


A one-of-a-kind Willys-Knight 66B touring car with special body built by Baker-Raulang, originally intended for use on the short-lived Ruxton car. The standard headlights have been replaced by a pair of "Woodlites," and other modifications include the running board spotlights, twin external horns and a rear windshield which can be lowered into its own compartment.

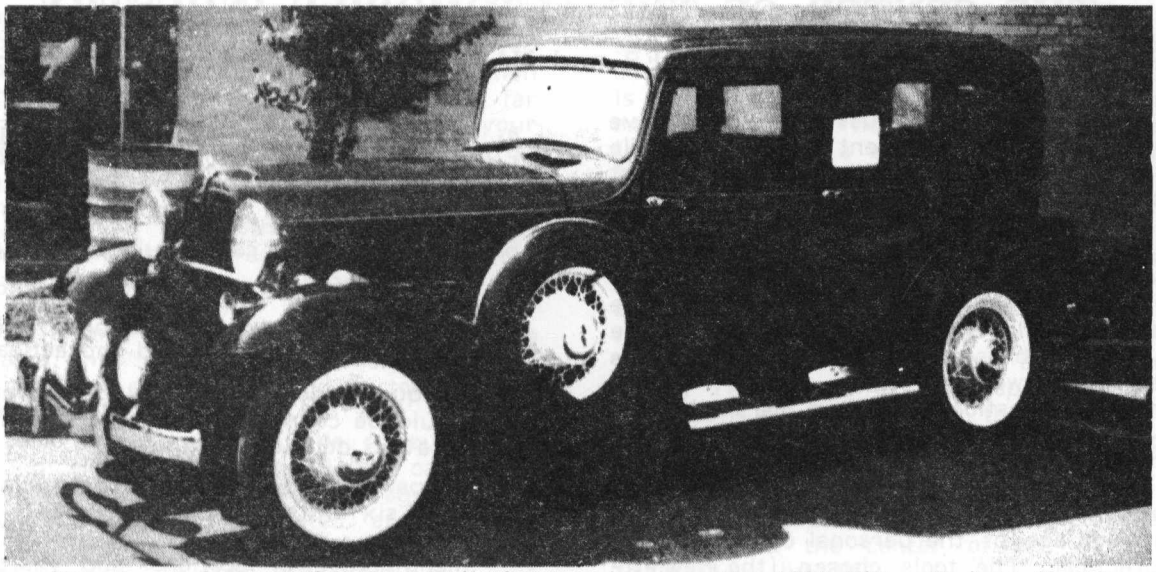




The "Plaidside" bodies for the Willys-Knight 66B chassis were designed by Amos E. Northup, and built by the Griswold Motor & Body Company, Detroit, Michigan.



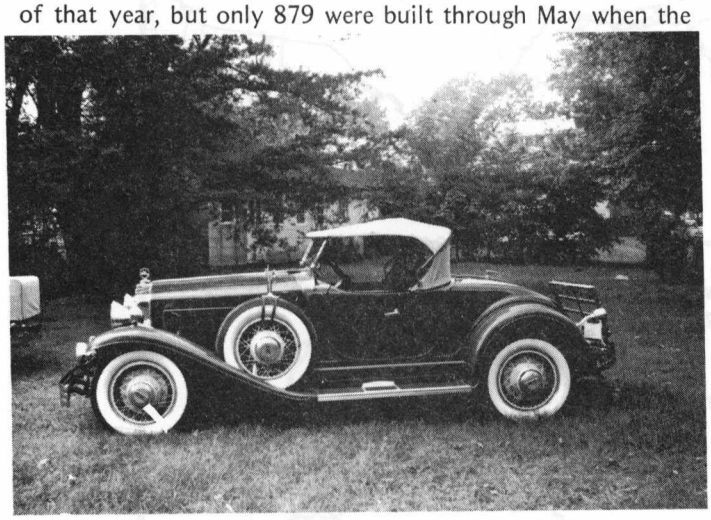
1931 Willys-Knight Model 66D Victoria Coupe.



The last sleeve-valve car built in America was the 1933 Willys-Knight Model 66E (actually made in 1932). Between the summer and fall of 1932, only 573 of the 66E's were produced before Willys-Overland shut down the line to prepare for receivership.

were later subsitituted by A. N. Rodway, who acquired the car in the late 1960's from its second owner.

Willys-Overland replaced the "B" series with the Model 66D starting in January 1931. Unfortunately, like its predecessor, the car was built down to a preconceived price and thus many of its previously standard deluxe features were sacrificed. While the car appeared to be a new design, it was actually Willys-Overland's utterly commonplace Model 8-88 equipped with the 87 horsepower Knight engine. Owing to its maker's escalating financial difficulties, only a factory-built sedan and victoria coupe were on a 121-inch wheelbase. Both were available in varying trim levels and at prices which ranged from $1,095 to $1,395. Essentially the same car was carried over into 1932, dubbed the "Silver Anniversary" series in honor of the company's 25th year as an auto manufacturer. To commemorate this milestone, the Great Six was dressed up with special hubcaps, revised radiator trim and safety glass in all windows. Also standard that season was Ride Control, a remote-controlled device found on some far more costly cars, which varied the ride over different road surfaces. The second series 1932 model began production in January of that year, but only 879 were built through May when the car was abruptly replaced by the last of the Great Sixes, the Model 66E.



Side view of the Griswold bodied Model 66B Willys-Knight Roadster, showing "Plaidside" design.

Utilizing the same tried and true 87-horsepower engine, the 66E had become the only sleeve-valve model offered by its maker, the other cheaper companion lines having been dropped. Though but a pale shadow of the impressive 66A and dashing 66B, the "E" type (then offered only as a sedan at $1,420), bristled with a host of usually costly standard features. These included dual sidemounts, free-wheeling, clock, wire wheels, two cigar lighters and, surprisingly, white-wall tires. The car's body also came in for a minor facelift which emphasized its horizontal rather than vertical lines. Called "Streamline," the Model 66E was an excellent value for the money but it was also the last and least successful. Only 574 were produced before Willys-Knight's Toledo assembly lines were halted forever in November 1932.

It was somewhat ironic that, in the same year in which Charles Knight's sleeve-valve patents expired, also saw the last of the genre unceremoniously discontinued in its country of origin. The Knight engine survived with only limited popularity in Europe for a few more years, Minerva building the last in 1940. Coincidentally, Charles Yale Knight passed away that same year.

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Those who graciously supplied information to make possible this history of Willys-Knight's Great Six, Model 66, include the following individuals:

Al Copsetta, Ralph Dunwoodie, Duane Perrin, Robert Rowe, Jerry Szostak and Charles Weaver.

Source materials include the following:

Selected issues of *The Knight-Overland Starter*, a publication of the Willys-Knight Overland Registry; *Automobile Topics; Automobile Trade Journal* and *MoToR Monthly.* Also the National Used Car Market Report *(Red Book)*, 50th Edition, 1927; 68th Edition, 1931, and 71st Edition, 1932, together with *The Official Used Car Guide*, Vol. 1, No. 8, July, 1934.

Also Willys-Knight sales materials and advertising for all years and series described or mentioned.

Karl S. Zahm

THE CENTER OF THE AUTOMOBILE INDUSTRY

by KIT FOSTER and MARSHALL NAUL

There has been much discussion in automotive journals regarding the movement of the automobile industry over the course of this century and just what this might mean in terms of regional power struggles. Underlying any such discussion, however, is a need to accurately measure just how the industry has migrated, and when. It's more than an academic argument and one that can be quantified since all the data are at hand. The enormity of the job is daunting, but the process is fairly straightforward.

The initial suggestion came from Marshall Naul. He had thought for some time about rigorously charting the movement of the center of production for the automobile industry. Such a task would be gargantuan if tackled with a pencil and calculator, but the age of the personal computer made it seem practical. The tools chosen (the Hewlett-Packard 86 personal computer with HP's file management program "File/80") was selected because it happened to be available; any number of other machines and software packages could have been used. A more inventive researcher could have written a more capable and efficient program, but the message remains: personal computers are useful in automotive history, and not just as word processors.

Some ground rules are necessary for any project, and the following were mutually agreed upon at the outset:

a. Primary data source would be Georgano's *New Encyclopedia of Motorcars*[1] (1982 edition). Georgano's data would be used unless authoritative evidence to the contrary was known.

b. Only passenger cars would be considered.

c. Kit cars and race cars would be excluded.

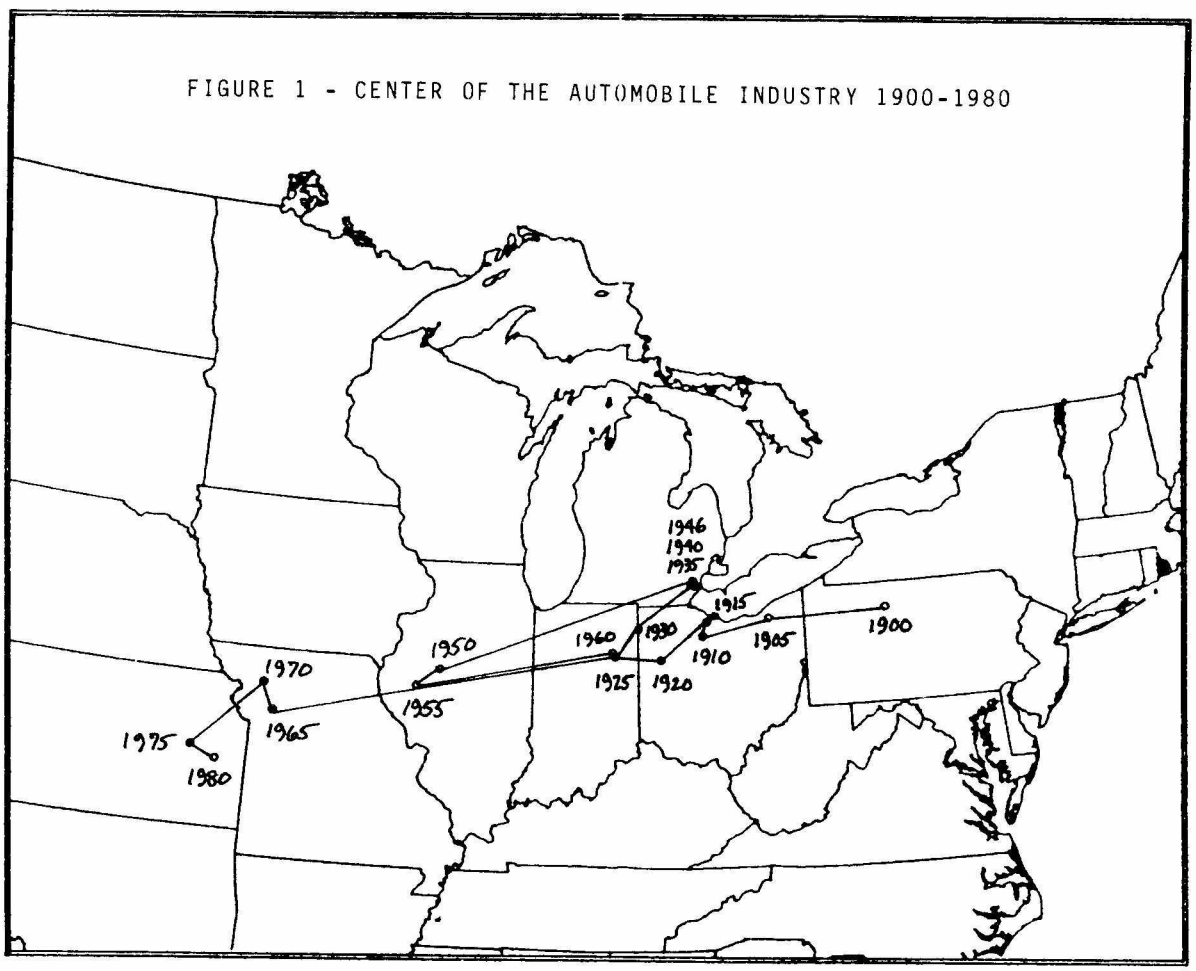
d. Each marque would have one "vote"—weighting by production seemed impractical.

e. Marques which moved during a given year would be counted only at the earlier location to avoid double counting.

f. "Paper" cars and ventures producing less than six units would be excluded.

