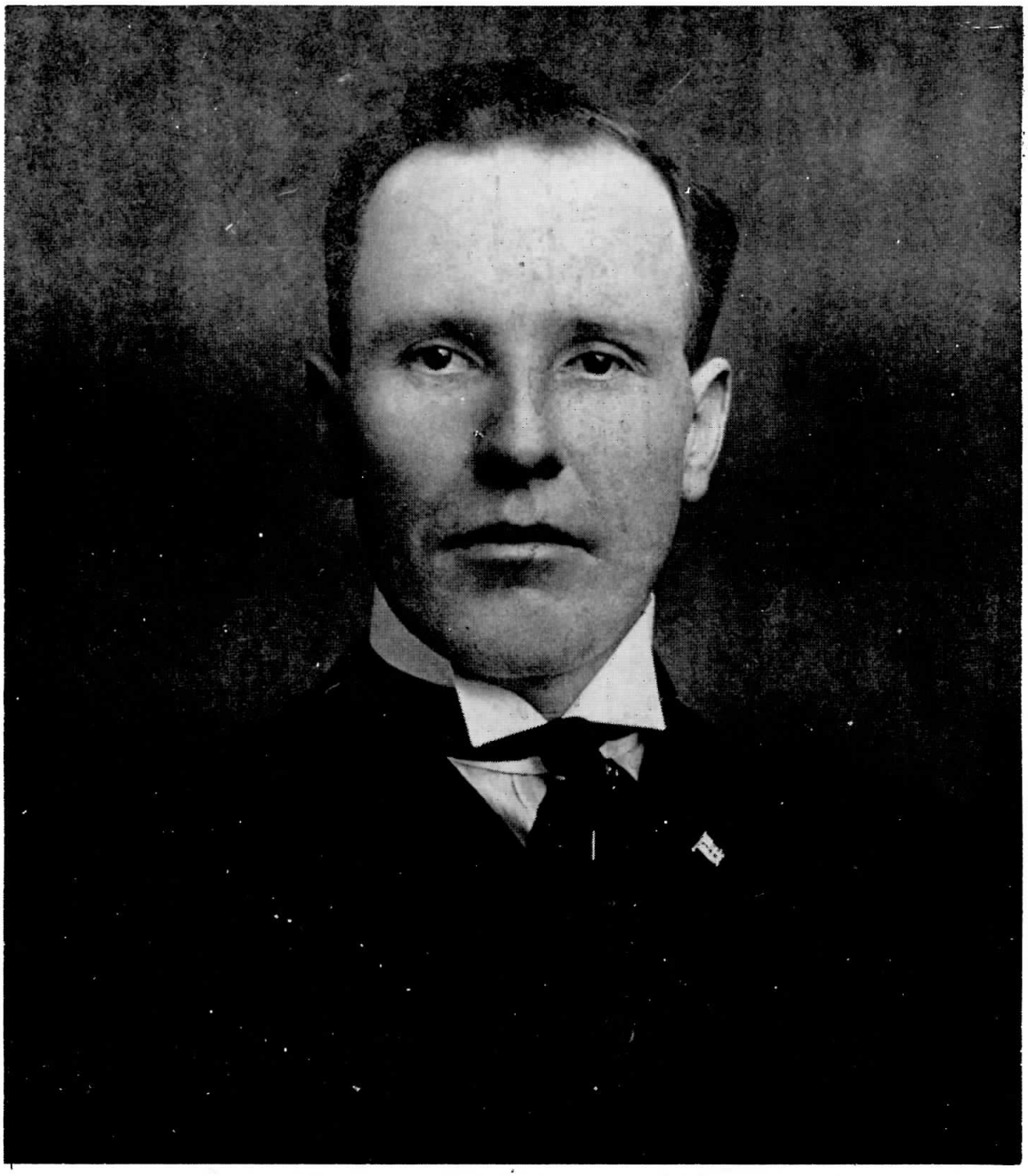
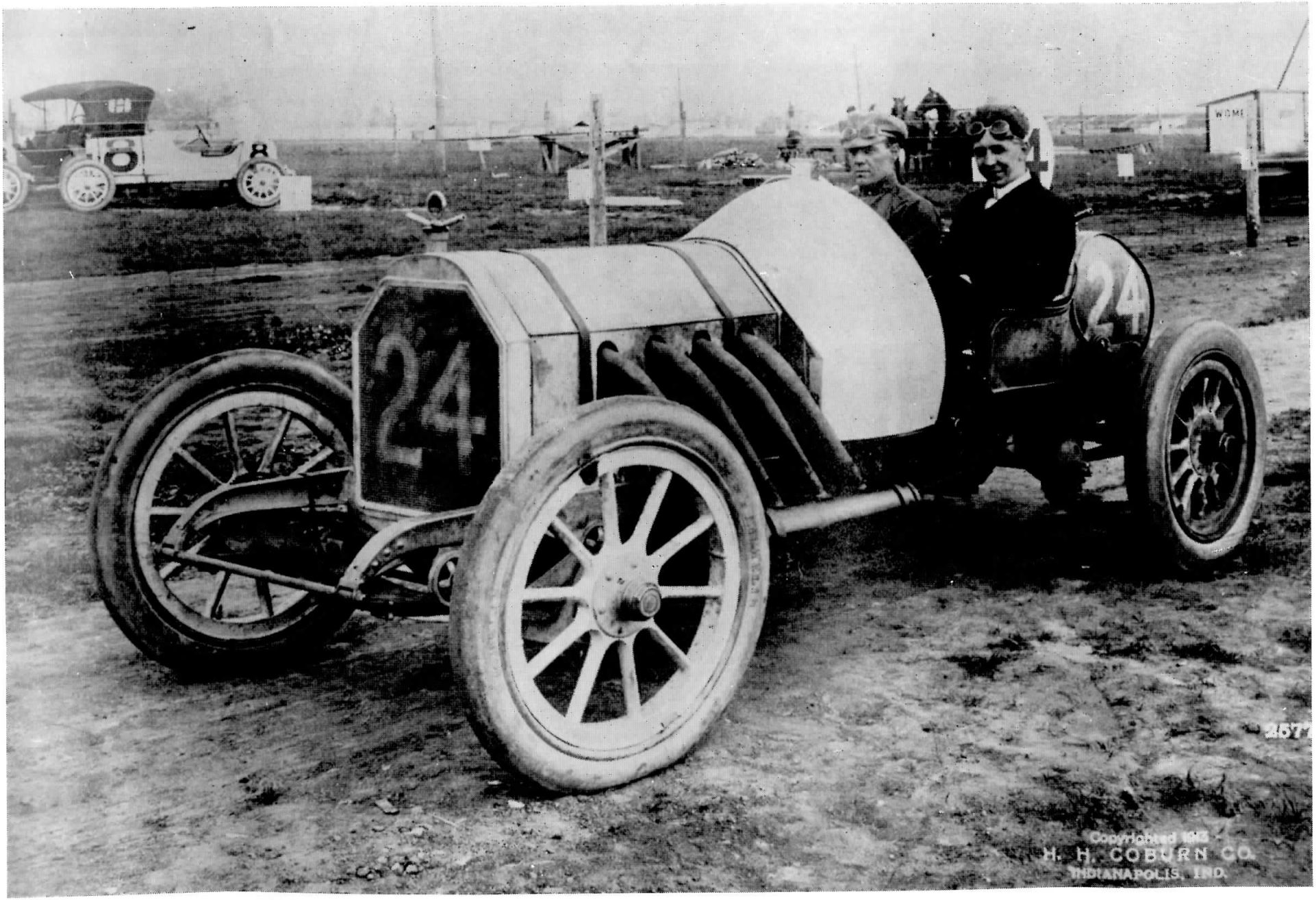
AUTOMOTIVE HISTORY *Review*

WINTER 1979 - 1980 ISSUE NO. 10



ALEXANDER H. TRUMBULL, 1878 - 1959

The Society of Automotive Historians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AUTOMOTIVE HISTORY Review

A PUBLICATION OF THE SOCIETY OF AUTOMOTIVE HISTORIANS

RICHARD B. BRIGHAM, EDITOR

NOTICE

The present editorship of Automotive History Review ends with this issue. All future correspondence and contributions for publication should be addressed to:

Frederick D. Roe, Editor
837 Winter Street
Holliston, Massachusetts 01746

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THE COVERS —

FRONT - Alexander H. Trumbull, president of the American Cyclecar Company (1913), which became the Trumbull Motor Car Company in 1915. Photo loaned by SAH member George S. Clark.

BACK - Stevens-Duryea advertisement, from Horseless Age, June 30, 1909.

INSIDE FRONT - Stearns-Knight racing car at Indianapolis in 1913. The racer in the background (No. 8) is a Stutz. This picture was given by SAH member Jerry Gebby to the late Harry Pulfer, who contributed it to AHR for publication.

INSIDE BACK - 1909 Overland. This picture was also contributed by Harry Pulfer, with no clue as to its source except for a notation on the back which reads "Bill Kirk restored this 1909 Overland in 1953".

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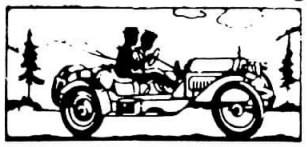


MARIETTA, GEORGIA 30066

EDITORIAL COMMENT

Here, at long last, is Issue Number 10 of Automotive History Review. It is the last of what may come to be known as the First Series. Now the time has come for a New Model, and Issue Number 11 - the first of a brand new design - has already been printed and distributed to members of the Society. It comes in a crisp new format designed by John M. Peckham, a charter member of SAH and a frequent contributor to the earlier issues of this publication.

The new cover design is both attractive and interesting. One can almost hear the rumble of the big Riker Military Truck as it seems about to leap right off the page. The picture suggests the action and forward movement which a team effort can provide for Automotive History Review. John and his staff (David W. Brownell, Keith Marvin, and John B. Montville) are to be congratulated for the job they have done on Issue 11. The next four issues are to be edited by Fred Roe, 837 Winter Street, Holliston, Mass. 01746. He will need your help in the form of contributed articles and pictures. Now that we have a fine new model and a fully qualified staff, let's all give it our best possible efforts to make AHR the finest of automotive historical publications.

Nearly a year ago I began dropping hints to our club officers that my own little business had grown to such a degree that I could no longer maintain anything resembling a definite schedule for AHR, which has, until now, been strictly a one-man effort. The job has included editing of the articles submitted, plus the actual writing of about half of them, setting up the whole magazine for printing, preparing the photographs, making the negatives and plates, followed by the actual printing, folding, assembling, stapling and trimming of the entire issue. All of this had to be fitted into a work schedule which sometimes ran to seven days a week. That is why AHR, which was supposed to be a semi-annual magazine, has been produced only "semi-occasionally".

For months I have been looking forward in happy anticipation to the day when I could turn this job over to someone else. Now that day is at hand, and I'm already having pangs of regret. I shall miss the wide correspondence with SAH members around the world, the hours of research required for the writing of many articles, the time spent in the darkroom trying to convert an old, yellowed and stained photograph into a picture suitable for printing, and the dozens of little problems which were a part of the publication of each issue. In retrospect, they weren't problems at all - merely challenges.

Now, as I write this final paragraph for the last issue of this First Series, a word or two of thanks is in order for all of those whose contributions have made these ten issues possible. SAH members - and in many instances non-members - have supplied many of the articles and photos which have appeared in these pages, as well as the interesting letters which have been received for the "Viewpoint" column.

The editing and publishing of Automotive History Review has often been a chore - but it has also been an extremely pleasurable and rewarding experience. I'll miss it.

Richard B. Brigham

VIEWPOINT
COMMENTS OF OUR READERS

OF KNIGHTS AND CHRYSLERS

MICHAEL SEDGWICK, SUSSEX, ENGLAND

Denney Freeston's Knight story was great, but some mangled names seem to have crept into the list of foreign licencees:

1. Daimler and BSA. The latter firm acquired Daimler in 1910 and in fact controlled it until the sell-out to Jaguar Cars Ltd. in 1960. The intriguing aspect of this take-over was that the BSA automobile range was jettisoned in favor of badge.engineered Daimlers, produced - with occasional hiatuses and an heretical valve-in-head vee-twin (1921-4) - through 1926, when the BSA-Knight line came to an end.
2. 'London Omnibus Co.' must, I think, be 'London General', though Daimler made the bus-Knight motors.
3. Bellanger, not 'Bellenger'. Knights only to 1914, and they bought their motors from Daimler.
4. Aries. A license, maybe, but did they actually make any Knights?
5. Loeb. Their LUC automobiles used imported British, not German Daimler motors.
6. Horch, not 'Hersh'. The German experts in this make figure that Knights were listed, but not made in series. Their planned Knights were probably again Daimlers from Coventry. Add also to the German list Stoewer of Stettin and Mathis of Strassburg, whose bigger pre-'14 automobiles were (usually if not always) Stoewers with Mathis hoods and radiators.

Marshall Naul's fascinating notes on our joint project are, hopefully, a sneak preview of a formidable survey, but his CY adds to rather than alleviates the confusion. If it did happen, who bought it? We Limeys? In theory, yes, but the only Kew-assembled DeSoto I have inspected recently was the usual updated '34 with '35 hood but not '35 bumpers. Being even more ignorant in those days than I am now, I checked out serials only to find that they were SE rather than SG or (as one might expect) CY.

Australia? Again no positive evidence, though that country harbors at least one similar updated '34 to Kew specification, titled as a Chrysler Croydon. Maybe someone (Max Gregory, maybe) has inspected the car and can confirm if it bears an SE or CY prefix! Alas, in my limited Antipodean travels the only Airflows I actually saw were unmistakable 1934 CU Chryslers, and nobody called them Hestons! In case anyone hasn't figured this one out, Airflows sold in Britain carried the names of London's two then International airports, now both defunct.

Finally, on Knights again, I very much doubt that Minerva made Knight-engined passenger cars in 1940. Precious few were made after the merger with Imperia in '36, though the UK concessionaires continued to operate, and showed a pair of seven-passenger AP straight-eights at the '37 London Show. One of these was still around in Glasgow a year or two ago, and may yet survive. Up to the Nazi occupation they were playing around with a strange transverse-engined front-wheel drive V8 incorporating a torque converter transmission, but only three of these were made, all with the faithful old Ford 221. Oddly, though, a few Knight-engined bus chasses seem to have been put together in '46, along with some light trucks using Continental's flathead four. The last days of Minerva, however, would repay research, since there were overtones of Rover, Armstrong Siddeley and the Italian CEMSA-Caproni in the story.

THE ROTARY VALVE ENGINE COMPANY

HENRY H. BLOMMEL, CONNERSVILLE, INDIANA

My father, who built the first McFarlan car in the fall of 1909, worked on the Russell Rotary Valve engine during 1912 in a building that was the home of the Indiana Lamp Company in Connersville. This building was next door to the Ansted Spring and Axle Company, where the experimental money came from. They tried to get it to work, but lubrication problems caused them to give it up. The property is now a part of the Stant Manufacturing Company, whom you know as the gas and radiator cap people. Our son John is the advertising manager of the Stant Manufacturing Company.

THOSE OTHER VALVE ACTIONS

FRED ROE, HOLLISTON, MASSACHUSETTS

Your selection of engines with mysterious valve actions is quite tantalizing. Hopefully we will hear from more sources with further information on the ones you have chosen as well as some of the others not covered. Here are a few notes which relate to some of the ones you mention and some others.

I think you can wipe out the Ess Eff so far as being a product with a mystery valve action. Specs of their $350 car shown by drawing only on page 190 of the March, 1912, issue of *Cycle and Automobile Trade Journal* mention lubrication by mixing lubricant with fuel. This sounds like a two cycle engine is probable for this 2-cylinder car. The mystery would be how to claim such an engine is silent. I am always skeptical of makes represented by drawing only, and wonder if the silence of the Ess Eff also extended to its production.

The Ace car of Ypsilanti, Michigan in 1920-21 was another make claiming to be preparing to use an engine of different valve action. I believe it was called the "Guy rotary disc valve engine". As I understand it, the entire Ace production of cars with normal engines was contracted for by a dealer in the northwest, and probably the rotary valve engine was another still-born project.

CONTINUED ON NEXT PAGE

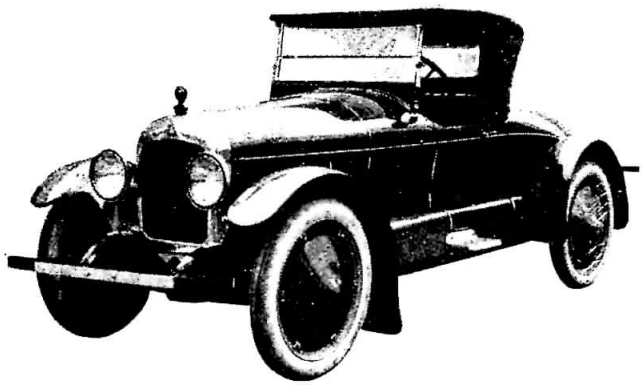
I was fascinated to see the photo of Miss Knight's K-D engine. I do not have the reference before me, but believe the production of this engine and prototype car was the work of Charles R. Grueter, who had been previously with Matheson and later with Stutz. I would like to know how he arranged the dealing and lubrication of those half-sleeves with "1/16 inch clearance between them."

The K-D car at the 1913 Boston show had space 220, and just across the aisle in spaces 227 and 228 was the Edwards Knight. Chevrolet, Cartercar, and the Borland Electric were close by, so the visitor to that aisle was presented with a considerable variety of engineering concepts.

EDITOR'S NOTE: The two half-sleeves which formed the valves of the K-D engine were located on the outside of the cylinder wall but inside the water-jacketed cylinder block. Thus the 1/16th inch gap between them was isolated from the combustion chamber, and no seal was required.

The Ace roadster pictured below was equipped with a rotary disc valve engine of six cylinders with a bore and stroke of 3¼ by 5 inches. This was the Guy Rotary Disc Valve engine, designed by Fred Guy and O. W. Heintz. With this engine the car was called Model G. An identical car, the Model L, used a six-cylinder Herschell-Spillman engine of exactly the same bore and stroke, which strongly suggests that the Guy engine may have been a converted Herschell-Spillman.

On December 13, 1920, Apex Motor Corporation announced that the Ace would be distributed nationally. The company had been in business for a year and a half, but the cars were made exclusively for a distributor in Seattle, Washington. We have been unable to find a confirming reference as to who this distributor might have been, but a man by the name of George P. Listman of Seattle was elected to a directorship in Apex Motors on March 4, 1921.



THE Apex Motor Corp. is placing the Ace car on the market featuring a new Disk-valve engine. This engine is a six cylinder job incorporating a new valve action. It is a development of the disk valve principle, the valves being in the heads of the cylinders and operating at one eight crankshaft speed. The valve which is somewhat the same shape as a Maltese cross, is keyed to the shaft as the gear which drives it. At present the car is being built in the touring and roadster form, selling for $2260.

Picture and car description reprinted from MOTOR AGE, January 27, 1921

MISS MARGARET KNIGHT

FRED ROE, HOLLISTON, MASSACHUSETTS

Miss Margaret Knight lived for many years in the town of Framingham, which is just two towns removed from here. Her home was on Hollis Street which now is a numbered state route and we travel it on most of our trips to that town.

A few years ago the town had a 275th anniversary celebration and a small book was issued that contained brief stories on people, places, businesses and historical events, all of which had been written by a former editor of the local paper over the years and published therein from time to time.

One of his stories, only a page long, was about Miss Knight, and he gave her credit for inventing the Knight engine. Not being an automotive specialist, I am sure he did not realize that his statement was only partly correct.

I am sending a copy of AHR No. 9 to the Framingham Historical Society with a cover letter so that there will be on record in the town a clarification of just what engine Miss Knight did invent.

THE BURT McCOLLUM ENGINE

Max Gregory, Drouin South, Victoria, Australia.

Issue No. 9 of AHR is a credit to your efforts to tie up so many connections and parallels to the Knight story. It is to be hoped that it will serve as a catalyst for more thought. In my own case it has stirred the works up a little and I would like to make the following comments.

Regarding cars, it would be true that the Knight was the major sleeve-valve type and that the Burt-McCollum was not so significant. However, if we admit the realm of aero-engine design into consideration, then the single-sleeve comes across quite strong.

Roy Fedden takes credit for recognizing the suitability of this application when he laid down a new design of 9-cylinder radial engine for the Bristol Company which saw the light of day as the Perseus, a 900 hp type of 1934. As mentioned, Bristol remained faithful to this single sleevevalve until gas turbines overtook piston engines. Most prolific was the 14-cylinder Hercules of about 1500 hp during the War, and the big 18-cylinder Centaurus of some 2500 hp. The fine service record of these engines caused other makers to adopt the single sleeve also. The Napier concern had a liquid-cooled 24 cylinder "H" configuration type under development prior to the warwhich, after much tribulation, emerged as the 2400 hp Sabre in the early war years. Rolls-Royce, after the debacle of their first attempt at a 2000 hp engine, the Vulture 24-cylinder "X" form effort, went to an engine very like the Sabre in the Eagle which more or less missed the War and lacked development due to priority on gas turbines. Nor was this attraction to sleeve valves confined to Britain as in 1937 Pratt & Whitney were working on liquid cooled designs having 24 cylinders in a twin crankshaft "H" configuration. Although they were sure this was the way of the future as aircraft speeds rose and frontal area became critical, military procurement programs decreed that

emphasis should be placed, at the time, to production of engines rather than new designs requiring long development periods. It is an interesting exercise to speculate what we would now have if the gas turbine had not fulfilled its promise as discerned by Whittle.

Another application of the Burt-McCollum principle was in the Barr & Stroud engine for motorcycles and other applications.

To return to cars again, there was another design which had some currency in the early 20's, particularly in Europe where it was employed by Peugeot, among others, this being the Schmid cuff-valve type which, it is hoped, someone will explain to us clearly.

In looking specifically at Mr.Freeston's complete discourse on the Knight engine history, I find myself a little puzzled at his reference to a famous farm tractor of the Daimler Company in 1910. While Daimler did offer some models of farm tractors during the 1910 to 1917 period, I doubt that they were ever famous. They were very large, going up to 105 hp, and very costly and doubtless sold few. I wonder if he was alluding to the Daimler-Renard road tractor of this time which certainly did gain a good deal of prominence. There was, however, no similarity between the farm and the road tractors, as the farm type was designed for direct haulage while the Renard comprised a string of trailers, each of which had a powered axle to which power was carried by a shaft running the length of the train.

Finally, as there is the request for more on sleeve and rotary valve designs, perhaps they go back earlier than one would expect, as instanced by the Raymond gas engine which was made by the J.I.Case Threshing Machine Company from the 1890's. This had an overhead mechanism driven by a vertical shaft and spur gear. It must have had some virtue, as it was offered in a large range of sizes.

"MARQUE" (Pro)
John M.Peckham, Troy, New York

In response to Col. Haefner's comments on the use of the word "marque" in referring to a certain make of automobile, the answer is quite simple. According to the Random House Dictionary of the English Language, which has a very nice foreign language section, "marque" finds itself among such automotive oriented words as **garage, coupe, Grand Prix,** etc., as being distinctly French. Not surprisingly, it stands for brand or mark. Since a brand is an identifying emblem or name, the term "marque" is certainly not as awkward or silly sounding as "nameplate", and is a perfectly legitimate word when used to refer to a make of automobile.

The term "Mark", of course, means the same thing, but is generally used to denote a specific model. Columbia was probably one of the earliest users of the "Mark designation in reference to automobiles, having started the practice as early as 1898 or '99. As the Colonel is no doubt aware, the military has used the term for many years to identify changes in a basic item. In the automobile world, the British have been great users of the word. The MG Mark III Tigress and the Jaguar Mark V are good examples.

In order to differentiate between model and make, the spelling of "marque" is quite reasonable. I'm sorry is the Colonel feels that it is such a disaster to use the word, but it does help to break the monotony of using the words "make" and "brand" over and over again. The term has come into common usage, and, in any language, that is nine-tenths of the battle toward legitimacy. Right or wrong, the word is used and understood by most of us, and it is doubtful that it will disappear just because a few of us don't like it.

- and "MARQUE" (Con)
Fred Roe, Holliston, Massachusetts

I agree with Col. Haefner completely that the term "marque" has no place in automotive descriptions. My own theory as to how the word came into use in our field is tenuous but possible. I do not know how long ago or by what means it became the practice of weapons makers to identify variations of their designs by calling them "Mark I", "Mark II" and so on as necessary, but it was before the automotive age, I am sure. Perhaps such things were used to identify other things even farther back in the past, but the weapons makers will do for a starting point anyhow, and they maintained the practice for many years, and maybe still do.

In the 20's and 30's certain automobile manufacturers adopted the practice to identify the different models of their lines. Jaguar, at least, followed this form of model designation into the 50's, by which time their cars were to be seen frequently in the USA, as well as all over the rest of the world.

I think that "marque is a corruption of "mark" and came into being as enthusiast slang about 25 years ago, and has since spread like dandelions and now seems to be used by everybody to cover models, car lines, brand names, manufacturers indiscriminately.

I have my own ideas on the correct terminology to use, but that is another story.

STEARNS-KNIGHT PRODUCTION
Arthur W. Aseltine, Forbestown, California

Re: Denney Freeston's article on page 11 of AHR No. 9, I believe the number of Stearns-Knights produced between 1925 and 1930 is closer to 8126, as that is the total number of serial numbers assigned to all models of Stearns-Knights for model years 1925 through 1930. I pointed this fact out to Denney, but I guess the change didn't get made before publication.

Denney informed me that he gave a copy of my Stearns-Knight serial numbers to Grace to help update her book. (For which many thanks. Ed.).

In answer to your quest for information about various types of valves, Continental Motors Corporation at one time was developing a single sleeve valve engine. I have a small bi-color movable cardboard depiction of its operation. An old friend of my family, Stanley Bell, now deceased, used to work at the Knight laboratories in Pasadena, California (working on a second harmonic balancer). He then went to Continental to work on this sleeve valve engine. He told me that this engine was under contract for the Jordan Playboy, but it never reached the production stage.

As a new member of the Society, I am not familiar with topics previously presented. Therefore I have a question I would like to ask the experts. I have recently received many old newspeper ads concerning automobiles. Among these are some complete Automobile Supplements from the Sunday newspapers of the San Francisco Bulletin, Examiner, and Chronicle during the period from 1912 to 1921. These papers are old, brittle and discolored. My question is - How is the best way to preserve these newspaper pages?

MEMBERSHIP DIRECTORY - WHEN?
Ralph Dunwoodie, Sun Valley, Nevada.

When are we going to get an updated Roster of Members? It seems that I read of a new one to be published perhaps as much as two years ago. If one has been printed since that first one, how do I go about getting a copy?