Manufacturer's locations and years of incumbency were taken from Georgano, and latitude and longitude of each was extracted from the *Times* (London) *World Gazeteer*. As some of the entries in the latter looked suspicious, each was checked against the *National Atlas* (US Department of Commerce. Several errors, probably typographical, in each source were found in this way. Once the data entries were agreed upon, the entire data base was entered into the computer using "File/80." The resulting data base, stored on a single 5¼ inch diskette, contained 1808 entries. This is not precisely the number of

FIGURE 1 - CENTER OF THE AUTOMOBILE INDUSTRY 1900-1980



marques manufactured in the United States, but rather represents a quantity that could be called "marque-locations," or marques in a single location for a contiguous period. Other sources list far more cars--3000[2] or even 5000[3] depending on your choice of authority--but the data base from Georgano seems to be sufficiently large to show trends in the industry. The same technique could be used with data from other sources, though one should check the storage limit of both the computer and the program. Georgano doesn't list all the assembly plants for the major manufacturers, and it was decided to omit these on the basis that the information on all plants and their years of operation would be too difficult to assemble.

Then came the easy part. The computer was instructed to simply print out all the cars built during a given year and their average latitude and longitude. This was repeated at five year intervals for 1900 to 1980. 1946 was substituted for 1945 as it was felt that the latter would give a skewed view of the industry in an abnormal wartime condition. The resulting plot of what was called the "Center of the Automobile Industry" is shown in figure 1.

The general trend in the early years seems logical: a 1900 center in western Pennsylvania converging on Detroit by 1940 when most of the independents had withered away. The post-war behavior, though, takes a bit of explaining. Here the unweighted average gives greater importance to the west coast locations than in earlier decades, if only because the total number of manufacturers is fewer. Remember, Clenet has as much effect on the average as Chevrolet. Figure 2 helps to show the extent of this. The vertical axis is marque-locations, rather than just marques, but is nearly proportional to the total number of manufacturers. The number peaks about 1910, then goes into a steady decline until World War II. After the war, a considerable number of entrepreneurs took advantage of the economic climate to launch new ventures: Tucker, Davis, Keller, et al. This phenomenon persisted until the recession of 1958, and the lesser number of marque-locations by 1960 bears this out. The great resurgence since 1970 is a reflection of the replicar boom. There might be some reluctance among readers to accept replicars as legitimate marques, but, after all, the replicars are the assembled cars of the seventies and eighties, so they were included in the data base. These new ventures tended to arise in the west and it is this fact coupled with the unweighted average that pushed the center of the industry nearly to Oklahoma by 1980.

One other technique was attempted to display the shift of the industry without resorting to research of production totals. Figures 3, 4 and 5 show the marque-locations plotted geographically for 1900, 1940, and 1980. These plots show not only the shift of the center but the concentration and then dispersion of the industry.

Readers may be inspired to speculate about what will happen to the number of marques in the future, whether the replicar boom will be sustained, and whether the industry will continue to disperse or again converge on Detroit. Historians from other countries may wonder

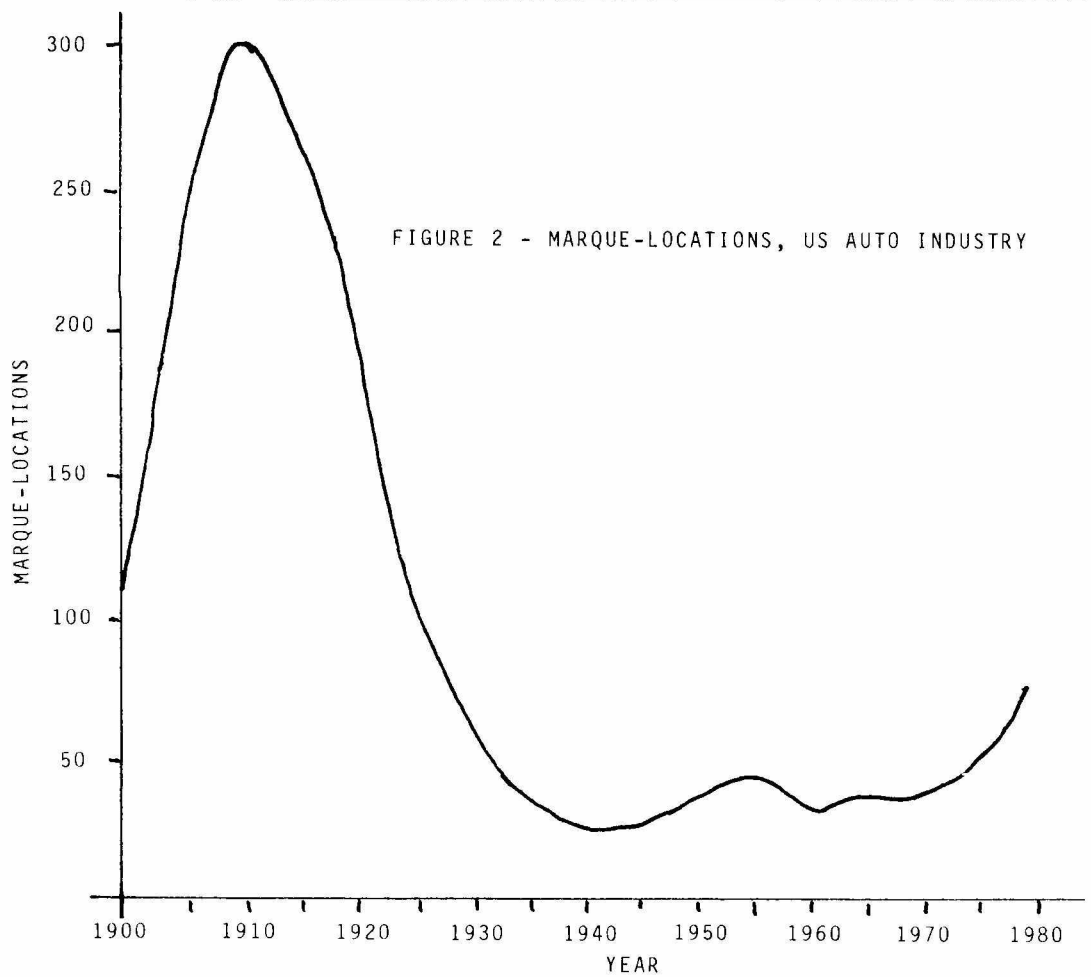


FIGURE 2 - MARQUE-LOCATIONS, US AUTO INDUSTRY

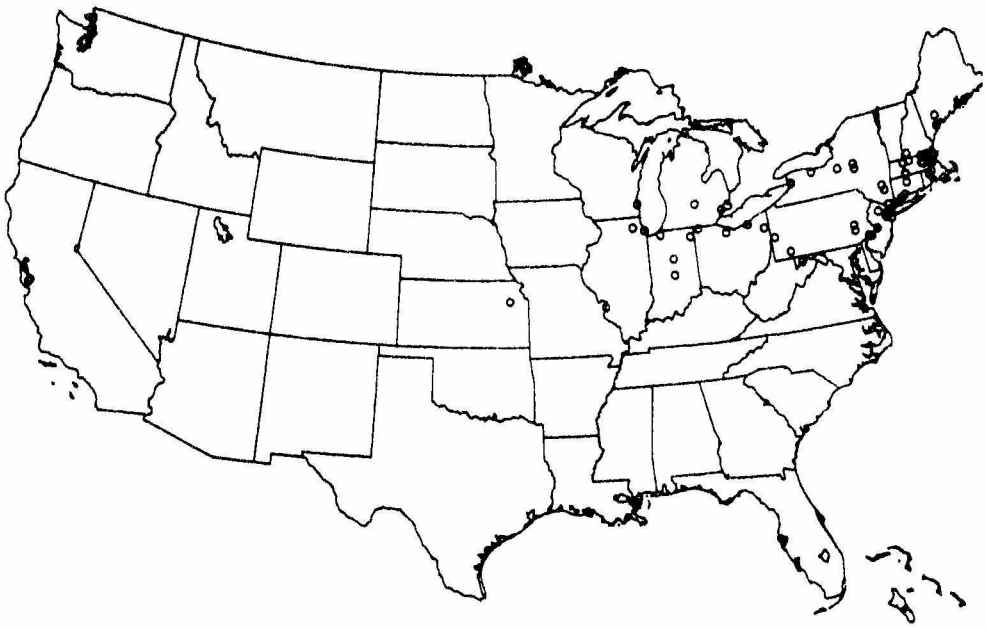


FIGURE 3 - US AUTO MANUFACTURING LOCATIONS, 1900

FIGURE 4 - US AUTO MANUFACTURING LOCATIONS, 1940

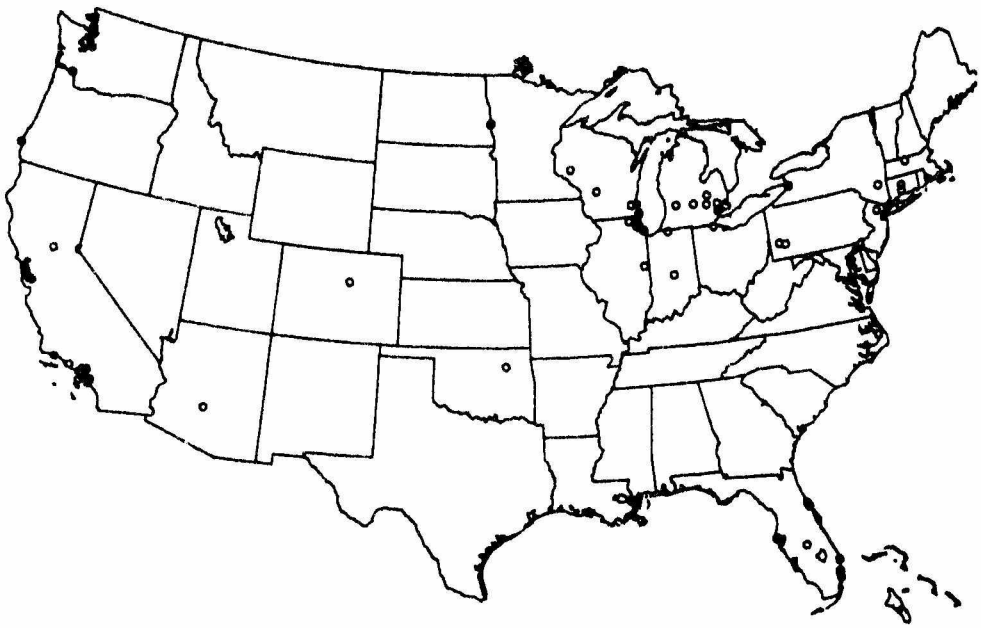


FIGURE 5 - US AUTO MANUFACTURING LOCATIONS, 1980

whether similar studies in their homelands would show similar results. These questions will not be addressed here, but it is apparent that when data become available, further analysis using this method would answer either one.