According to an item published in Horseless Age (January 6, 1909) there were at that time 253 recorded American manufacturers of automobiles, grouped by states as follows:

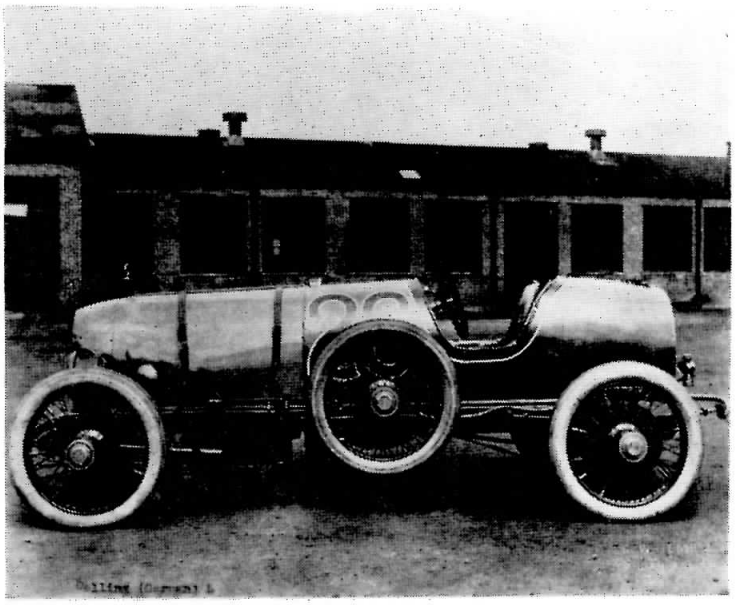
Michigan	39
Illinois	39
Indiana	30
Ohio	30
Iowa	7
New York	29
Pennsylvania	18
New Jersey	4
Maryland	2
Massachusetts	16
Connecticut	4
Rhode Island	1
Missouri	12
Wisconsin	6
Minnesota	6
Kansas	1
Nebraska	2
Colorado	1
California	4
Nevada	1
Texas	1
	253

It was stated that of these 253 manufacturers, only about 25 had made a name for themselves commercially, and that it was doubtful that 20 could show a fair profit.

Of the 253 manufacturers in business at the beginning of 1909, only the Ford Motor Company has survived without undergoing mergers or changes of ownership. Among the other survivors, Buick, Cadillac, Pontiac (as a continuation of Oakland), and Oldsmobile were all absorbed into General Motors. The present American Motors Corporation is a direct descendent of the Thomas B. Jeffrey Company, and the Chrysler Corporation was the successor of Maxwell and, less directly, Chalmers and Thomas.

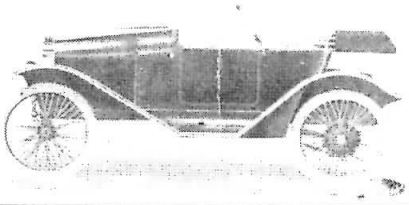
The picture below was contributed by the late Harry Pulfer shortly before his death. According to Harry's notes on the back of the photo, the car was a Deltal-Mercer race car, designed by Eric Delling. It was built during 1911 and 1912, and was the prototype of all L-head Mercer cars. It was raced by Dawson in the Elgin Road Races in 1913 where it finished second, setting the fastest lap time in the process, and finished only seven seconds behind Ralph de Palma in a Model F T-head factory works race car. It would have finished first but for eight tire changes.

The car originally had a tail, which was removed when lamps were added for street use.



THE TRUMBULL MOTOR CAR

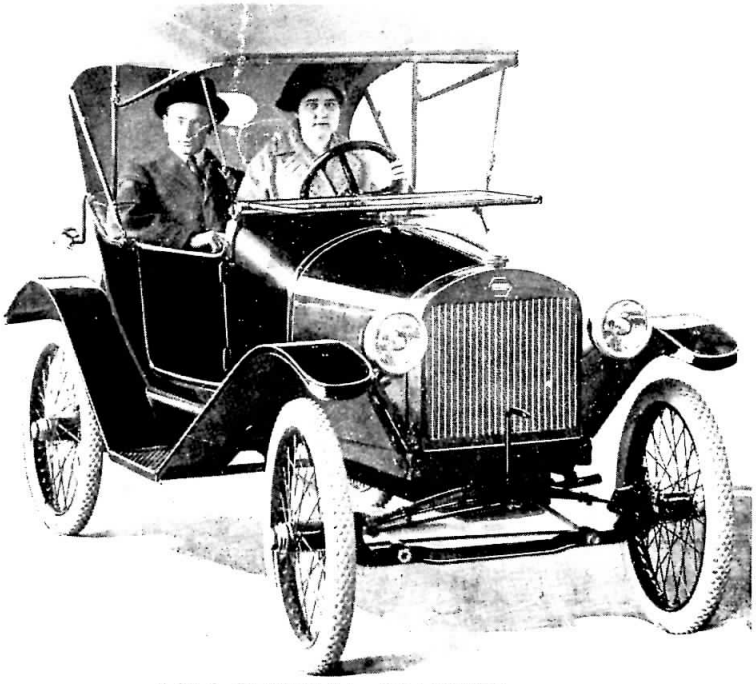
by George S. Clark



The Trumbull car was built in Bridgeport, Connecticut, starting in the latter part of 1913 and ending in June of 1915. The first formation of the company came about when the Connecticut Electric Manufacturing Company, of Bridgeport, Absorbed the American Cyclecar Company, of Detroit, Michigan, and moved it to Bridgeport. After acquiring the Detroit business, the capital stock was increased from $100,000 to $200,000, and when final arrangements were completed the capital stock reached $500,000. The company was now called The American Cyclecar Company of Bridgeport, and plans were made to build 10,000 cars.

Officers of the new company were: A.H. Trumbull, president; Harry J. Stoops, vice-president; and I.B. Trumbull, secretary and treasurer. The original idea behind this new cyclecar was that of Mr. Stoops, and he was assisted by K.L. Hermann, of the Hermann Engineering Works, who was affiliated with the new company as engineer. Robert A. Adams, former purchasing agent of the Inter-State Automobile Company, of Muncie, Indiana, became temporary assistant purchasing agent.

Early in 1915 the name of the company was changed to Trumbull Motor Car Company. Alexander H. and Isaac B. Trumbull were two of seven brothers, of which John H. Trumbull, the eldest, was governor of the State of Connecticut from 1924 to 1931.



1914 TRUMBULL ROADSTER
(Picture from ad in Cyclecar Age, June, 1914)

This Connecticut-built car is not to be confused with another car of the same name made in Warren, ohio, between 1899 and 1904.

The Connecticut-built Trumbull was offered to the public at $425 for the roadster and $600 for the coupe. The wheelbase was 80 inches, and the tread 44 inches. The car had a nine inch road clearance and weighed about 950 pounds. It was capable of a speed of 50 miles per hour.

Regular equipment included top and side curtains, adjustable windshield, electric lights (two in front and one at rear), electric horn under the hood, oil gauge in base of motor, jack, tire pump, tool kit, and storage battery for lights. Optional extra cost items included a spare wheel with hub cap and tire, #25; 60 MPH speedometer, attached when ordered with car, $20; dash auto clock, $5; and Ward-Leonard electric starting system, $75.

The motor was a vertical 4-cylinder L-head type, water cooled by the thermo-syphon system. Bore and stroke were 2 7/8 by 4 inches, giving a total displacement of 104 cubic inches. Horsepower rating was 14 to 18. The water jacket extended entirely around the cylinder and valve pockets, being so designed to operate without fan or water pump. Cooling was handled by a type R-300 McCord radiator, with a capacity of six quarts. The block held an additional six quarts, providing a total of three gallons of water for cooling. Lubrication was by pump and splash. The pump delivered oil to the two main bearings and the timing gears. The crankcase held six quarts, and was provided with reservoirs in the oil pan into which the connecting rods dipped. Ignition was by high tension magneto. This motor was designed by K.L. Hermann and manufactured by the Hermann Engineering Company of Detroit, Michigan, which devoted its entire time to its production.

The first cars produced were equipped with a friction transmission system, which was soon abandoned in favor of a sliding-gear transmission. The clutch was of the cone type, leather faced, 10 inches in diameter with a face width of $1\frac{1}{2}$ inches. The sliding gear transmission, with three forward and one reverse speeds, was assembled as a unit with the rear axle, which was a 3/4 floating type with bevel gears and Hyatt roller bearings in the hubs. Rear end ratio was 3.6 to 1. Brakes were internal expanding and external contracting on nine inch diameter drums, $1\frac{1}{2}$ inches wide.

The wire wheels were of quick detachable design so that all wheels were interchangeable, front and rear, without disturbing the axle bearings. Each wheel had 40 spokes, 5/32 inches in diameter and 10 inches long. The tire size was 28 x 3 U.S. clincher type.

The springing system consisted of one transverse spring in front, 30 inches long and 1 3/4 inches wide, and two quarter-elliptic springs at the rear, 28 inches long and 1 3/4 inches wide.

The gasoline tank was located under the cowl, providing gravity feed to the carburetor. Fuel capacity was seven gallons. Fuel consumption was claimed to be 35 miles per gallon.

The steering gear was of rack and pinion design, with a 14 inch diameter steering wheel. The front axle was forged I-beam construction, with replaceable bronze bushings in the steering arms and ball bearings in the front hubs.

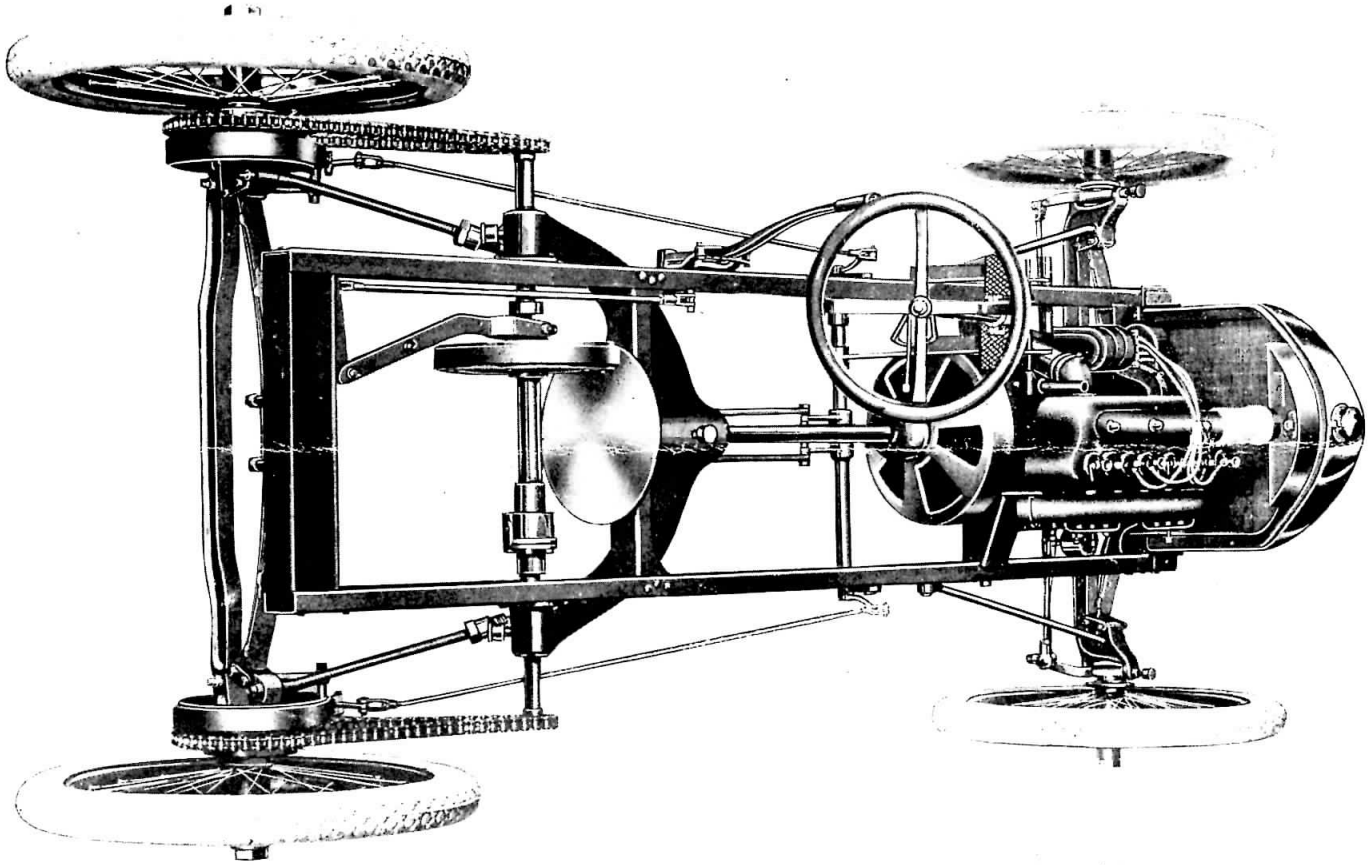
With wheels removed, 16 complete cars could be loaded into a standard automobile freight car for economical shipping.

The standard finish of these cars was black with nickel trimming, but for an additional $15 any color with striping to match could be furnished. Mr. A.H. Trumbull was unlike Henry Ford in that he believed that cars should be painted different colors to suit the choice of the buyer. His own car, in fact, was a speedster painted gray with red leather upholstery, red pin striping and red wire wheels, while his wife's car was a roadster painted canary yellow, with black upholstery and black wire wheels.

Both the roadster and the coupe had a rear storage compartment which when closed afforded a waterproof box for carrying necessary tools, etc., and when open could easily carry an additional 200 pounds, making the car useful for light package delivery work. The bodies were made by Hale and Kilburn, of Philadelphia, Pennsylvania.

Sales promotion for the Trumbull car in this country was alloted to county areas in each state, and dealers under contract were supposed to stay within their county boundaries. For each car under contract a $10 deposit was required with the order. For 50 cars $500 was needed, and for 100 cars, $1000. This deposit was refunded pro rata as the cars were shipped, and deducted from the invoices.

In one specific example, the factory offered two propositions to a tentative dealer in New Haven, Connecticut. The first was for a contract for 100 cars to be distributed in New Haven County, with sub-agents appointed in various towns and cities in the county. On a 100-car contract covering this county, the factory would allow a 20% discount on cars and 33 1/3% extra on equipment and repair parts. This discount was supposed to be sufficiently liberal to allow



CHASSIS OF EARLY MODEL, SHOWING FRICTION DRIVE MECHANISM.
(Picture from Trumbull brochure)

the dealer to sell to sub-agents at a 15% discount and still make approximately $20 per car.

The second proposal was for a contract of 50 cars to be distributed in the City of New Haven and vicinity. On such a contract the factory would allow a 17½% discount on cars and 25% on extra equipment and repair parts. The factory considered this to be a a very liberal proposition, for, in its opinion, 50 cars would not go very far in a city the size of New Haven.