The sociologists and economists can take over at this point and link these results to changes in our mores, social structure, and the vagaries of the financial community. The work just described simply gives a reliable starting point for such discussions, for it is important to know just what and when before asking why.

If there's another lesson here, it's that personal computers are useful for all sorts of historical research, especially those projects which involve searching through large amounts of data. True, someone must put all the data in, but once that's done any number of searches and computations are possible. One can imagine how useful it would be in searching early registration records to estimate vehicle production; and the distribution patterns of particular manufacturers. The key to usefulness would probably be the emergence of standards for machines and software so that every user would not have to independently enter his or her own data. That, however, is something for the future.

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ACKNOWLEDGEMENT

The authors would like to thank J. Robert Katan for his help in plotting the maps which illustrate this article.

I Can Dream, Can't I?

This article was contributed by Cecil Stockard of Smyrna, Georgia. He has been a member of SAH for many years, and is also a member of the Society of Automotive Engineers. Mr. Stockard is a practicing Atlanta attorney, a long-time automobile enthusiast and, for recreation, a driver of racing cars.

When I was a child, light bulbs were clear and the earliest I remember had the exhaust tube closure opposite the socket. Engineering progress moved the closure into the socket, and the next step was outside frosting. After a few years, the modern inside-frosted types appeared, with their obvious advantages. When I was in college, an electrical engineering professor told this story of their invention.

For reasons that he saw no need to explain, everyone knew that inside frosting was impossible. It took little sadistic humor to assign the solution of this problem to every newly-hired engineer in the lamp division. After several years a new hiree, too stupid to realize that it couldn't be done or, more likely, smart enough and determined enough, achieved the impossible. All I need now is just such an engineer who can pick up the ball and run with it. My abilities will not let me do more than see the need.

Designing a gasoline engine to develop peak power or economy at a given fixed speed is duck soup, but automotive engines are asked to operate over a wide variety of speeds and power demands. An engine which gave 200 horsepower at 6000 rpm in order to give the maximum performance desired may run 85 percent of the time at or below 2500 rpm and 40 horsepower or less, and do so very inefficiently.

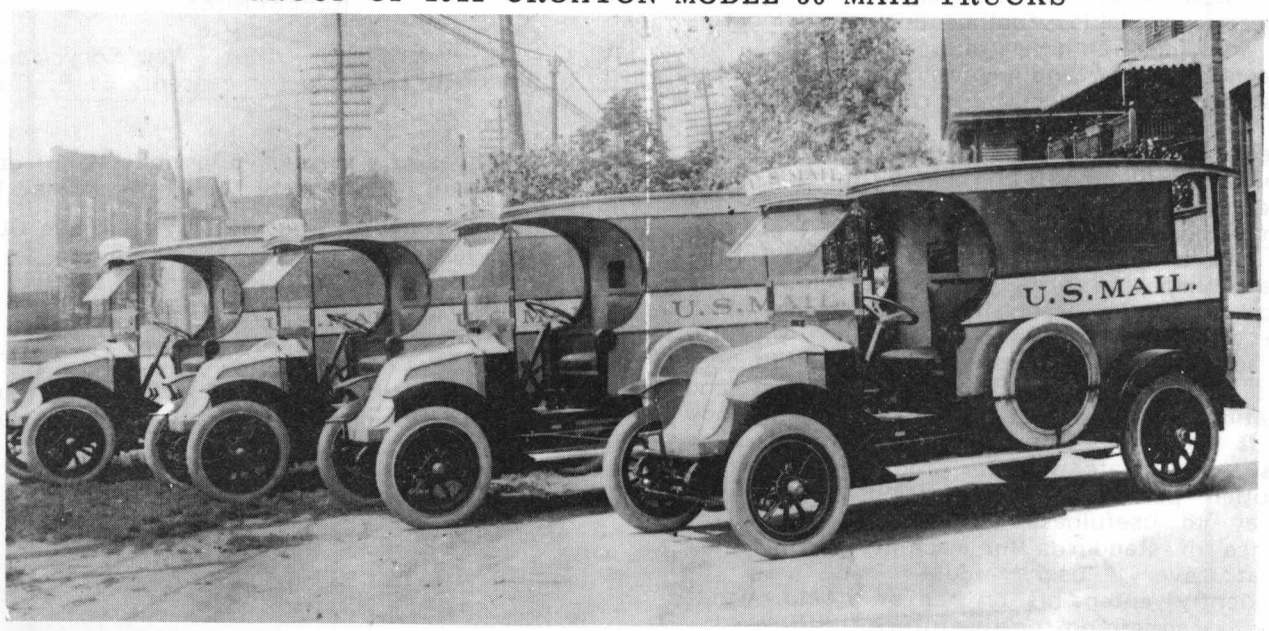
On the other hand, if an engine which adjusts its fuel quantity and electrical timing to optimum conditions also controlled its compression ratio, valve opening, and timing, the gains in efficiency even with emissions control would be excellent, even surpassing the fifty-mile per gallon carburetor we used to hear so much about. At the middle of the century, Mann made a diesel bicycle engine on which one twist-grip controlled the fuel supply and the other the compression ratio, which could be varied from 20/1 to 80/1. Yamaha markets a five valve and has experimented with up to seven in round cylinders, and Honda has used up to eight valves in its oval-bore racer.

Controlling valves electronically eliminates camshafts and their drive mechanism, which simplifies movement of the head and block with relation to the crankshaft to vary the compression ratio. If we used five small valves—three intake and two exhaust—instead of two large ones, they could be opened, one intake and one exhaust, only at low speed to increase the rate of flow and thereby the turbulence and efficiency. This first valve and possibly the others would have its own manifold runner. The separate throttle valve and its minute restriction could also be eliminated. As the demand for power increased, the intake valve would continue to open wider and at its optimum point, valve number two and finally number three would progressively open.

Exhaust valves would also open as needed to give the best emissions and efficiency for each change in rpm and power demand. Why five valves of equal size with seventy percent of the diameter? Because they would allow approximately fifty percent greater intake area and the same intake to exhaust area, two to three, as in the highest performance two-valve engines and with a valve opening of only seventy percent of the two-valve. Intake velocity should be high for good turbulence and low for minumum restriction, which must be balanced for greatest power. More valves would create more complications and expense than the results would justify.

I know and you know that varying compression ratios and valve opening and timing cannot be done electronically, but neither could light bulbs be internally frosted. For now, I can dream, can't I?

A GROUP OF 1912 CROXTON MODEL 30 MAIL TRUCKS



The trucks pictured here were built on the 1912 Croxton "30" taxicab chassis, and were the first Croxton vehicles to have left-hand steering. The Croxton Motor Company came into being following the amoeba-like split of the Croxton-Keeton Motor Car Company of Massillon, Ohio, with Croxton relocating in Washington, Pennsylvania, and the Keeton half reorganizing in Detroit.

We are indebted to Keith Marvin for the use of this photo, which was published back in 1955 in *The Upper Hudson Valley Automobilist*, of which Keith is the editor. (See also *SAH Journal* #110).

THE RILEY CYCLE COMPANY

FROM RIBBON-WEAVING TO ROAD WHEELS

BY DAVID G. STYLES

In the minds of most people today, the name "Riley" probably conjures up images of solid, reliable motor cars and perhaps, if their memories or enthusiasm stretch far enough back, of some of the finest motor-sporting performances ever witnessed, including the German Grand Prix victory of 1931, twelve Class wins and three outright wins in the eleven Ulster TT's, British motor racing's "Triple Crown" (the British Empire Trophy Race, the JCC International Trophy and the BRDC "500") and the highest Index of Performance coupled with the most prizes taken by one make of car in any pre-war Le Mans. And that's only some of them. So it might be surprising to contemplate the origins of this family business which became arguably the most consistently successful participant in motor sport Britain ever knew before World War II.

In the mid-19th Century, however, William Riley and Son was a family business engaged in ribbon-weaving. Like most weaving businesses of its day, it depended on out-workers, mostly womenfolk, who collected material from the warehouse and worked it into the finished product at their homes in the surrounding villages.

This had gone on for the best end of a century, but young William Riley, Jr., with ever an eye to the main chance and some concern for his employees, soon brought about change after taking over his father's business at the age of 19 in 1870. Soon he began trading in ribbon-weaving machinery components, supplying all comers (including his adversaries) with parts to keep their equipment going. Then finally, rather than give an unnecessary margin of profit where he need not, he began to actually manufacture parts and even assemble complete machines as part of his business. While it lasted, it was immensely successful. But, as good things do, it came to an end, though slowly enough for Mr. Riley to back out carefully and gracefully—and no doubt profitably, too.

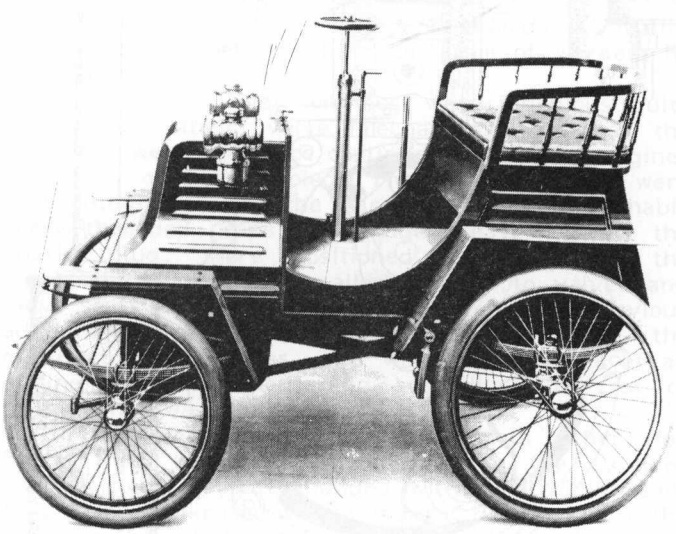
The year 1885 was to have great significance for the future fortunes of William Riley, Jr., and his five sons, though it would not register with him for five more years. 1885 was, in fact, the year in which Bonnick & Co. was established in King Street, Coventry, to manufacture bicycles. By 1890, at the same time as William Riley was coming to realize that the ribbon-weaving business was not, in his view, to be the business for his sons to inherit, Bonnick's were coming to realize that they needed funds for re-capitalization. As the result of both consolidating their thoughts, they came together and, in the summer of that year, William Riley bought the whole assets of the cycle business, agreeing, for the time being, to continue manufacturing under the Bonnick name. William's brother Herbert was installed as General Manager to oversee the family's interests.

The original family business remained under William Riley's own control, but continuing legislation against child labor made the British weaving business uncompetitive against its European rivals (who endured no such trappings of conscience), so Mr. Riley decided, in the spring of 1896, to dispose of the assets of the original family firm and withdraw from the weaving trade. He now turned his whole attention to the development of the cycle business, investing new funds into the King Street works and changing that company's name to the Riley Cycle Company.

William Riley had been interested in bicycles for some time before acquiring Bonnick, and his eldest son, Victor, recalled that as a schoolboy he once saw his father working on a spring-drive for pedal bicyles. He described it as a huge clock-spring and, when he asked his father what it was for, it was explained that the spring, when engaged, would be wound up on a downward slope of a hill, so that in unwinding itself it would assist the rider up the next hill! Thus the acquisition of Bonnick's was not the great diversion of interest it might have been thought, especially in the light of the topical growth of interest in bicycles generally, quite apart from the Riley Company's existing involvement in things mechanical through its interests in weaving machinery.

Since William Riley, Jr., had taken over the family weaving business of William Riley & Son at the tender age of 19, under his father's guidance, it seemed perfectly reasonable to him to involve Victor, who was now almost 20, in the reorganization of the newly constituted Riley Cycle Company in 1896. Indeed, all but his youngest son, Cecil, who was only a year old at that time, were showing an interest in the self-propelled vehicle and were strongly encouraged by their father. Allan was in his final year at King Henry VIII Grammar School, Percy was in a lower form of the same school, and Stanley was just about to enter its hallowed halls.

From a very early age, Percy Riley was showing signs of mechanical genius and, by the time he was thirteen, he had concluded his ideas for the construction of a four-wheeled motorcar. In that year, 1896, he started work on the construction of the car in the Cycle company's workshops. By 1898, when he was not yet 16, the car was finished and running on the streets of Coventry. It was only the third motor vehicle to be designed and manufactured in Coventry and on its first major test run it covered the 18 miles from Coventry to Stratford-on-Avon



This was the first Riley automobile, designed and built by Percy Riley, 1896-1898. It was the first car to have a mechanically operated inlet valve, a feature copied by the Benz Company of Germany in 1899.

Photo: Via British Leyland

without a hitch, then did the return journey in similar fashion! Such was the advanced design of this machine that it was steered by wheel, not tiller; it had leading-edge spoon brakes and an engine with the world's first mechanically-operated inlet valve. Amazingly, Percy Riley actually machined for himself the gears which operated the valve mechanism. Just a year later, Carl Benz's application for a World Patent on the mechanically-operated inlet valve was thus scuttled by Percy Riley's priority on the design.

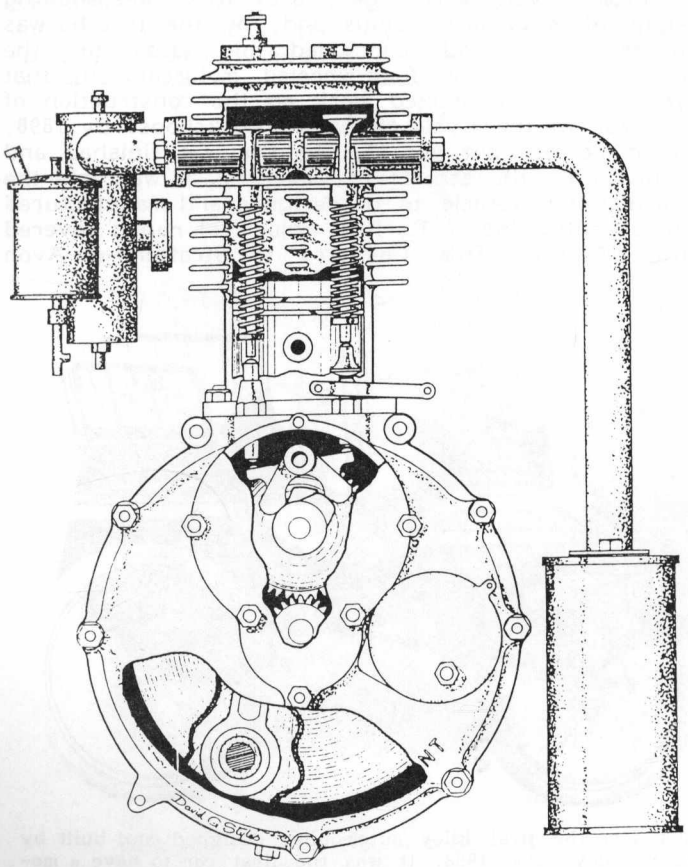
William Riley determined that bicycles should remain the mainstay of the family business for the time being, though by 1899 the Riley Cycle Company was manufacturing pedal bicycles, motor tricycles and motor quadricycles. Two basic engine types were used, both of 2¼ hp rating, the German Cudell and the Minerva. The tricycle was a single-seat machine of orthodox one-in-front and two-behind wheel arrangement, while the quadricycle was a convertible two-seater, based on tricycle design but with a sprung seat mounted between the front wheels. The "convertible" aspect of the machine was that the front axle and longitudinal frame supports could be removed and a single wheel substituted to make it into a tricycle. The engine for both machines was mounted behind the rear axle, with a straight-cut pinion driving an 8:1 reduction gear. Both of these machines were displayed at the 1899 National Cycle Show at the Crystal Palace under the label of "Royal Riley Motors," and both attracted great interest. The age of Riley motoring had arrived.

The Riley brothers were at the core of their products' competitive success. In those early days, Victor worked tirelessly to promote the sales of Riley machines and led the way within the family to participate in sporting events. He also actively encouraged outsiders to show Riley machines to good advantage. In the process of doing that, in 1899, he lent a motor-tricycle to his friend Robert Crossley (whose family later started their own motor manufacturing business) and persuaded him to enter a local speed event. Crossley won it, putting Riley's first competition success on record, and then bought the tricycle as he had promised to do.

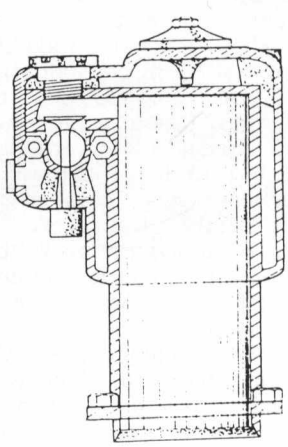
Shortly after the dawn of the 20th Century, Riley took a stronger position in the newly-emerging world of motor-tricycles and quadricycles by offering a wider range of engines for their machines. The Motor Manufacturing Company had produced two very reliable single-cylinder air-cooled engines—one of 2-3/4 hp, generally described as a 3 hp, and the other of 3-1/2 hp. There were now three engines in the Riley range, the Minerva 2-1/4 hp and the two MMC's. It has been said in the past that CCC engines were used in Rileys, but the Cycle Component Company was in fact more of a trading company than a manufacturer in those days (it was to be the parent of the Ariel motorcycle in later years), importing the De Dion-type Cudell engines at one time, then switching its interests to MMC for installation into Ariels. It is ever possible that Riley may have bought engines from CCC, which could have been Cudell or MMC units with "CCC" cast into one half of the crankcase.

Only a single motorized machine was exhibited at the National Cycle Show in 1900. Beside the range of Riley bicycles was a 2-1/4 hp Royal Riley Tricycle, for which a conversion kit was offered to make it into a quadricycle. At the 1901 show the game plan was reversed, with a "Quad" being exhibited as a "convertible," powered now by a 2-3/4 hp MMC unit. This was quickly followed by a pair of motor bicycles—one a 1-1/4 hp Minerva-engined machine and the other a "Three," employing the tried and trusted 2-3/4 hp MMC engine.

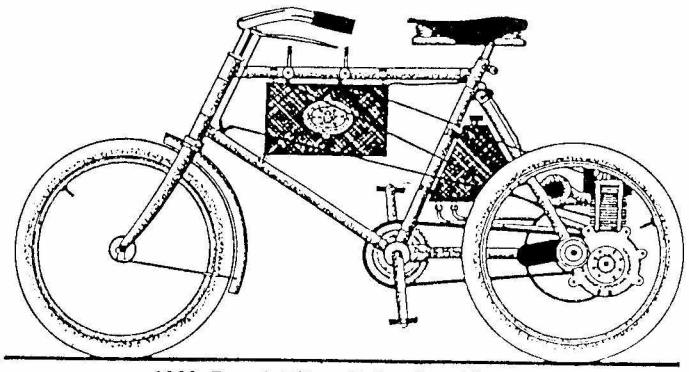
Clearly, these two machines were based on existing pedal bicycle designs, though the front frame was made longer, then reinforced with a rectangular tube structure, to accommodate the sloping engines hung under the front down-tube, which was the tube positioned between the steering tube and the bottom bracket, housing the pedal-crank shaft. All Riley motor bicycles of the day used the then-common method of pedal power combined with motor power, the engines driving the rear wheels by means of link-belts. Wheel-rim braking was used on all Riley "Mo-Bi" models and sometimes its efficiency was improved by the addition of an extra caliper front and rear to double the braking surface contact area. The popularity of the "1½" was limited, due, no



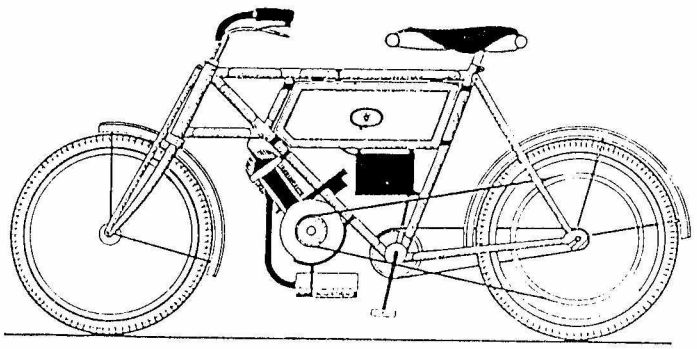
Percy Riley's original 3 hp air-cooled engine of 1903, with patent valve overlap.



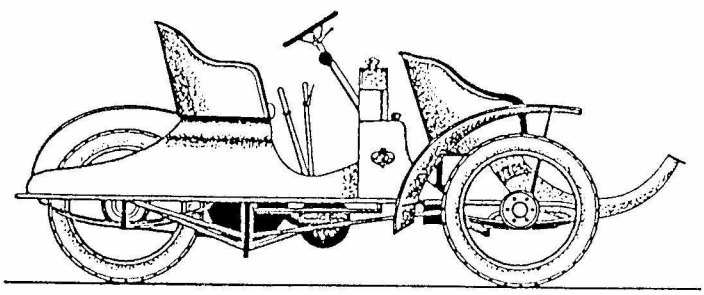
Cross-section of early water-cooled cylinder barrel.