There were approximately 2000 of these cars actually built. 1500 of them were shipped to all parts of Europe, and of that number, 300 to 400 went on to Australia.

In a letter written by A.H. Trumbull to his brother John, dated September 17, 1957, he states the following:

"We started the manufacture of the Trumbull car in Bridgeport in the latter part of 1913. This had a four cylinder motor with a friction drive transmission. After making about 300 of the friction drive type, we found this construction not to be practical, especially for quick starting, hill climbing, or pulling out of ruts, so we discontinued this model. During the early part of 1914 we began production again, using the conventional type of transmission and rear axle which proved satisfactory. We soon found, however, that the narrow gauge tread didn't go very well in this country, due to the condition of the country roads. Our next step was to try to create a market abroad, where

The following is a breakdown of the profit schedule that could be expected on the sale of the car under the two different plans:

Distributor's profit per car @ 20% discount	$85.00

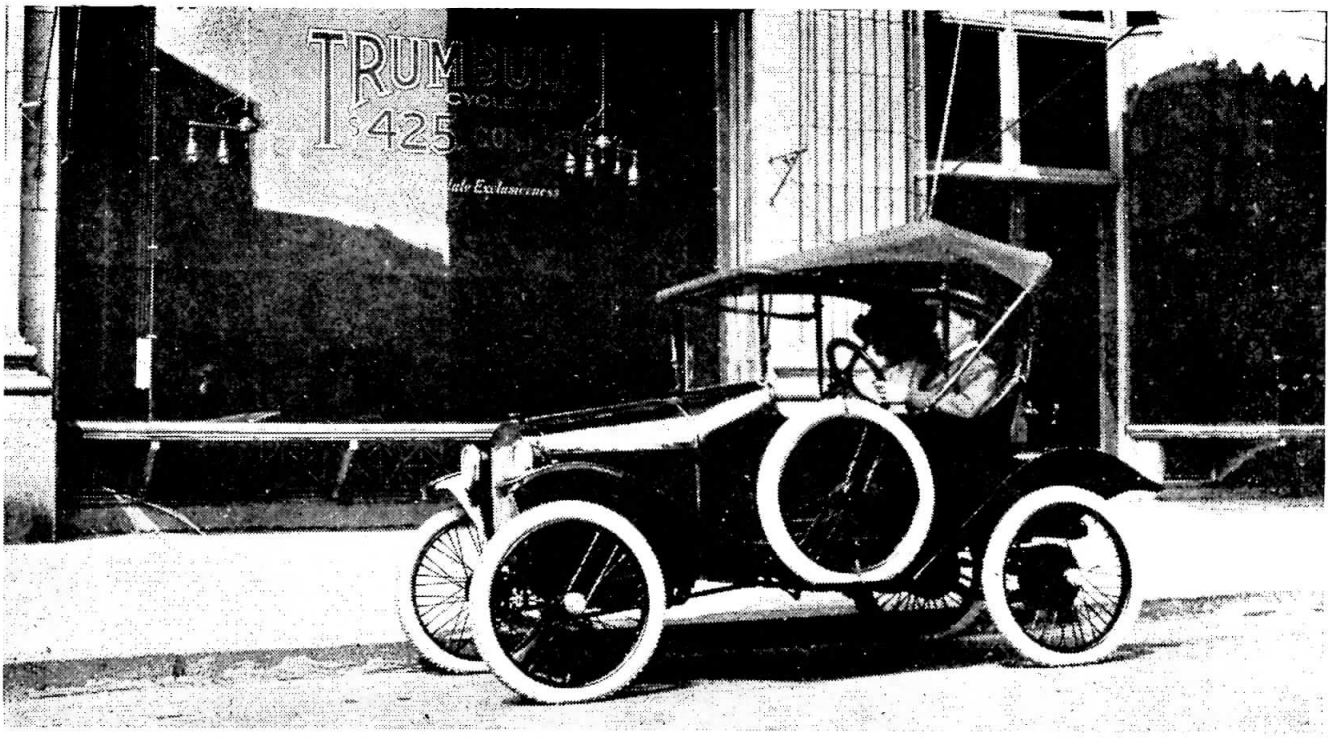
Extra Equipment

Wheel	Discount 33 1/3%	$8.33
Speedometer	Discount 33 1/3%	6.66
Clock	Discount 33 1/3%	1.66
Total per car sold		$101.65

Profit on cars sold through agents allowing 15% discount on cars and 25% on equipment.

15% on cars	$63.75	
25% on wheel	6.25	
25% on speedometer	5.00	
25% on clock	1.25	76.25
Profit on cars sold by agents		$25.40

In the July 11, 1914, issue of the Saturday Evening Post, The American Cyclecar Company ran a half-page ad in which 42 distributors and agents were listed, representing 26 different states from Washington to Connecticut.



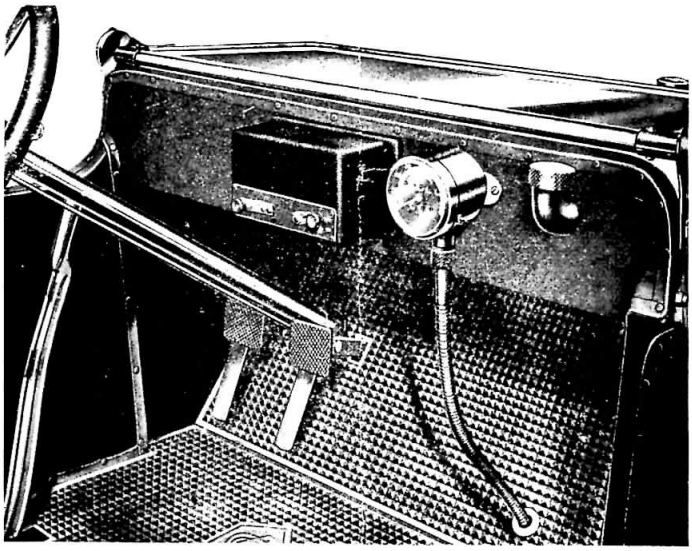
NEW YORK CITY SALESROOM OF THE TRUMBULL CYCLECAR, AT BROADWAY AND 68th ST. This photo appeared in Cyclecar Age, June, 1914. Note the slogan on the showroom window which reads, "The Car of Absolute Exclusiveness". This exact slogan had been used since 1912, and perhaps even earlier, by the Norwalk Motor Car Company of Martinsburg, West Virginia, to describe the huge Norwalk Underslung Six. Apparently the Trumbull people liked the sound of this phrase.

the narrow gauge tread was already accepted. It didn't take long before our car 'caught on' in England and we began receiving inquiries and sample orders from that country and other parts of Europe. At the beginning of 1915 we were turning out approximately 100 cars a month and were gradually increasing each month until May, when our business collapsed due to circumstances beyond our control. Up until that time about 95% of our cars were being shipped abroad. Shortly after the Lusitania went down, the government put an embargo on all shipments of pleasure cars abroad and that put us out of business. My brother I.B. was on the Lusitania, making a trip to England with a view of closing a deal with one of our distributors for 300 cars and was lost with many others. Obviously, that was the end of the Trumbull Car Co."

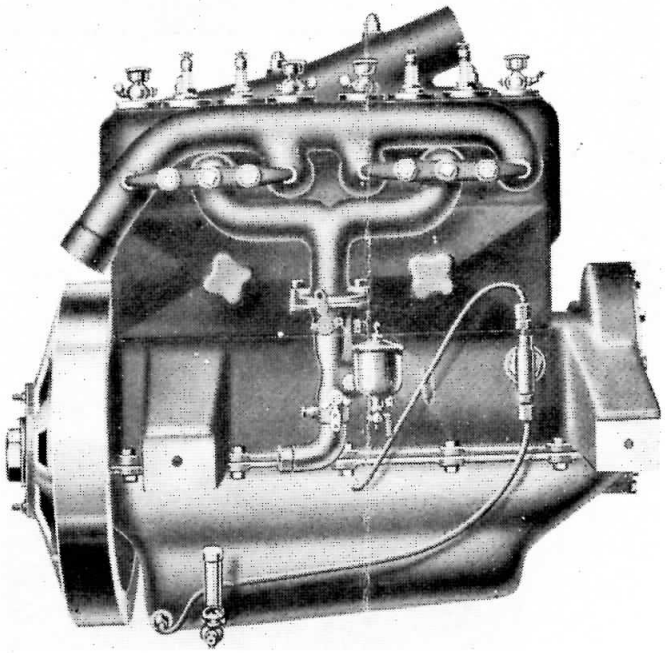
Incidentally, the 32,500 ton Cunard liner, Lusitania, was sunk in 302 feet of water, 11 miles off the west coast of Ireland by a German torpedo on May 7, 1915, and 118 Americans were drowned. Mr. I.B. Trumbull's body was recovered several weeks later and returned to this country. His body was identified by grandma Trumbull's brother, a Dr. Harper of Nottingham, England, by his signet ring. This sinking precipitated the entry of the United States into World War I.

Mr. A.H. Trumbull passed away in 1959 at the age of 81. The last direct descendant of thr Trumbull family is his daughter, Mrs. Harold Cruikshank, who contributed much of the information in this article.

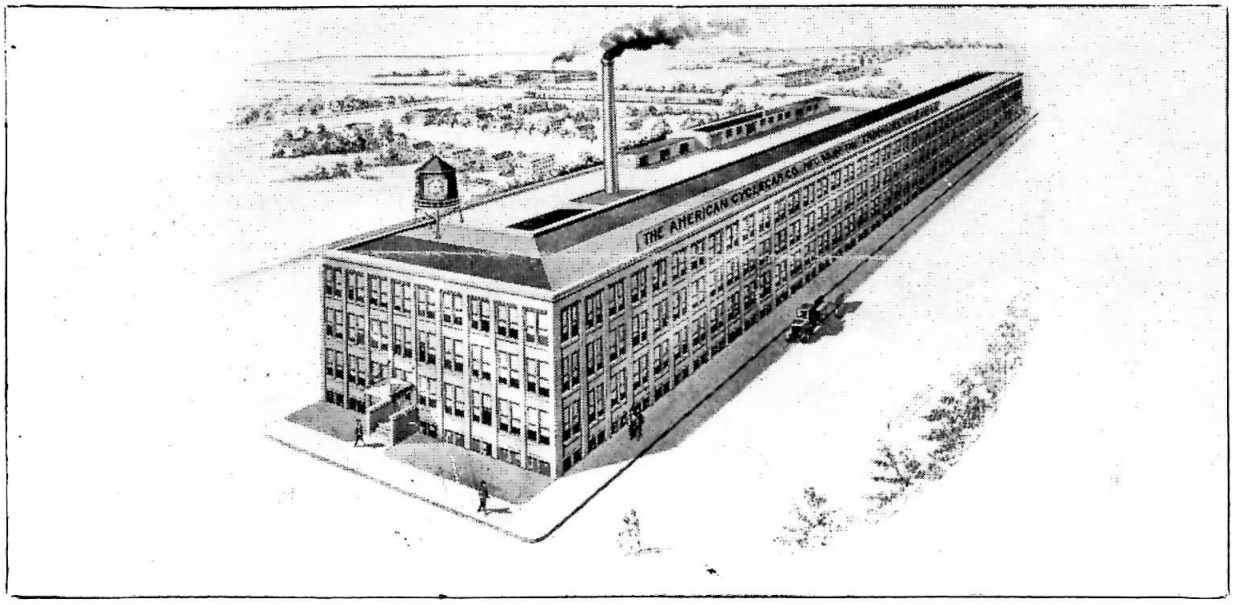
Below: Drawing of the Trumbull factory in Bridgeport as shown in an advertising brochure of 1914. Perhaps this large plant did exist, but it seems unlikely that it was there in the early days of the company's existence, or that such a large facility was needed to produce no more than four cars a day.



Dashboard and controls of the Trumbull Cyclecar



Trumbull engine, 2 7/8 x 4 bore and stroke, 18 H.P.



SOME NOTES ON THE NUMBER OF NEW MAKES OF U.S. AUTOMOBILES INTRODUCED EACH YEAR

by G. Marshall Naul

The new *Encyclopedia of American Automobiles, by* Nick Georgano, has provided more complete data on starting dates for U.S. cars than was obtainable from the original *Complete Encyclopedia of Motorcars.* The following is a summary in numerical and graphical form.