1899 Royal Riley Tricycle, 2¼ hp.



Riley 1½ hp Motor Bicycle, 1903



1906 Riley 9 hp V-Twin Tri-car (outright winner of 1907 SMC Reliability Trial.)

doubt, to its low power output. The range was supplemented in the late spring of 1903 by a 3¼ hp machine--again MMC-engined. The "3" and the "3½" were very successful machines, especially in competition.

In the autumn of 1902 the Riley brothers decided that the tricycle and quadricycle were becoming out-dated, so Percy and Allan set about designing a new three-wheeled two-seat machine from the ground up, to accompany their range of motor-bicycles. It was a 3 hp MMC-engined "two-in-front, one-behind" wheel arrangement with a forecarriage for the passenger and a saddle for the driver. Handlebar steering was retained, in common with the motor bicycles. The braking system employed rim-brakes at the rear and a five-inch band-brake to each of the front wheels. This was the machine that really set the Riley company on the route to making motor cars.

Harry Rignold was one of the first sporting personalities outside the family to give Rileys a regular competitive airing. He was a North-Country blacksmith who came to be noticed as a particularly competent rider at the trials for the 1903 International Trophy Race, which were held at Knowsley Park in Liverpool. For his part, Rignold was already a seasoned Riley user, having earlier bought himself an MMC-engined 3 hp motor bicycle. This he went to work on to create his ideal mount for speed trials.

Southport Sands had become a popular venue for motor and motorcycle sport at the beginning of the 20th Century and Harry Rignold was quickly among the regular competitors to be seen there almost any weekend. Preston was another location where the new motorized vehicle was made welcome and it was here that Rignold achieved his first major victory by winning outright the Preston Speed Trials of 1903, astride his faithful MMC-engined Riley. This machine also carried him to second place in the Southport Speed Trials that same year. Rignold later bought a 3½ hp air-cooled Riley-engined Moto-Bi, and proceeded to augment his own and Riley's reputation still further.

As the Riley Cycle Company consolidated its position in the world of motor bicycles and forecars, Percy Riley's dissatisfaction at having to use bought-out engines was growing stronger by the day. He had already developed the mechanically-operated inlet valve and the Benz patent application had highlighted its existence and merits. Because he hadn't thought to patent the idea himself, Percy had no way of preventing others from using mechanical inlet valves in engines which were now out-performing those used by the Riley Company. So, at the age of seventeen, he set about designing a new engine which he hoped to put into production. Experiment followed experiment, and once he had satisfied himself of the practicability of his ideas he applied for, and was granted, patent number 14391, issued on the 29th of June, 1903. This patent covered the principle of valve overlap where, in a four-stroke engine, the exhaust valve remains open for a short period as the inlet valve opens to admit fresh mixture. The purpose was to assist scavenging and improve volumetric efficiency of the engine.

Percy Riley formed the Riley Engine Company in 1903, in a factory located next to the medieval Cook Street gate of the old City of Coventry. Here the engines for the Riley Moto-Bi and tricars were made, and it was in his small gas-lit office that the still very youthful Percy (only 20 years old when the company was formed) worked deep into the night on many an occasion to complete a piece of design or ponder something new. His object always was to produce to the best possible standards—a quality with which he imbued the small team of workers he engaged.

Those early Riley engines were ingenious quite apart from their valve mechanisms, in that the cylinders were one-piece castings whether the engines were air- or water-cooled. The cylinder heads were cast integrally with the barrels and two detachable screw-threaded caps, one ingeniously housing the spark plug, were positioned exactly above the side-mounted valves to allow access to valves and valve-seats for grinding. There were two obvious advantages to these screw-in caps--firstly the manufacturing process, and with it the cost, of an engine was simplified, and secondly, the cost of maintenance was reduced.

Interchangeability is no new concept either, for Percy Riley designed his engines so the cylinder barrels could be interchanged with ease. This meant that the crankcase was a single design, with the cylinder barrel being a tight slip-fit into the top of the crankcase with a four-bolt flange locating and retaining it. A copper gasket sealed the two together upon tightening of the mounting bolts. It was,

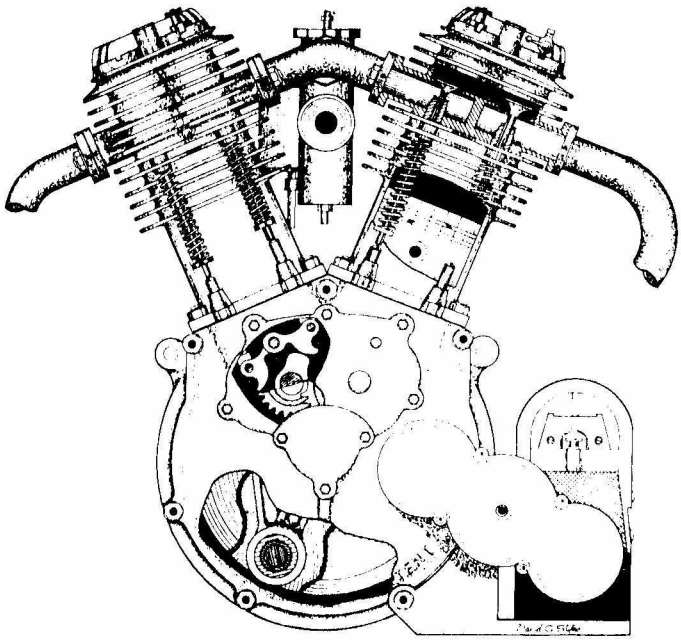
therefore, very easy to change from air to water cooling among engines of common bore and stroke. What is more, the design of the water-cooled engine tells us how Percy Riley foresaw cooling problems around the valve seats, since his water jacket gives very generous cooling in that area.

Riley-engined motorcycles began to appear in the late summer of 1903. These new machines were slightly shorter in wheelbase than their forbears and the engines were mounted vertically in the much more characteristic layout of modern machines. Frame heights were still based upon bicycle dimensions, with a choice of a 20-inch to 23-inch available as factory sizes, measured from the center of the bottom bracket up the seat tube to the centerline of the joint between it and the top tube. Three Riley-engined models were available: the 2¼ hp, the 3 hp, and the 3½ hp. All were air-cooled side-valves, with cast-iron integral-head barrels and cast-iron three-ring pistons. Ignition was by trembler coil and contact maker. Braking was by means of cable-operated rim brakes.

For 1904 the motor bicycle range continued, with the addition of three tricars, all bicycle-based. These featured the 3 hp, the 3½ hp (which was simply the "3" with the larger engine), both of which were air-cooled, and the new 4½ hp, which was simply a "3½" with a water-cooled cylinder barrel. The improved cooling brought with it an increase in the output rating, but an inevitable increase in weight also resulted from the use of the slightly heavier water-cooled engine and its associated radiator. The "3" featured a wicker fore-carriage as standard, whereas a coach-built seat was on both the "3½" and the "4½."

In that same period, Sun Rising Hill, near Kineton in Warwickshire, was becoming well known as the Midland Automobile Club's hill-climbing venue, and a young man named John Browning was a regular spectator there. Such was his enthusiasm that he bought a 3½ hp Moto-Bi late in 1903 and competed as regularly as he could in MAC events. Being sure that more power would give him more speed, Browning set about fitting a 4½ hp engine into his machine during the winter of 1903/04 and used it with frequent success up Sun Rising Hill, though the first outing of this modified machine ended rather abruptly. The engine mounting bolts sheared as he was halfway up the hill, and it was a stroke of greatest fortune that engine, machine and rider didn't all go their separate ways. Soon afterwards, of course, Shelsley Walsh was to become the MAC's hill-climb venue, as it is to this day.

With a name now acknowledged for producing quality motor bicycles and tricars, and with an appetite for improving the breed, Percy, Allan and Stanley Riley felt that they could take time to join forces for the next step in the development of their product range. With his conviction that water-cooled engines were better all-around performers, and more reliable, Percy set about designing a 6 hp engine for a new tricar in which development Stanley was to have a major hand. The 804 cc engine was of the same cylinder dimensions as the 3 hp (80mm x 80mm), the two cylinders of which were mounted to an aluminum crankcase. A pair of cast-iron three-ring 3 hp pistons were used on siamesed connecting rods. The solid big-end bearing consisted of a phosphor-bronze bushing (which served to hold the two rods together) lined with white metal as the bearing surface between that bushing and the crankpin. The crankpin was removable, as on the single-cylinder engines, and carburetion was by Longuemare.



1904 Riley prototype of the air-cooled 6 hp 45° V-Twin engine.

The prototype 6 hp engine was built in the summer of 1904, using two air-cooled 3 hp cylinders. It was shoe-horned into a 3½ hp Moto-Bi, on which Allan Riley carried out the road trials and ran it in numerous speed events. It was said to be capable of about sixty miles per hour, which was quite rapid in 1904, and it is reputed to have performed well in competition. However, the Six was never intended to be offered as a motor bicycle, as would be demonstrated with the unveiling of the new Riley Six Tricar.

Satisfied that his engine design was all he had hoped for, Percy Riley then turned his attention to the matter of transmitting drive from his engines to the road with the least loss of power, in order to improve the efficiency of his and his brother Stanley's tricars. Having machined every component of his original 1898 car himself, he was well familiar with all the problems he was likely to face. In fact, he had acquired an enviable reputation among his peers for the exquisite quality of his gear-cutting. He was a master with a lathe before he was 15 years old, so now he applied that mastery to improving the reliability of a gearbox.

By September 1904 he had produced his solution in the form of a three-forward, one-reverse speed gearbox. It bore some similarity to the drive mechanism of a lathe, but was essentailly the world's first constant-mesh gearbox. All the gears, even reverse, remained in mesh all of the time, the change of speed coming from sequential engagement of a series of drive dogs, one for each forward and reverse speed. There were four drive dogs inside the gearbox--two on the primary countershaft carrying first and reverse gears, one on the mainshaft for direct top-gear drive, and one on the other countershaft for second speed. This made for a relatively simple change-speed mechanism, involving a transverse bar across the top of the gearbox which moved cams above the selector forks, to enable the change to be made as smoothly as possible, in that the rotation of a cam pushed or pulled the fork in or out of engagement. The result of that idea was another patent--this time No. 20860 of 1904, approved on the 28th of September.

The 1905 season Riley Tricars were all car-like three-wheelers, fitted with Percy's new gearbox, steering wheels and car-type controls, though still possessing much of the convenience and economy of their two-wheeled cousins. These machines now clearly pointed the direction Riley was to follow, though motor bicycles remained in production for the rest of that year. The Six was soon joined in the new product range by Stanley's 5-hp popular Tricar, which replaced the old single-cylinder 4½-hp. Gone now was the last feature of motorcycling, for the Five also had a steering wheel. It was powered by an up-rated version of the old 4½-hp single cylinder engine and was soon joined by the largest model in the range--the 9-hp V-twin.