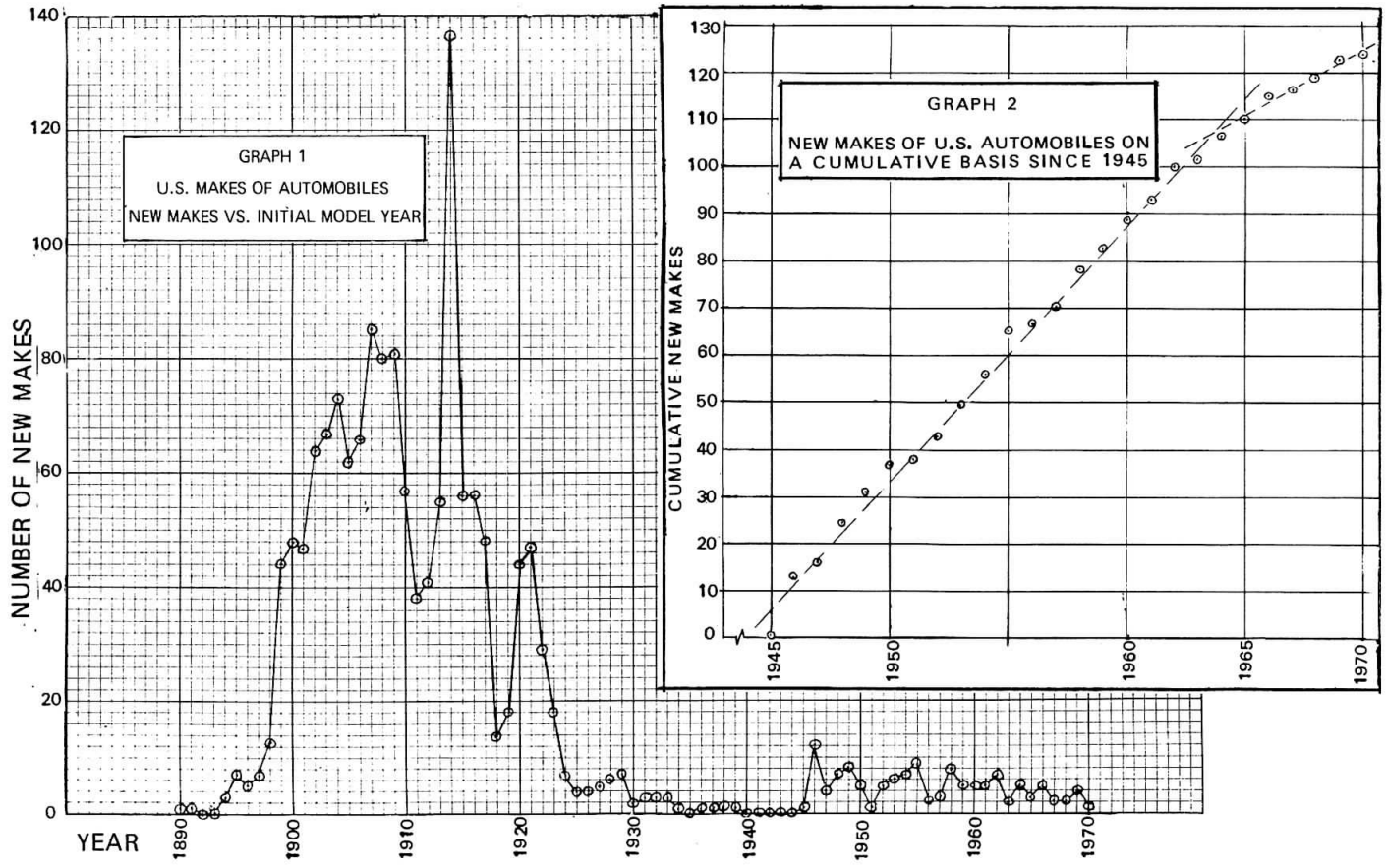
INITIAL MODEL-YEAR FOR U.S. AUTOMOBILES
Data from *Encyclopedia of American Automobiles*
(G. N. Georgano)

	0	1	2	3	4	5	6	7	8	9
189-	1	1	0	0	3	7	5	7	13	44
190-	48	47	64	67	73	62	66	87	80	81
191-	57	38	41	55	136	56	56	48	14	18
192-	44	47	29	18	7	4	4	5	6	7
193-	2	3	3	3	1	0	1	1	1	1
194-	0	0	0	0	0	1	12	4	7	8
195-	5	1	5	6	7	9	2	3	8	5
196-	5	5	7	2	5	3	5	2	2	4
197-	1									

The chart shows the number of new makes for each year from 1890 to 1970. There was some personal interpretation of the years in some cases, so others may find slightly different figures. It is quite possible, even probable, that there are some errors in the work used, but these would have little effect upon the trends as shown in the accompanying graphs.

The early years show an extremely rapid rate of growth for the new idea of the Horseless Carriage. The drop after 1909 was probably caused by the panic of 1908, and, of course, the "spike" at 1914 was due to the fantastic Cyclecar Bubble. The years of World War I and the depression of the 30's had an extreme effect on the introduction of new makes.

The post-World War II trend is shown in Graph 2. This is shown on a cumulative basis. The changes apparent from the graph are too subtle to show in the bare figures. This plot shows an apparent straight-line increase (additive) in the number of makes introduced from 1946 to about 1962. Since 1962 or 1963 there seems to be a change in the slope of the dats, indicating a reduction of the rate at which new makes were being launched. The average number of makes over the period 1945-1962 was 5.9 per year. Since 1963 the average has been 3.0. If this trend is continued, and there is no evidence of an expected change, it seems probable that we can expect fewer new makes to appear in years to come. In short, the boom is over.



THE STEARNS-KNIGHT MOTOR CAR
The Beginning Years
(through 1915)

This article appeared in the March, 1979, issue of "The Knight-Overland STARTER", which is published quarterly by the Willys-Overland-Knight Registry, Inc., and is reproduced here by permission. The author, Arthur Aseltine, is a member of SAH, and is also the W-O-K Registry's expert and technical advisor for Stearns motor cars.

by Arthur W. Aseltine

Frank B. Stearns first became interested in the power driven vehicle in 1893 at the early age of fourteen years when he attended the World's Fair. During his freshman year at the Case School of Applied Science his "desire to build and operate a motor-driven vehicle became strong." This desire, coupled with "the agitation in connection with the activities of Mr. Pennington in Cleveland with his motor bicycle," caused Stearns to quit school with "the ultimate aim of manufacturing of motor-driven vehicles as his business and life work."

A 2-HP steam plant and machine shop in the basement of his family home was established. In the fall of 1896 Frank B. Stearn's first car was actually completed. The car ran so successfully that his father advanced him $1,000.00 to establish a full-fledged machine shop in the big barn in the back of their yard.

The original design was a horizontal four-cylinder motor of 4-by-4-inch size. Because Stearns did not get all the four cylinders to work alike, the car as it finally rolled down the driveway was equipped with a single-cylinder motor of 4-by-6-inch size giving about six horsepower, chain transmission and valves operated by an eccentric with hit or miss spark. The mixture was prepared by allowing gasoline to drip on gauze and both governor and hand control were fitted.

The first marketable car was sold in the winter of 1898 and about fifty more were turned out in their old barn prior to 1900. Stearns kept no books and the office was in his hat. He devoted all his time to development work and had no amusements or pleasures outside of his work.

As soon as a company put a car on the market (that Stearns thought had merit), he would purchase a model of this car. He bought in turn a Duryea, a Haynes, a Winton, and an Apperson. This policy was pursued as long as Stearns was associated with the Company, to give his engineers and officials an opportunity to see what the other people were doing.

In its 1901 form the Stearns had one enormous cylinder (6¼-inch bore and 7-inch stroke) of 10-HP and wheel steering. By 1902 the Stearns had grown into a bonneted 20-HP double-opposed retailing for $3,000.00. The 1905 Stearns was altogether more European with its mechanically operated side valves, paired cylinders, and Mercedes-style radiator. A 40-HP four sold for $4,000.00.

By 1906 the Stearns 40-45 HP stock cars were accumulating an impressive number of victories of hill climbs and cup races, mostly in the hands of owners. Then, for the 1907 season, at the age of 27, Frank B. Stearns introduced the superb 30-60 HP four cylinder, which sold for $4,600.00, and the legendary 45-90 HP six, retailing for $6,250.00.

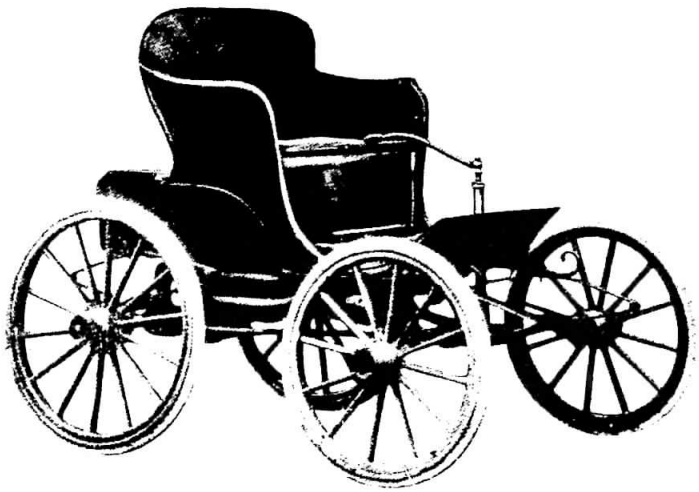
In 1907 the 30-60 had 19 important victories, during which it set three world's records. Frank Leland made one record by covering a mile in 41.4 seconds at Atlantic City. In 1908 the 45-90 won hill climbs in Cincinnati, New Haven and Pittsfield. It took first place in races at Baltimore and Brighton Beach. The Stearns was considered one of the fastest stock cars of its time. Barney Oldfield won one of the early Mount Wilson hill climbs with it, and Al Poole won the Brighton Beach 24-hour race with a Stearns in 1910.

It must be remembered that Stearns built only stock cars and "never built a special racer". What other car maker could advertise a "mile record of 41-2/5 seconds" in a stock car?

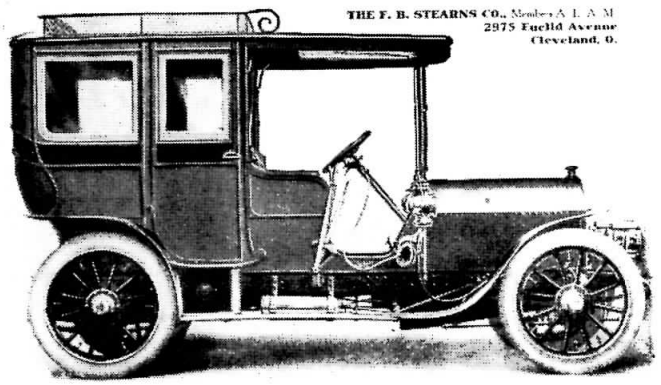
With these fabulous cars, considered by many as the "Best Stock Cars in the World," and the long list of impressive victories in races and hill climbs, why was it that Frank B. Stearns sent his Chief Engineer, James Gilman "Pete" Sterling, to England in 1909 to study the Daimler-Knight engine?

One must bear in mind that while studying the Knight-type motor, the F. B. Stearns Company was in the position of BUYERS, not SELLERS. They had everything to lose and nothing to gain if the motor failed to make good. Their engine was considered among the best in the world. They, too, had heard some of the criticism of the Knight-type motor and maybe more.

Before adopting the Knight-type motor the F. B. Stearns Company subjected test motors to severe test conditions. Sterling even built a new poppet-valve engine incorporating the latest in European and U.S. designs in an effort to match the efficiency of the Knight engine. During the two years they were experimenting with the Knight-type engine, they gave it



1896 STEARNS



1906 STEARNS

tests more severe than the average automobile owner ever conceived. The drivers of the test cars were given orders to "drive it to death". For two years they tried to kill it under harder conditions than the poppet-valve motor could stand, but instead it proved itself. It proved to them that no poppet-valve motor could be built that would show the efficiency of the Knight-type. Then the Stearns Company bought it.

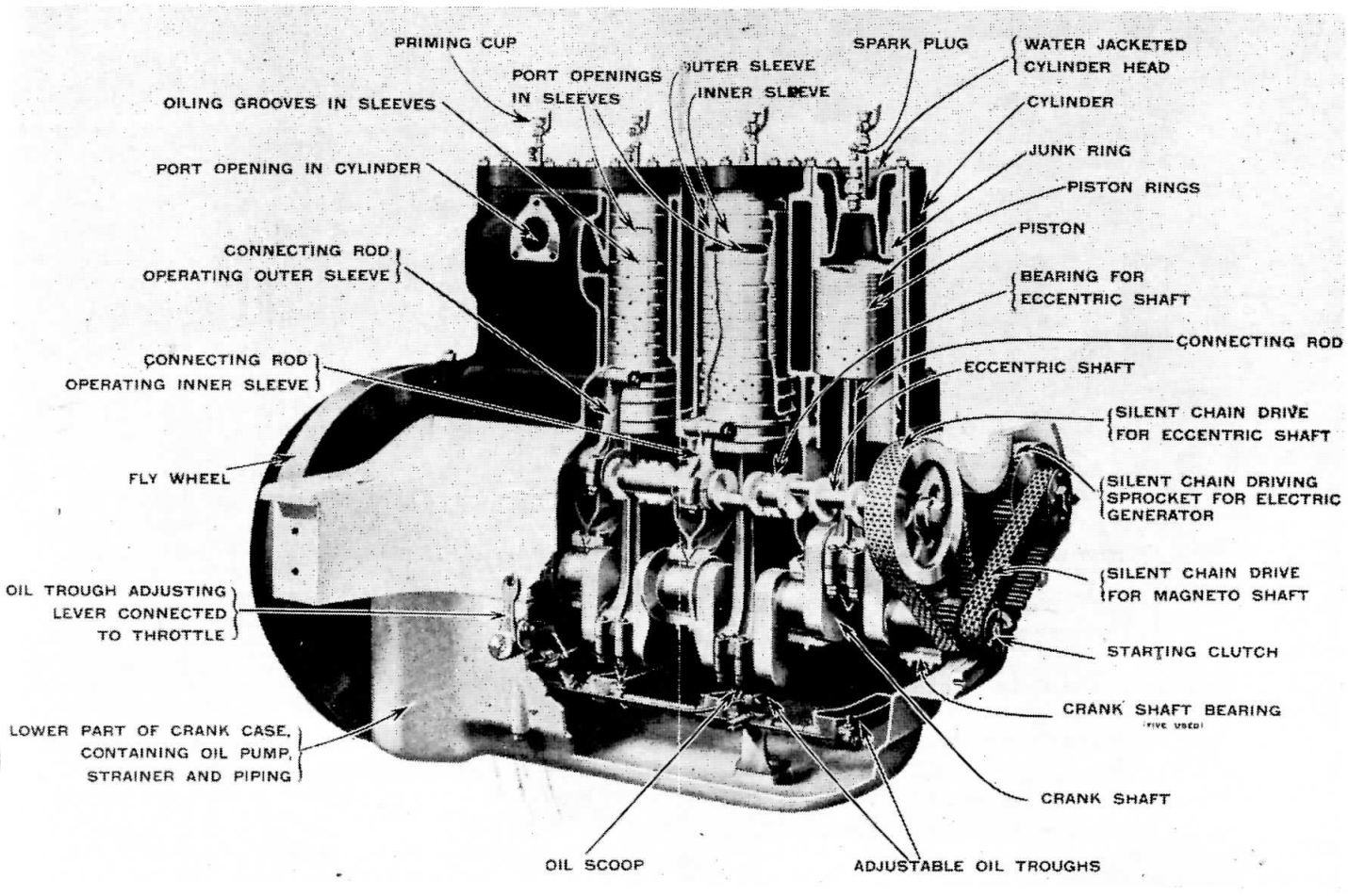
What is this engine that so captivated F. B. Stearns and Mr. Sterling, and proved to be so superior in the tests given it by the F. B. Stearns Company? What is this engine that remained so little understood or accepted not only then, but also today? It did work, and work well, in some of the finest automobiles ever built.