Following the example of the Six, the new Nine used two 4½-hp pistons and water-cooled cylinder barrels to create a quite powerful 1034 cc vee engine for installation in the new 9-hp Tricar. This new vehicle became extremely popular, proving to be quite a force to be reckoned with in competition, one notable early success being the Fastest Time of the Day in the Dashwood Hill Climb section of the 1905 ACC Tricar Trials.

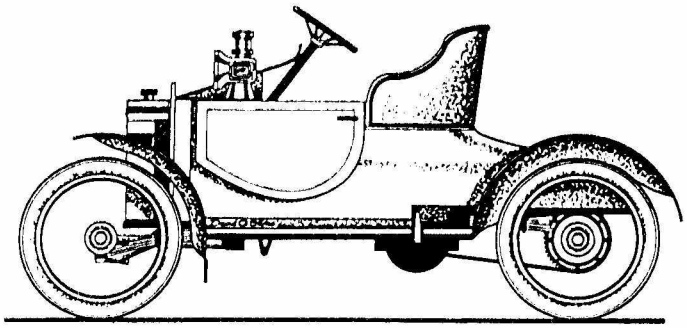
At the end of 1905, although continuing to manufacture pedal bicycles, Riley took the bold decision to abandon the motor bicycle in favor of tricars. Even though tricars were still closely related to motorcycles, and their sporting organization remained the ACC, all drivers of future Rileys would sit on or in them, rather than astride them. Riley's true motor bicycle era was over. Indeed, the tricars were so successful that the next step was to produce a four-wheeled car.

The Nine Tricar hadn't been in production for long before Percy Riley realized that it could be quite a handful at high speed, if not actually unstable at speed, and was capable of over 60 miles per hour. So he set his mind on the target of a car, using the same basic principles embodied in the well-known Tricar, such as transversely mounted engine and chain drive to the rear wheels. A duplex tubular chassis accommodated the two-seat body, the radiator was now out in front for the first time on a Riley, and the first experimental car was on the streets of Coventry by the end of 1905. It was offered to the public late in 1906.

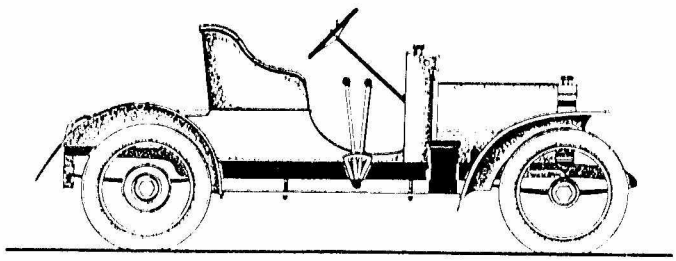
Having now originated the mechanically-operated poppet-type inlet valve and the first constant-mesh gearbox for cars (and incidentally tricars), this energetic genius now applied his fertile mind to the matter of car wheels. Percy Riley never liked the Stepney rim, a means of detaching the rim of a wheel in order to have tire interchangeability and resolved to do something about it. His own engine design and gearbox were now in manufacture, so it seemed only logical to improve the next most important component of the car, the road wheel. Indeed, his main objective in devising a better wheel was to be able to offer a car with genuinely detachable wheels, rather than rims, as a standard feature.

It didn't take Percy long to put his first ideas on paper, and his first patent for a detachable wheel—number 13857—was issued on the 30th of June, 1908, though he had devised the mechanism as much as two and a half years before. The Riley Nine car was offered with this wheel as a catalog option as early as 1906, and by 1907 it was standard on that model, so keeping Riley at the forefront of development and competitive success.

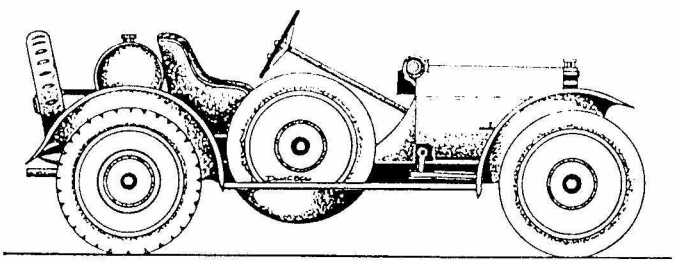
It is fascinating now to realize that the Riley brothers made no less than six successful patent applications before the beginning of the 1914-1918 war. They had bitter legal wrangles with John V. Pugh of the Rudge-Whitworth Company over patent rights for wheels, which entailed one sitting before the Law Lords and many minor court hearings, all of which came to naught because of the onset of the Great War. They all shook hands and forgot their differences so as to face a larger common adversary--Kaiser Bill.



1907 Riley 9 hp V-Twin 2-seater (1st Class "A", Coventry-Holyhead Trial).



1908 Riley 12/18 hp 2-Seater



1909 Riley 10 hp Speed Model

As the 9-hp car settled down into the marketplace, yet another car was in the development stage, and the decision to make road wheels for sale to motor manufacturers was made. As if that were not enough, time was also taken to find new premises for the Riley Engine Company, which was now bursting from the seams of the old Cook Street factory. When a new site was found in Aldbourne Road, Coventry, a truck was built in the Cook Street works to transport plant and equipment from the old location to the new. A Riley Nine engine powered the vehicle through a Riley 3-speed gearbox. The truck discharged its task without faltering once, and with the expanded facilities now available it was now possible to concentrate attention on the next stage of engine development-the 2-litre 12/18-hp.

"Old Midnight" was the name given to the prototype 12/18 car, a four/five seat tourer of nine feet wheelbase, because during its development work rarely finished much before that hour. Preliminary design work had begun on the engine for this new model before the Engine Company's move from the Cook Street works, and the prototype was the first new development completed at the new Aldbourne Road site. It was a good omen for the new factory

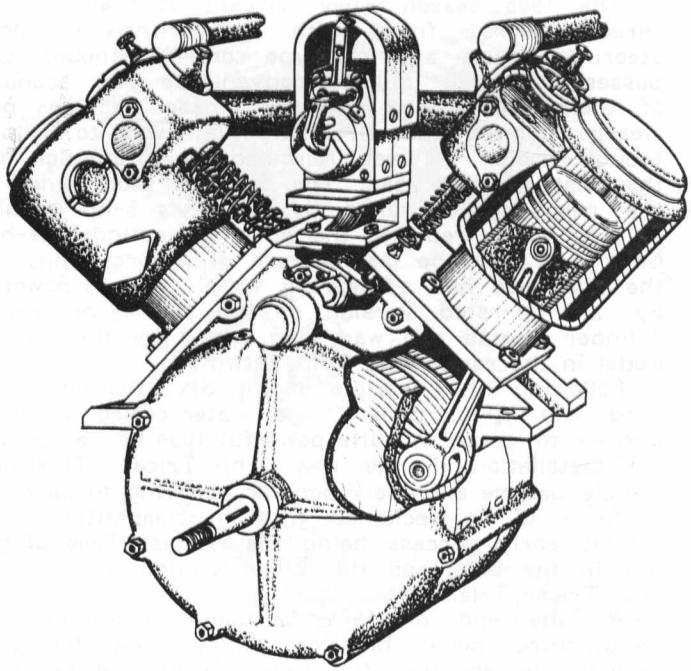
as the 12/18 quickly became as successful as its two-, three-, and four-wheeled predecessors. That first car was tested under the most gruelling conditions and came through with flying colors, as a consequence of which it was put into production from early 1907.

At about the same time as the 12/18 entered production, William and Victor Riley realized the merit of Percy's detachable wheel and began to "spread the gospel" to car manufacturers up and down the country. Such interest was shown that the Riley Cycle Company began to manufacture road wheels for sale to motor manufacturers, first in Great Britain, then Continental Europe, and finally even to North America. Among the famous cars which achieved competition success on Riley wheels were the 1908 Austin 100-hp Grand Prix cars, the 1910 Prince Henry of Prussia Trial Austro-Daimler, the mighty Blitzen Benz, and the 1913 Rolls-Royce "Alpine Eagle." Other great motoring names which used Riley wheels were Napier, Panhard-Levassor, Pierce-Arrow and Spyker. From Austin to Spyker there were 183 car makers on the books of the Wheel Department of the Riley Cycle Company Limited.

No sooner had the 12/18 been successfully launched onto the market than the next new model followed it. This was the 10-hp, a new V-twin, with cylinders at 90 degrees to each other as on the 12/18, but using a bore and stroke of 96 mm x 96 mm to give a capacity of 1390 cc. The two body types offered on the Ten were both two-seaters, one an orthodox relatively high-seated car, and the other the 10-hp Speed Model with a spartan lightweight sporting body. This was the first-ever Riley car to be offered with the option of no bodywork, so that the customer could secure a chassis only and have the coachwork of his own choice fitted by any other coach builder. The new model possessed all the customary Riley features, including the three-speed constant-mesh gearbox, detachable wheels and tremendous reliability. As with the 12/18, the car quickly caught on and was very successful in competition. In fact the first 10-hp Speed Model was driven in the 1909 Scottish Trial by Stanley Riley, whose brain-child the car was, to win its class and out-perform many a larger vehicle, including the 12/18 driven by J.F. Buckingham in the same event!

For the next few years the Riley business activities were fairly well defined and reasonably settled by virtue of their successful products' continuing high levels of sales The Riley Cycle Company Ltd. was essentially two activities—the wheel-making business, with Stanley Riley at the helm under his father's guidance, in the St. Nicholas Street works, and the Motor Department in the King Street works. Victor Riley's sales efforts had produced as much business for the wheel department as it could handle and, by 1910, he had negotiated licences in France and Germany, thus taking the pressure off Coventry and improving its profitability in a single action. Bicycles were still made in the wheel department, though their sales were declining, partly because the Riley brothers were too busy to develop new models and partly because their interests now lay elsewhere.

Allan Riley ran the motor department at King Street and the range of models available went from 10-hp open two-seaters to a 12/18-hp laundaulette, there being just three chassis in the range—the 10-hp and the two 12/18 wheelbases, 8'0" and 9'6". Even now these fine cars had two identifying features which betrayed their origins in the early motor bicycles. The first was the two-cylinder engines, developed directly from the original air-cooled motorcycle units, and the second was the gearbox, which clearly was



The 1907 Riley 12/18 hp 90° V-Twin water-cooled engine.

designed for operation with either transverse or in-line engine positions.

The third arm of the Riley family businesses was Percy's engine company, where many an engineering problem had been solved. Back in 1904 the engine company had responded to an enquiry from the South African Railways for powered inspection and maintenance vehicles by building a utility type for track maintenance work and an upholstered "rail-car" type for use by line inspectors. Percy used his original two-speed gearbox connected to a 4½-hp water-cooled engine by means of a leather-faced cone clutch. A power take-off was fitted to the maintenance vehicle gearboxes to provide a drive for tools, and they were equipped to tow trailers fitted with dynamos. So successful were these machines that more were ordered in 1906, powered this time by the 9-hp V-twin through three-speed gearboxes.

The Riley Engine Company also supplied engines and gearboxes to the Singer Motor Company for installation into a number of cross-country vehicles, built in 1904 for export to India and for a quantity of rail-cars they built for the India Railways in 1907. The Mount Lyall Mining Company, in Tasmania, bought three rail-cars for its railway in 1908. One became the mine manager's personal transport and the other two doubled as maintenance units and personnel carriers. The last of these was finally retired in 1964! It survives to this day, having been restored.