The sleeve-valve principle was invented by Charles Yale Knight, who had become disillusioned by the noise and frequent valve grindings inherent in his poppet-valve car. In 1902 he completed his first engine, a single-sleeve version. The double-sleeve type was completed in 1904 and first commercially demonstrated in the United States in 1905. Acceptance from auto builders was not forthcoming and, indeed, engineers ridiculed the invention as a "freak" as the engine combined principles with which they were not familiar. Knight decided to try the European manufacturers and finally, in 1907, the English Daimler Company at Coventry invited him to England and agreed to test the engine. After a year of testing, Daimler announced that they had accepted the engine for exclusive use in their cars, and the Daimler sales trebled. Licenses from the Knight and Kilbourne Patents Company were also awarded to the greatest manufacturers the automobile industry has ever known, such as the Rover Company in England, DMG (Mercedes) in Germany, the Minerva Company in Belgium, and Panhard et Levassor in France. Knight's engines had really been accepted.

The principle of the sleeve-valve engine is not unlike that of the sliding valves used in the steam engine. A general idea of the sleeve-valve principle can be perceived by picturing the moving parts of one cylinder of a Knight engine, consisting of a piston and connecting rod mounted on a crankshaft the same as a poppet-valve engine; two sleeves (each being in configuration like a large fruit juice can with no top or bottom) with one fitted inside the other and both being moved vertically, independently of each other, by small connecting rods affixed to the side-bottom of each sleeve and to an eccentric shaft (in lieu of a camshaft). Ports on two sides of each sleeve provide the valve openings.

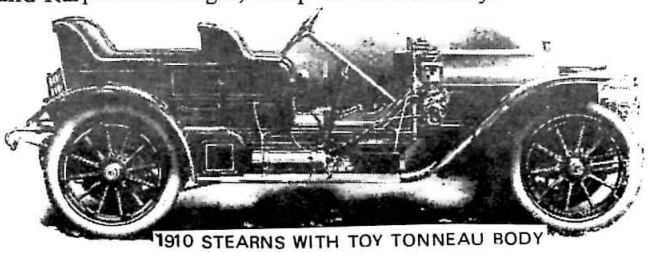
A cutaway view of an early Stearns-Knight 4-cylinder engine has been presented to provide a clearer picture of the sleeve-valve operation. The sleeves, with a stroke of about one inch, move in opposite directions. Valve action is created when the ports of each sleeve register with the ports of each other and the block ports. This results in a larger area of the valve ports and straight through flow design.

The eccentric shaft is driven by a silent chain from the crankshaft sprocket at one-half crankshaft speed. Each cylinder has an individual head, a deep-set spark plug, and a hemispherical combustion chamber. In addition to standard piston rings, there is a large junk ring and several small rings against which the inner sleeve seals at the top end. The sleeves have grooves and pinholes for oil flow between each sleeve, between the outer sleeve and the cylinder wall, and the inner sleeve and the piston. Valve timing is not different from ordinary poppet-valve timing. However, valve timing of the Knight engine is seldom if ever needed except at engine tear-down or chain replacement. Valve action is positive, being constant regardless of engine speed.



The Knight-type motor was considerably more efficient than the poppet-valve motor of the period. As a result, Stearns guaranteed their motor would develop 50% more power than that called for by the A.L.A.M. rating. The actual amount of power developed was considerably more than the amount guaranteed.

Some of the "Old Guard" who assisted Frank Stearns in the development of the Stearns-Knight motor cars were: James Gilman ("Pete") Sterling, the Chief Engineer who'd been with Stearns since 1902; J. V. Thomas the merchandising expert; James P. Johnson in charge of factory management; Clarence Putnam, engine manufacture; Martin Stanko, dynamometer room; A. R. Catto, chief draughtsman; John Burke, road test dept. foreman; T. A. Boyle, asst. Sales Manager; Martin Johnson, machine shop; L. J. Petrie, inspection work; Purchasing Agents H. B. ("Hall") & J. N. ("Jack") Fleming; and Ralph Stamberger, complete car assembly.



1910 STEARNS WITH TOY TONNEAU BODY

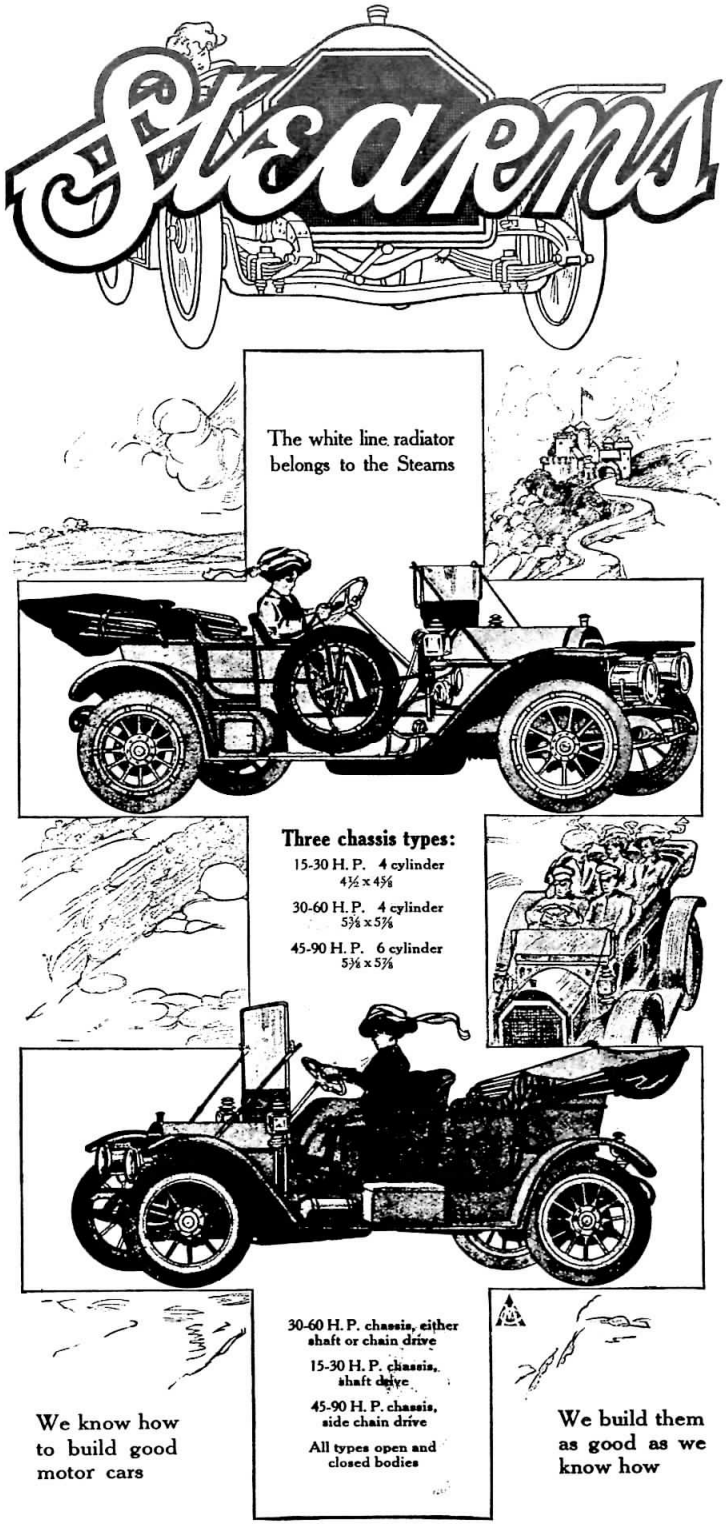
On July 1, 1911, for the 1912 model year, the F. B. Stearns Company introduced the first American Knight-powered production car. This 1912 Stearns-Knight four-cylinder replaced the lovely 15-30 HP model that had been first introduced in 1909.* The 30-60 HP model, offered in either shaft or chain drive, was continued through 1912, the 45-90 HP model having been discontinued after the 1909 model. Soon to follow suit were the Stoddard-Dayton-Knight, Columbia-Knight, and other very limited production cars. At this time, Knights were winning races and setting records in Europe. In the 1913 Indianapolis 500, a Mercedes-Knight, said to be a standard touring car with 9,000 miles on the chassis, finished fifth overall, with complete absence of pit stops excepting change of tires twice and a carburetor adjustment.

In the Tourist Trophy Race on the Isle of Man in 1914 the only complete team to finish was the Minerva-Knight team which finished second, third and fifth. Of the twenty-two cars starting the race (nineteen poppet-valve and three sleeve-valve) all three Knight engined cars finished while sixteen of the poppet-valve cars were out of the running because of mechanical troubles.

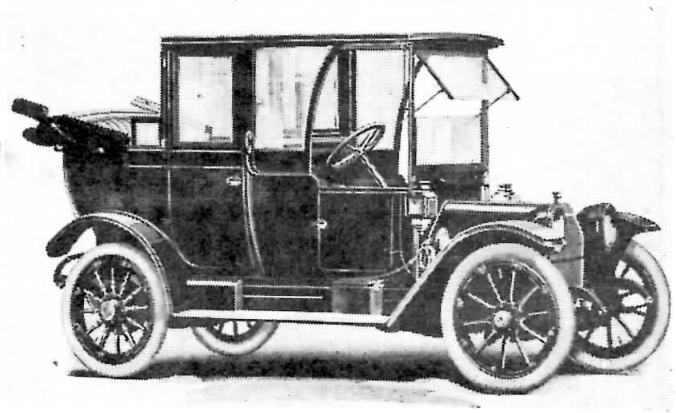
With the adaption of the sleeve-valve motor, orders for the 1912 Model Stearns-Knight doubled and doubled again. So great was the demand for the 1912 Model Stearns-Knight that Stearns was forced to secure another factory in addition to their own plants. In November 1911, Stearns leased a large part of the factory of the Royal Tourist Car Company while they erected new factory buildings of their own. Eight hundred and seventy-five serial numbers were assigned to the 1912 Stearns-Knights.

The first production car off the line in July 1911 was driven by Chief Engineer Sterling to establish a record: With five persons in the car, they left Cumberland, Maryland just at daybreak and drove to Cleveland, Ohio that night in time to see the sun drop into Lake Erie. They stopped the engine only to fill the gasoline tank at Wheeling. All this in the days of poor roads and no filling stations or garages.

The Stearns-Knight as offered for the 1912 selling season was very similar in the general design of the chassis to the 1911 15-30 Stearns except for the motor and its accessories. The motor, four cylinders cast in pairs, was of moderate size – 4¼ x 5½, 312 cu. in. four-cylinder and was rated by the A.L.A.M. at 28.9 HP.



*The author owns a 1912 Stearns-Knight touring car. It had been driven a verified 325,000 miles when sold by the original owner in 1940, and was the second owner's only car throughout WWII. The present mileage on the car and the original engine is approaching 400,000.



1912 STEARNS-KNIGHT LANDAULET

Every Stearns-Knight engine of that era was put on a test stand, run in and then torn down for examination and reassembly prior to being installed in a vehicle. It was the Company policy that the engine must show a minimum of the guaranteed 43 HP at the brake before it would be installed in the vehicle. Time after time in testing the motors, they actually showed far in excess of 50 HP.

Externally the Stearns-Knight motor resembled the proceeding Stearns motors, except that there were no valves, springs or stems. The engine drew its intake air supply through box beams within the crankcase, thereby cooling the main bearings, oil and crankcase and warming the air before it reached the carburetor. The carburetor, a specially designed Stromberg for this motor, was also equipped with a water jacket for additional heating.

The ignition was the usual Bosch Dual system. With a Bosch D-4 "Dual" high-tension magneto and a single set of spark plugs a double system of ignition was obtained.

Stearns dropped its ball bearing mains in favor of bronze-backed insert bearings. The 1912 "4" was equipped with 5 main bearings totalizing 14½ inches in main bearing length. The oiling system consisted of a pressure feed from a gear-driven force feed pump. The connecting rods dipped into an arrangement of individual troughs that were movable and capable of adjustment up and down in accordance with demand.

Gasoline was supplied from a pressurized 22-gallon tank in the rear. Pressure was supplied by a small piston air pump mounted on the crankcase and driven from the eccentric shaft of the motor. The tank was equipped with a reserve fuel supply.

A dry multiple disc clutch was used on all Stearns models. The clutch consisted of a comparatively small number of steel discs of large diameter. The driving discs were lined on both sides with an asbestos fabric, the alternate driven discs being of hardened and ground saw steel.

A propeller shaft with one universal joint transmitted the power from the clutch to the transmission which was placed at the rear axle. The transmission was of the selective type, giving three speeds forward and reverse. The shafts were mounted on ball bearings. The transmission and differential gears were enclosed in a cast case which was supported in the center of an open, truss-like portion of a solid, one-piece, forged-steel axle. The wheels were driven by floating shafts. A torsion tube extended forward from the transmission case to a pivoted yoke mounted on a cross member of the frame.

The wheels, front and rear, were 36-inch artillery type. Gilbert-type Continental Q.D. Demountable rims were regularly supplied as standard equipment. The brakes were both of the internal expanding type and acted directly on the rear hub drums. The foot brake was an expanding shoe on the inside of the outer drum, while the emergency was also an expanding shoe, in the inner drum, operated by a hand lever.