All this work was excellent development material for Percy's later designs, but for the moment, in 1908, he was working on a double-sleeve-valve engine which, unlike those covered by the Knight patents, had a water jacket located between the sleeves. It was an ingenious but somewhat complicated machine which, under trial, did not produce the level of power expected from it. So Percy did no more than abandon it in favor of a poppet-valved version of the same engine. In 1909 he sold the rights to his sleeve-valve patent to the Packard Motor Car Company in America.

By the summer of 1911, William Riley decided he should discontinue making pedal bicycles, there now being only two models in the range, a Gent's and a Lady's Royal Riley Bicycle. The last design

modification having been made in 1908, his sons gave no opposition, so the space taken up in the manufacture of bicycles was allocated to increasing the output of car wheels. In March of 1912, the Riley Cycle Company was re-named Riley (Coventry) Limited, and William Riley brought about perhaps the biggest-ever disagreement between himself and his sons by that action. For, in the same move, he announced to the world that Riley (Coventry) Limited would not be manufacturing cars, as car wheels were, in his view, a far more profitable business.

In the discussions which led up to this decision, Percy and Stanley revealed that they had been working together on two new cars and they were not ready to abandon development work. Because the existing range of cars was still selling well, Allan supported the argument against ceasing the manufacture of cars. Cecil was just a junior in the drawing office of the wheel department and so was not accorded an opinion, but Victor threw his weight behind his brothers, creating a four-to-one vote against their father. The result was the creation of two new companies.

After seeking the necessary capital to buy out the motor department of the Riley Cycle Company and to finance the development of the two new cars, the Riley Motor Manufacturing Company and the Nero Engine Company were set up. The Riley M.M.C., headed by Allan Riley, continued making cars to existing designs, while the Nero Engine Company acquired premises in Aldbourne Road alongside the Riley Engine Company's works, where work continued on the new four-cylinder 1034 cc Riley Ten, designed by Stanley, and on the 17/30, which was a development of Percy's earlier sleeve-valve, in a large touring car.

So, the era of the Riley Cycle Company Limited was over. It had been one of the most innovative periods in the history of the Riley family companies. There were hard times, however, and Percy faced one of the most trying times of his young life realizing how close he came to losing his innovation of the mechanically-operated inlet valve to Benz. His decision to set up the Riley Engine Company was also the result of differences of opinion whether the family company should or should not be involved in the business of manufacturing engines, In order to set up his new company, which drew no support from his father, he borrowed from his mother and other members of the family. The happy consequence of that was a number of innovations which are still used to this day in automotive engine design.

Although Riley wheels sold in great numbers to all the leading names in the world's motor industry, the company, for some reason, failed to secure a patent on the basic principle of the detachable wheel, so had to settle for patented applications, which were consistently the subjects of legal wrangles between Riley, Rudge-Whitworth and Goodyear. The last dispute was between Victor Riley and John Pugh, of Rudge-Whitworth, and they abandoned their battle for a much larger one in the name of Britain and the Empire. It was to be more than four long years before the Riley brothers could return to the world of motoring. But that's another story.....

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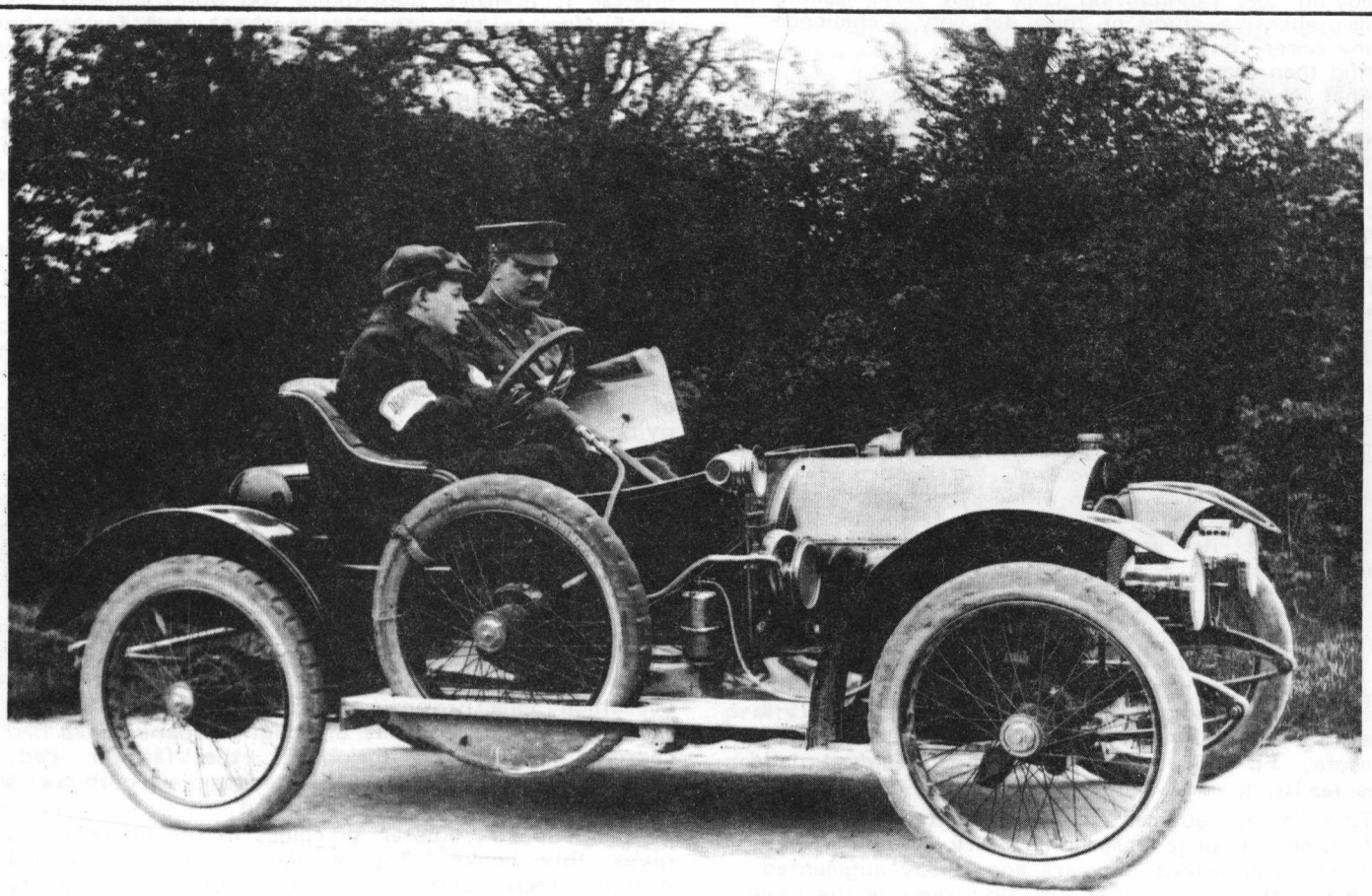
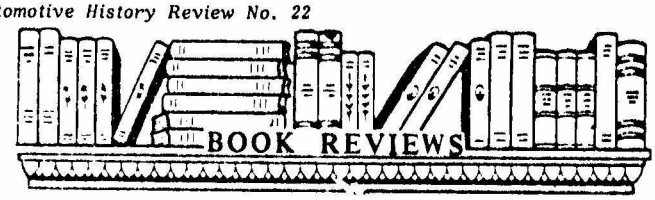
The photographs used in this article are credited to their proper sources. The drawings are the work of the author, David G. Styles.



1909 10 hp V-Twin taking part in Army trials, with Stanley Riley at the wheel.
Photo: Riley Publicity (Now British Leyland)



THE IMMORTAL 2.9 ALFA ROMEO 8C 2900 A # B, by Simon Moore. 270 pages. 360 duotone photos plus 18 in color and drawings by Ron Deaver and Jonathon Thompson. Hard Covers, 10½" x 10½". ISBN 0-9617-266-01. Parkside Publications, Suite 3210, 999 Third Avenue, Seattle, Washington 98104. $59.95.

This is doubtlessly one of the finest "in-detail" books ever published in automotive history, and it excels in format, content, presentation and binding as few others which have hit the bookstores these days. *The Immortal 2.9* will hit few because only 2,500 copies have been printed and there is no guarantee that there will be a second run.

The 2.9 Alfa Romeo 8C 2900 A # B was strictly limited productionwise, some 40 or so having been completed by World War II. But man, what a car it was! Kings, princes, maharajahs and the more affluent racing confraternity availed themselves of the cars which sported superior performance and some of the finest coachwork imaginable. And they were at home on the boulevard as well as on the track, winning Mille Miglia in 1936, '37, '39 and '47 as well as the first Watkins Glen race and the 1951 Pebble Beach Cup.

With the onset of World War II, the cars were scattered this way and that, some disappearing altogether, others smuggled to Switzerland, and the remainder just sitting out the hostilities.

Through those years and ever since, numerous rebodying and cannibilizing came their way, making a comprehensive study of them not only a challenge to any comer, but a near-impossibility.

And then came Simon Moore.

What Moore has done is to take each of them, car by car, and trace them and their collective destinies to the present time, allowing a full chapter for each car. That's a pretty good recommendation. To add that such attention was a labor of love in the truest sense in superfluous.

The cars seldom come into the public domain, even in the more select auctions, but when they do, they may command six- or seven-figure prices, and from this you can get some idea of the immortality of the Immortal 2.9.

This is Parkside Publications' first attempt in the field, and judging from it we look avidly to the future for further works of this kind which we are assured are in the works.

The book, with Beverly Rae Kimes' *The Star and the Laurel* (see the *SAH Journal*, March-April 1986), shared the honors as co-winners of this year's Cugnot Award by The Society of Automotive Historians at its annual meeting in Harrisburg, Pennsylvania.

Keith Marvin

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75 YEARS OF CHEVROLET, by George Dammann. 536 pages, Approximately 2,680 black and white photos. Hardbound, 8½" x 11". ISBN 0-912612-25-8. Crestline Publishing, 1251 N. Jefferson Ave., Sarasota, FL 33577. $34.95. (Florida residents add sales tax).

This is an augmented and updated version of SAH member George Dammann's *Sixty Years of Chevrolet* which appeared 15 years ago. I say augmented. because although some of the text remains the same as the earlier work, there have been a few deletions, several additions, and a good deal of rewriting. And of course, "updated" is self-explanatory.

This volume is 216 pages longer than its predecessor and, similarly contains a variety of pictures showing not only the Chevrolet cars, trucks, station shots and the like but also angle shots and interior views.

75 Years of Chevrolet hasn't been restricted to the domestic product either, but carries the story of the car to other parts of the world where Chevrolets are produced and marketed and, whereas there is little difference in some of these, there are those which will surprise the reader who is acquainted only with the output from Detroit. Among these is the beautiful "Moonlight Speedster" which was limited to the Australian 1932 "Confederate" chassis, which is saying something for a car which was pretty in the first place.