Models of the Kinght-powered Stearns offered in 1912 were all 4-cylinder and included a Toy Tonneau Runabout and Roadster on 116-inch wheelbases, a Touring Car, a Limousine and a Landaulet on 121-inch wheelbases. Prices started at $3,500 for the touring, runabout and roadster, $4,900 for the landaulet, and ran up to $5,400 if ordered with an extra body.

Standard equipment included Warner Auto-Meter, Banker Windshield, Vesta Electric Generator Lighting System, Bulb Horn, Klaxon Horn, Silk Mohair Top and Dust Cover, Continental Q.D. Demountable Rims fitted with 36 x 4½-inch tires all around including two extra rims and lugs, Muffler Cut-Out, Trunk Rack, Robe Rail, Footrest, complete tool and tire repair equipment. Firestone and Diamond Tires were optional. The front vestibule being fitted with doors was also optional.

Extras offered were a Storm Front, "V" Curtains, Seat Covers, Lamp Covers and a Chauffeur's seat on left running board on Toy Tonneau Models.

July 1, 1912, was the introduction date for the 1913 year model four-cylinder Stearns-Knight. August 15, 1912, saw the end of the Stearns-poppet-engine era with the introduction of the Stearns-Knight six cylinder, replacing the 30-60 HP model. Stearns thus completed its transition from the poppet-valve to the sleeve-valve principle.

The 1913 4-cylinder Stearns-Knight was similar to the 1912 Model. The motor and chassis being virtually the same while the bodies were of smoother lines. Nickel plating was used in lieu of brass trim and an American Ever-Ready Self-Starter No. 3 (Spring) was offered as standard equipment. One change, although not readily noticeable, was the switch from screw-base light bulbs to bayonet-base light bulbs (the screw base having a tendency to vibrate out of their sockets).

A 7-passenger touring and a 4-passenger light touring car were added to the models offered. A new and longer 127-inch wheelbase in addition to the 121-inch wheelbase was offered as an option on the 7-passenger touring, limousine, and landaulets. Tire size was increased to 37 x 5 on the rear of the 7-passenger touring, limousine, and landaulet. A Mea "Dual" magneto was used instead of the Bosch. And the "piece de resistance" was the addition of the standing Knight on the radiator cap. Prices of the 5-passenger touring car were increased to $3,750, and $5,100 for the landaulet.

Nineteen hundred and thirteen also brought the introduction of the first 6-cylinder Stearns-Knight. The "six" had few noticeable departures from the design of the four-cylinder chassis. The motor included an additional cast-in-pairs block unit similar to those used with the 4-cylinder. The bore remained the same as the "4" at 4¼ inches, while the stroke was increased to 5¾ inches, for a total of 489 cu. in. displacement, rated at 43.6 S.A.E. HP. The "six" differed mostly from the "four" in having a 4-speed, selective-type transmission mounted amidships, fitted with a Gray and Davis starting and lighting system, and had 37 x 5 tires all around. The same models of the six were offered as were offered for the four except the wheel bases were 134 and 140 inches respectively and prices started at $5,000 for the seven-passenger touring car. Only 412 serial numbers were assigned to the 1913 "four" cylinder and an even fewer 327 serial numbers assigned to the 1913 "six" cylinder.

The 1914 Stearns-Knight chassis was very similar to earlier models. Both the "4" and "6" were offered. The major changes were moving the drive to the left-hand side, moving the transmission admidships on the four with full floating

rear axle, and the incorporation of the European body styling with the hood smoothly blending into the body. The number of body styles offered was increased to include 5, 6, and 7-passenger touring cars, a 4-passenger light touring car, a 3-passenger roadster, a limousine, a landaulet, a sedan and a coupe on either the 4 or 6-cylinder chassis. The bulb horn was dropped and wire wheels were offered as an option. Production again dropped with the total number of "four" and "six" assigned serial numbers for 1914 being 700.

Acknowledging the rebellior against the horsepower tax in 1914, for the model year of 1915 the new Stearns-Knight "Light Four" (L-4) was introduced. This car was in addition to the larger four and six-cylinder models, which were continued. The new model was offered as a five-passenger touring car, a cabriolet and a limousine all on a single 119-inch wheelbase chassis with the touring car selling for $1,750. Production took a remarkable increase with 702 serial numbers being assigned to this new light car while the big "six" dropped to 109. (In 1916 almost 2100 of these "Light Four" cars were built).

Externally the power plant differed greatly from the past models and consisted of a unit power plant of four cylinders cast en-bloc with intake and exhaust manifolds cast integral, the cylinder heads being submerged, a leather-faced cone clutch, and a three-speed selective transmission. Internally the motor followed very closely the standard practice of Stearns-Knight design. The oiling system depended upon force feed through the counterbalanced crankshaft and connecting rods to the gudgeon pins. The bore and stroke of the motor was 3-3/4 x 5-5/8.

1913 STEARNS-KNIGHT ADVERTISEMENT

THE F. B. STEARNS COMPANY — A CHRONOLOGY

1896 - First experiments conducted by Mr. Frank B. Stearns, founder of the company.

1897 - Experiments continued. A number of patents taken out. First car constructed.

1898 - Improved and redesigned first model.

1899 - Built larger range of models. Increased size of motor.

1900 - Moved into new factory. Steady increase in production.

1901 Brought out largest single-cylinder motor ever built in this country; 6¼ inch bore x 7½ inch stroke.

1902 - Produced two-cylinder model. One of the first American cars to use sliding gear transmission.

1903 - Increased output. Took perfect score in famous Pittsburgh-New York "Mudlark" run.

1904 - Produced four-cylinder model. First American car to use magneto.

1905 - Adopted I-beam axle, pressed steel frame and other notable improvements. First American car to use four forward speed transmission.

1906 - Built largest American four-cylinder model ever produced at that time. Cylinders 4 7/8 x 5 7/8 inches. Established a number of American records.

1907 - Produced 30-60 H.P. model, one of the most famous cars ever built. Established a number of world records.

1908 - Brought out 45-90 H.P. car, highest powered six-cylinder model ever constructed up to that time. Established more world records.

1909 - Produced 15-30 H.P. model - one of the most successful medium-sized high grade cars ever built. First American car to adopt demountable rims as standard equipment. Enlarged factory.

1910 - Established world's 24-hour record on mile dirt track - 1253 miles.

1911 - Moved into new factory buildings.

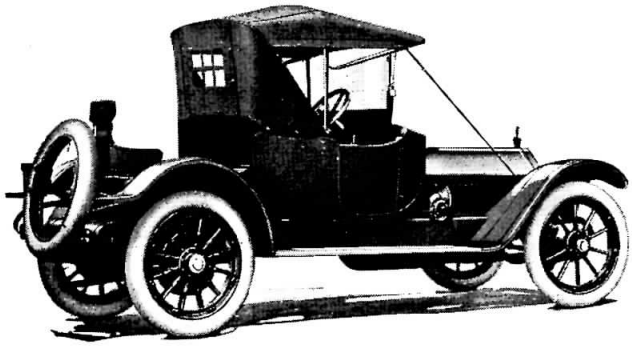
1912 - Adopted the Knight-type sleeve valve motor, the first American car to build this type of engine, and the only one using it exclusively. The greatest year's business in the history of the company. Doubled size of factory.

1913 - Four-cylinder model continued, and six-cylinder model added..

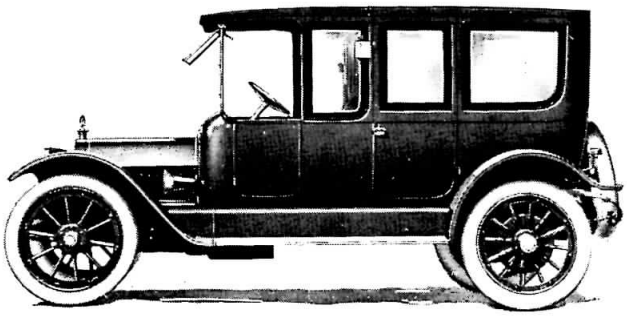
1914 - The new "Light-Four" Stearns-Knight introduced; heavier four and six cylinder models continued.

1915 - The six cylinder and heavier four cylinder models discontinued.

1916 - The Knight Eight introduced.



1913 Stearns-Knight 6 Cylinder Roadster



1913 Stearns-Knight 4 Cylinder Limousine

The starting and lighting of the car was by the new Gray and Davis two-unit system. Ignition was by magneto only, the Bosch high-tension system being employed (the Big-4 and the Six having returned to the Bosch Dual). The rear axle was of a very interesting design, being pressed steel from wheel to wheel. The rear springs were of the cantilever type.

(This L-4 with its 3-3/4 x 5-5/8-inch motor was to become the main offering of the F. B. Stearns Company through the war and it almost became lost in the dust of the big 6's and 8's of the period.)

In his letter written in 1915 to David Beecroft at "The Automobile", Frank B. Stearns summed up his situation in one sentence, to wit: "I believe at the present time, ours is the only concern, with possibly one exception, in which the founder has been President and in active charge of the management since the inception of the automobile industry, and believe I am the oldest executive in point of automobile experience that is actively engaged day-after-day in the industry, and at the same time the youngest man in years who is President of a company in the automobile industry, having just passed my thirty-fifth birthday."

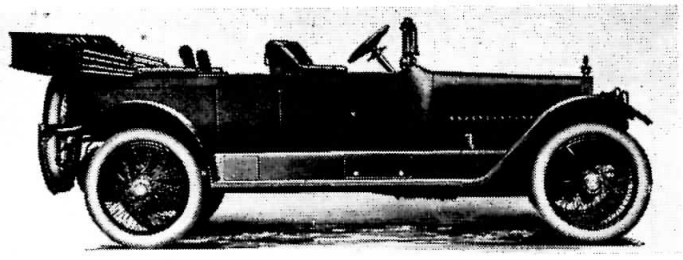
The Stearns was no longer winning road races or hill climbs and other manufacturers were producing large, noisy, more powerful engines. The Stearns engine was a quiet, efficient engine that did its job better than most. It should be mentioned that cars equipped with this type motor were everywhere the choice of Kings, Emperors, Governments – those accustomed to the best the world affords.

In an advertisement in the October 20, 1917 issue of "The Saturday Evening Post," Stearns stated that they didn't know of a single Stearns built Knight engine that had worn out, but do know of Stearns cars that have been driven 100,000 miles and more and are still giving satisfactory service."

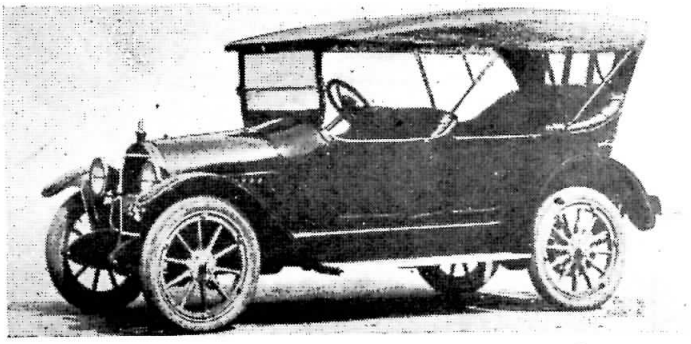
In 1915 Willys-Overland Company introduced the Willys-Knight. At this point in time the only relationship between the Stearns-Knight and the Willys-Knight was the fact that they both used the Knight patented motor.

A V-8 Sterans-Knight engine was introduced for the selling season of 1917, and F. B. Stearns sold his interest in the Stearns Company in 1918 and retired to his research laboratory to work on Diesel motors. These are all items for additional articles about the post 1915 history of the Stearns-Knight. The F. B. Stearns Company also produced trucks of various sizes during the pre-1916 era; however, commercial vehicles have purposely been deleted from this article, as a subject of future research and articles.

I wish to extend my extreme gratitude to the late Dr. Alfred S. Lewerenz, Research Historian, Horseless Carriage Club of America, for his generous help in furnishing and guiding me to reference materials. I also wish to thank Charlie Weaver, Past National Director of WOKR and all others who helped me in the preparation of this article.



1914 Stearns-Knight 6 Cylinder 7 Passenger Touring Car



1915 Stearns-Knight Light Four Touring Car

SERIAL NUMBERS AND SPECIFICATIONS OF STEARNS-KNIGHT CARS, 1912 TO 1929

MODEL	SERIES	SERIAL NUMBERS	MODEL YEARS	CYLS	BORE & STROKE	HP	WHEELBASE	INTRODUCED	DROPPED
"Four"	SK-4	5000 to 5875	1912	4	4 1/4 x 5 1/2	28.9	116/121/127	7/1/11	
		6000 to 6412	1913					7/1/12	
		6500 to 6800	1914						
		7000 to 7039	1915						
"Six"	SK-6	8000 to 8327	1913	6	4 1/4 x 5 3/4	43.6	134/140	8/15/12	
		8328 to 8728	1914						
		9000 to 9109	1915						
L	L-4	L1 to L702	1915	4	3 3/4 x 5 5/8	22.5	119		
	(Light 4)	L703 to L2800	1916						
		L2801 to L4744	1917						
		L4745 to L5901	1918				119/125		
		L5902 to L7102	1919				125		
		L7103 to L10952	1920						
		L10953 to L13999	1921						
		L14000 to L14693	1922						
		L14694 to L1503	1923						
"Eight"	SK-8	10000 to 10900	1916	V-8	3 1/4 x 5	33.8	123		
		10901 to 12078	1917						
		12079 to 12350	1918						
		12351 to 12403	1919						
S	"Six"	S1 to S1753	1923	6	3 3/8 x 5	27.5	130	Mid-1922	
		S1754 to S2692	1924						
		S2693 to S2905	1925						
B	B-4	B1 to B1213	1924	4	3 3/4 x 5 5/8	22.5	119		
	(Big 4)	B1214 to B1315	1925						
		B1316 to B1393	1926						
C	6-75	C1 to C1249	1925	6	3 1/4 x 5	25.4	121	10/24	
		C1250 to C1808	1926						8/26
S	6-95	S2906 to S3399	1925	6	3 1/2 x 5	29.4	130	Prior to '25 NY Show	
		S3400 to S4460	1926						8/26
D	6-85	D1 to D433	1926	6	3 1/2 x 5	29.4	137	9/26	
F	6-85	F600 to F1089	1927	6	3 1/2 x 5	29.4	137	Prior to '27 NY Show	
		F1090 to F1541	1928						
G	8-85	G1 to G338	1927	8	3 1/2 x 5	39.2	137	1/27	
		G339 to G641	1928						
H	Deluxe 8-90	H15650 to H15695	1928	8	3 1/2 x 5	39.2	137	1/28	
		H15696 to H15976	1929						12/20/29
J	Deluxe 8-90	J11650 to J11772	1928	8	3 1/2 x 5	39.2	145	1/28	
		J11773 to J12037	1929						12/20/29
NOTE: All "J" models have "H" motor numbers.									
M	6-80	M21550 to M21571	1928	6	3 3/8 x 4 3/4	27.54	126	4/28	
		M21572 to M22610	1929						12/20/29
N	6-80	N51550 to N51594	1928	6	3 3/8 x 4 3/4	27.54	134	4/28	
		N51595 to N52127	1929						12/20/29
NOTE: All "N" models have "M" motor numbers.									
TOTAL PRODUCTION: 31,907									

TWO CARS COMPARED

By Maurice Harrison
Hayes, Middlesex, England

My interest in the Horseless Carriage goes back as far as I can remember, and through the years this has caused me to make notes about the many and varied motor vehicles I have been fortunate enough to see and examine. As time went by I was able to test different vehicles from many lands, and these tests resulted in more notes (which were quite elaborate against my earlier ones) which, at the time of writing, were for my own use and pleasure. Never did I think that my childish writings (and my later test notes) would be of use to others.