Like the rest of the Crestline books, this is a scissors-and-paste production, but it illustrates how good this kind of book can be when properly done as this one is. Production statistics in the captions are another plus.

Also, as with the other Crestline offerings, the history has been presented in chronological fashion, which makes reference an easy task. This is a fine piece of work and one of Crestline's best to date.

Keith Marvin

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BERLINETTAS, by Jean-Paul Thevenet and Peter Vann. 223 pages with 193 color photos. Hard covers, 9½" x 12". ISBN 0-87938-261-9. Motorbooks International, P. O. Box 2, Osceola, Wisconsin 54020. (1-800-826-6600). $39.95.

If you look in your dictionary for the word 'Berlinetta' it is more than likely you won't come across it. Suffice to say, this is another word for coupe and this latest Thevenet--Vann collaboration follows their study of "Cabriolets" (see *Automotive History Review*, Winter 1986-87) which are similar except in "Berlinettas" the roofs remain in fixed position.

We are dealing with singular talent in this one—the lens of Thevenet and the pen of Vann--which, in the final reckoning makes a rather attractive and certainly valuable contribution to automotive history in general. The time span for the 47 cars illustrated runs from 1931 through 1986, and presents some pretty exotic automobiles representing six nations and a galaxy of custom coachbuilders.

A number of photos showing both exterior and interior views of each car make up the visual side of the work with a brief, yet informative accompanying text for each. Some of the chassis shown include the Bugatti, Talbot-Lago, Riley, Pegaso, Peugeot and Voisin, all of which sport some of the most attractive coupe coachwork in automotive history. A big plus (at least to this writer) may be found in the technical specifications which also list the number of each example that were completed, ranging from such machines as the DeLorean DMC-12, of which some 7,864 units left the Belfast works to the unbelievably exotic Dubonnet/Hispano-Suiza "Xenia" of 1945 with Saoutchik coachwork, of which exactly one was produced in 1945, and which is unique in that although Hispano-Suiza had ceased producing automobiles, the familiar red, yellow and white radiator badge sporting both Swiss and Spanish colors adorns its hood.

The superb register of colors in the photographs gives this book a special place in the sun and I heartily recommend it to those who enjoy beauty for its own sake, indivdualism in concept, and to anyone else who simply isn't satisfied with mass production when it comes to transportation.

Keith Marvin

THE CARS OF LINCOLN-MERCURY, by George H. Dammann and James K. Wagner. 592 pages. Approximately 2400 black and white photographs. Hardbound, 14¼"" x 9". ISBN 0-912612-26-2. Crestline Publications, 1251 North Jefferson Ave., Sarasota, FL 33577. #34.95.

George Dammann is SAH Member #173 and James Wagner is # 284 and that, folks, goes back to the earlier days of our Society. The numbers have little to do with the price of eggs but they identify these gentlemen as stalwarts for the cause of automotive history, and in *The Cars of Lincoln-Mercury* no further proof is needed. The book speaks for itself and its message is loud and clear and, provided that you own, like or admire Lincolns, Mercurys and Edsels, you would be remiss indeed if you didn't grab a copy of this one while you can get it. And at the price of $34.95 you may be getting the last real bargain in these days of inflation—and I kid you not.

Books from Crestline Publishing stand out as living proof of what scissors-and-paste layout can be at the very best, and you'd better believe this is the best on the market. It is a gold mine of information, a treasure trove of material, a reference book of great value and—as for reading pleasure—a revelation. It is the only four-pound book I've ever read in the bathtub. And I am not speaking facetiously, either.

If you want to have THE WORD on the cars aforementioned (plus some related vehicles), don't pass this one up. Why? I'll tell you.

Time was (the time being 1971) that the first book on the subject was published. This was back in 1971, also not surprisingly, by Crestline. Three years later it was out of print and there has been a crying need for replacement.

The replacement has arrived. Rejoice and be glad!

Drawbacks? Sure, all books have drawbacks, and the only one I have found here is that some of the illustrations are darker than I'd like them. On the credit side, there is so much going for it that space won't allow my enthusiasm. I've been accused from time to time of being "too kind" in my reviews. Have you ever seen some which I wrote that weren't? The publishers have, They did not rejoice; neither were they glad!

Here you have everything—and probably more—than you'll ever need concerning the subject at hand, and very nicely presented as well. Models, prices, production statistics, and all the rest is here for you, whatever your question, whatever your predilection.

Go for it. The first edition of this has been unavailable for 13 years. Should history repeat itself, as it sometimes does. get your copy while you can because if history does repeat itself again, it may well be that you'll have to wait until the year 2000 to get your new copy.

That is, if Messrs. Dammann and Wagner will condescend to update this one!

Keith Marvin

STANDARD CATALOG OF AMERICAN LIGHT DUTY TRUCKS, Edited by John Gunnell. 776 pages. More than 2,000 black and white illustrations. Hardbound, 8-1/4" x 11-3/4". ISBN 0-87341-091-2. Krause Publications, 700 East State Street, Iola, Wisconsin 54990. $24.95.

SAH Member Gunnell has done well with this which is the commercial vehicle successor to this earlier *Standard Catalog of American Cars 1946-1975* of five years ago.

This work should have its widest acceptance with those who own one-quarter to one-ton trucks, and especially those which are being built today or had been built not all that long ago, such as Studebaker and Willys-Overland, for it is in this major section in which the bulk of the material lies and which is identical in format to the earlier work aforementioned.

Like the volume on the 1946-1975 automobiles, the sections are carefully listed chronologically and with photos to match, a description of the models, I.D. data and weights, prices and production totals (where known) as well as engine, chassis and technical data. Options are also given and again, where known, available paint combinations. Each year is concluded with miscellaneous notes and historical material.

Thus, in a sense, we have a gold mine of information which will be invaluable to the truck lover and owner, or at least to those who favor light commercial vehicles such as vans, pickups and the like.

The main section of the volume as listed here comprises some 684 pages.

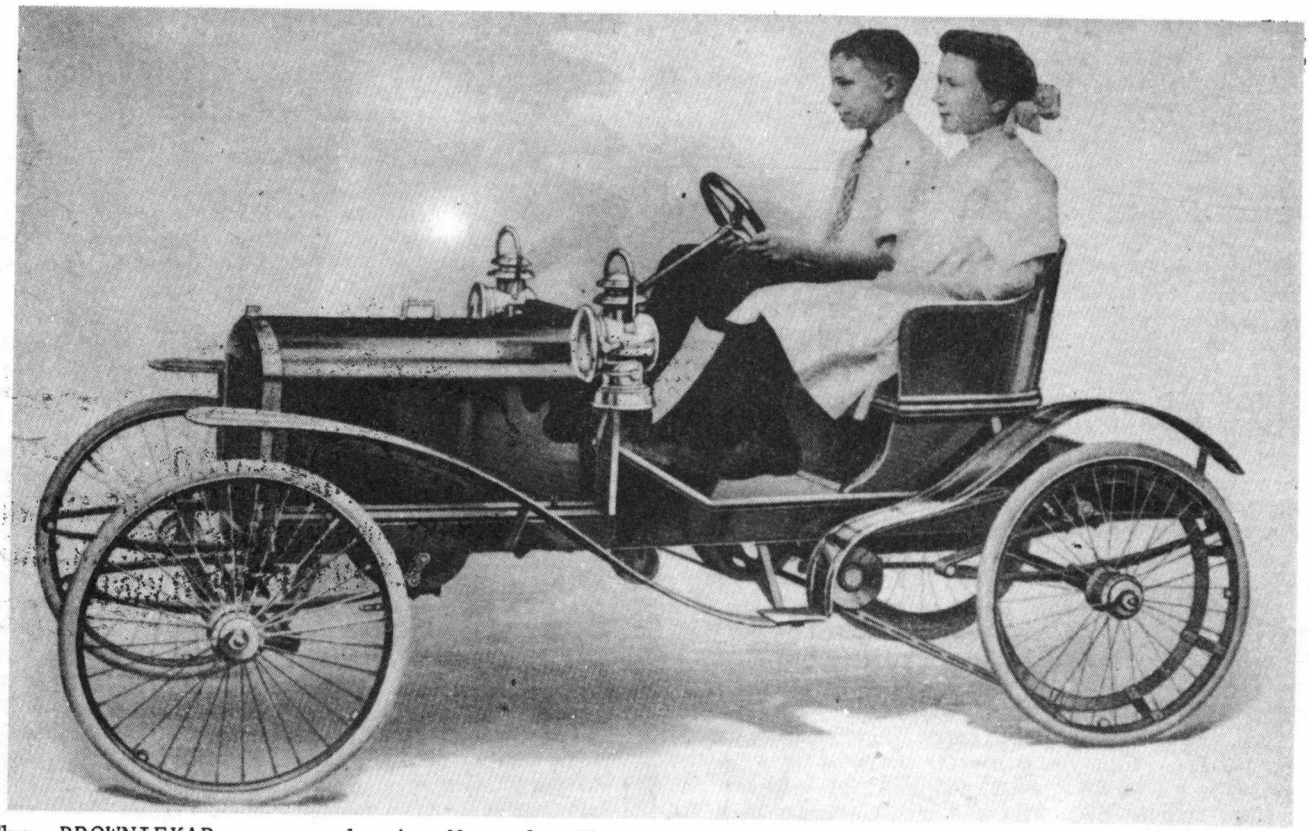
There is, in addition, a sort of catchall—a section devoted to the hundreds of other light trucks built in these United States between 1896 and 1986 but, of course, with such a wide scope to be considered this does little more than scratch the surface. There were simply too many on the market to give more than a passing reference in most cases. This "Illustrated Directory," however, is not pretentious and explains that "No claims are made as to the 'completeness' of this list at this time. It represents an extensive effort to provide light-duty truck enthusiasts with basic information," adding that "However, the lack of previous research in this field will surely have an affect (sic) on its degree of comprehensiveness."

What this means is that if you're looking for a certain type of taxicab, you may or may not find it included, but the section is a sort of guide to other things which were made in the United States and which fall into the pattern.

Proofreading leaves a good deal to be desired, however, and misspellings may be found without too much effort, as in cross-references where, when a reference is checked, there is nothing to find.

Never mind; the main and largest section is a pretty good guide to what the large percentage of light-truck fanciers want, and as such it is a pretty good investment at the price.

Keith Marvin



The BROWNIEKAR was made in Newark, New York, by the Omar Motor Car Company. It was designed by William H. Birdsall, chief engineer of the Mora Motor Car Company, and the two companies shared the same manufacturing facilities, Omar being an obvious anagram of Mora. The little car was just one of several small cars, usually classed as juvenile makes, which appeared from time to time from the first decade of American automobiles well into the twenties, none of which were particularly successful. The BROWNIEKAR had a 3 horsepower, one cylinder engine and a belt drive to the left rear wheel. Even at its low price of $150, it survived only from 1908 into 1910. At least one of these small cars still exists in unrestored form, owned by SAH member Walter E. Gosden of Floral Park, New York.

AUTOMOTIVE HISTORY REVIEW
1616 PARK LANE, N. E.
MARIETTA, GEORGIA 30066

Fall 1987
Issue No. 22