On going through my notes written in 1929 I came across descriptions and test details of two very interesting cars, one built in Britain and the other in the United States, which are now the subject of this short write-up; they were an Austin 16-6 and a Willys-Knight 20.7 Six, both of which were almost new machines at the time of testing. These automobiles were representative of middle class machines from both sides of the Atlantic, the Austin being quite a popular British make; the Willys-Knight was a very fair counterpart from the States which had staunch adherents in many lands. Both makes had robustly-built, long lasting engines; the crankshaft of the Austin was carried in eight main bearings and that of the Willys in seven. The British car had side valves and the American, with its Knight engine, had sleeve valves. The engines were smooth-running and silent, and both developed high torque at low speeds.

The Austin and the Willys-Knight were timed (several times) up a long and severe gradient, and their speeds were found to be almost identical. This is an interesting point, for the final drive ratios of both machines were almost identical.

Body work of both machines was good but the American body was slightly lighter. Both cars had deep, comfortable upholstery (real leather) which compared well with that found in much more expensive cars. The Austin had independent front seats, both of which were adjustable. The Willys-Knight had a bench-type front seat which was adjustable.

Both cars were equipped with semi-elliptic springs all around. Those on the Austin were interleaved with strips of zinc; with efficient shock absorbers the suspension gave real comfort with first-class road holding. The Willys-Knight suffered with somewhat poorer suspension with its single acting shock absorbers which did not provide sufficient control at high speeds.

Both cars had very good brakes which consistently gave top results (stopping distances were 35 feet from 30 miles per hour) under all kinds of weather conditions. The brakes on the Austin's front wheels were actuated by push-rods through the king pins, and were unaffected by the steering being at full lock.

The two cars had good steering gears; the Austin had slight caster action. The Willys had no caster action, its wheel having to be straightened up after going through a curve.

Both cars had throttle and ignition levers above the steering wheels; those on the Austin were large and ungainly and the Willys levers were small and particularly neat; the horn button on the American machine was in the center of the steering wheel and the English machine had a horn-ring below the steering wheel.

Instrumentation of these automobiles was fairly complete, both vehicles having speedometer, clock, ammeter, oil pressure gauge, lighting controls and choke.The Willys-Knight had, in addition, a very accurate water temperature indicator. As with the typical English car of the time, the Austin had its instruments (with dials of different sizes) mounted individually on a wooden panel, But the Willys-Knight had balanced dials symmetrically arranged in a panel which was very pleasing to the eye.

Acceleration figures for the Willys-Knight were definitely better than those for the Austin, but the maximum speed for the former (under the best conditions) was only 58 miles per hour. The Austin speedometer was calibrated up to 60 miles per hour but the needle could be taken right past this figure as the car was capable of a genuine 64 miles per hour against a stop-watch. Both cars cruised comfortably at 45 miles per hour and were able to hold this speed for long periods without any sign of distress.

The overall fuel consumption figures for the Austin and the Willys-Knight were almost identical, although when carrying out acceleration and maximum speed tests the American machine was slightly thirstier.

These tests, when carried out more than 50 years ago, were most interesting at the time. Now re-read and compared they are still of interest, and, as details of the cars may be of interest to others, they have been tabulated below:

DETAILS	AUSTIN 16-6	WILLYS-KNIGHT 20.7
Year	1929	1929
Number of cylinders	Six	Six
Cylinder bore	65.5mm	74.6mm
Piston stroke	111.0mm	98.4mm
Cubic capacity	2249 c.c.	2670 c.c.
Rated horsepower	15.9	20.7
Valves	Side	Sleeve
Cooling	Pump and fan	Pump and fan
Lubrication	Full pressure	Full pressure
Ignition	Coil and battery	Coil and battery
Clutch	Single dry plate	Single dry plate
Number of speeds	4F and 1R	3F and 1R
Forward gear ratios:	1st - 19.8-1	1st - 18.52-1
	2nd - 12.0-1	2nd - 9.41-1
	3rd - 7.9-1	Top - 5.11-1
	Top - 5.12-1	
Final drive	Spiral bevel	Spiral bevel
Brakes	Mech. 4-wheel	Mech. 4-wheel
Springs, front	Semi-elliptic	Semi-elliptic
Springs, rear	Semi-elliptic	Semi-elliptic
Wheelbase	9 ft. 4 in.	9 ft. 4½ in.
Track	4 ft. 8 in.	4 ft.8 in.
Tyres	30 in. x 5 in.	29 in. x 5.5 in.
Weight of sedan	26 cwt., 3 qrs.	26 cwt.,0 qrs.
Top gear acceleration	10-30 mph = 13 sec.	10-30 mph = 11 sec.
3rd gear acceleration	10-30 mph = 9 sec.	(2nd) 10-30 mph = 6 3/8 sec.
Brake test	35 ft. from 30 mph	35 ft. from 30 mph
Overall length of car	13 ft., 8 in.	13 ft., 5 in.
Price in Gt. Britain	£ 375	£ 350

It is hoped that this short write-up will give readers an outline of the matched performance and value for money offered by these two cars. Both Austins and Willys-Knights had very good reputations in the countries of their origin, and were looked upon with great esteem in Africa, Australia, China, India, New Zealand and elsewhere for they were, no doubt, very good cars which operated well under the most arduous conditions.

Old readers will remember these cars, but those of a younger generation may know these two types through books or periodicals. As this note is only an outline of a very small part of the Austin and Willys-Knight story, I sincerely hope that readers may find it to of some interest, for it is written for both young and old alike.

EDITOR'S NOTE: The Willys-Knight 20.7 was known in the United States as the model 70B. The British designation of 20.7 is the formula-based taxable horsepower. The actual brake horsepower of the W-K engine was claimed to be 53 @ 3000 RPM.

AUTOMOTIVE HISTORY *Displayed*

THE REYNOLDS MUSEUM

The Reynolds Museum is located in Wetaskiwin, Alberta, Canada, on Route 2A. Wetaskiwin is about 140 miles north of Calgary, or nearly 300 miles north us the U.S. (Montana)-Canadian border.

The museum comprises one of the world's largest collections of antique automobiles, trucks, tractors, airplanes, fire engines, steam engines, buggies, carriages, sleighs, motorcycles and bicycles. Also, in addition to these transportation items, there is a large display of machinery, weapons, household furnishings, antiques and relics.

The transportation museum has a collection of approximately 1000 automobiles and trucks, of which 100 to 200 are on display. More than 150 makes are represented, many of which are extremely rare and not likely to be found in other collections. Among the oldest cars are an 1899 Innes, a Mason Steamer of 1900, a Milwaukee Steamer, 1900, a 1902 Walton, and a 1908 Menard - the only one known to exist.

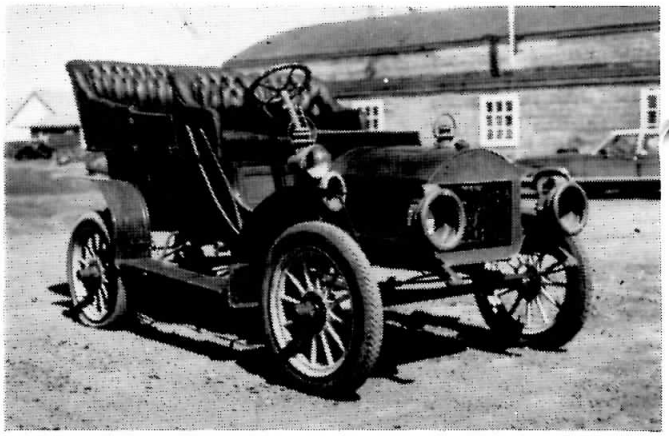
The museum is open daily, May 1st to October 1st, from 10 A.M. to 5 P.M. Admission charges are: Adults, $2.50; Children, $1.00; Children under 6, free. Special rates are available for clubs and groups. For further information write to:

The Reynolds Museum
Box 728
Wetaskiwin, Alberta T9A 1X7
Canada

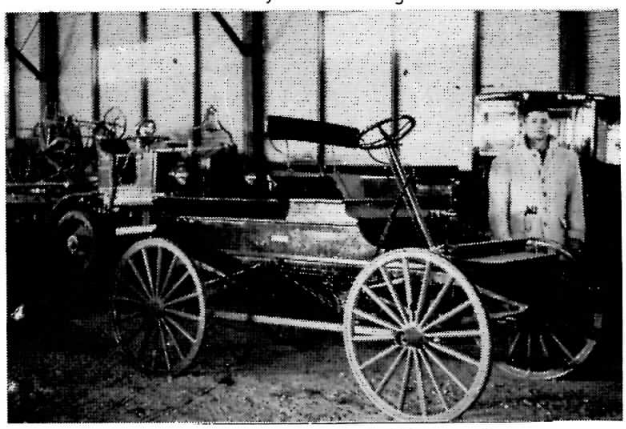
Telephone (403) 352-6201

All of the Automobiles pictured here are owned by the Reynolds Museum, Wetsakiwin, Alberta, Canada, and are a small sample of the hundreds of cars to be seen there.

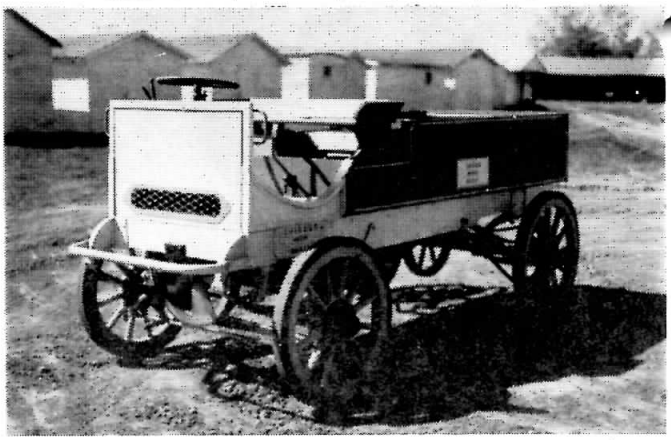
1901 Queen Stanhope



1905 Wayne Touring Car

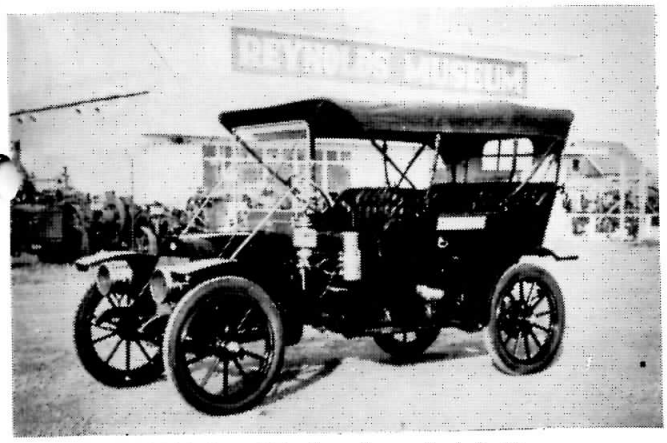


1909 Tudhope-McIntyre Delivery Wagon



1910 Chicago Motor Wagon (2-cylinder Truck)

1910 Stoddard-Dayton Roadster

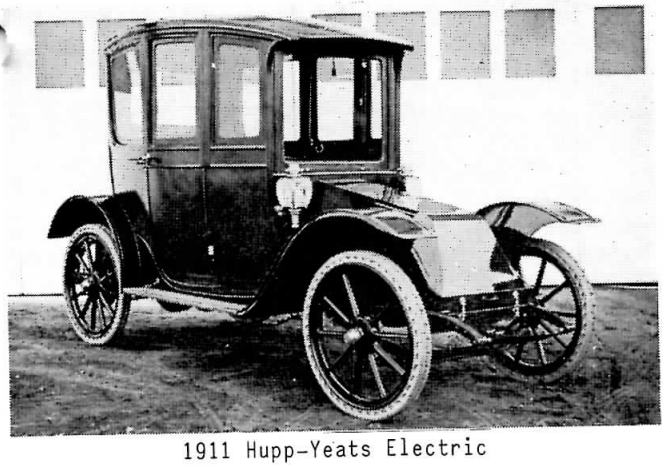


1910 Everitt Touring, Model 30

1911 Franklin Touring, Model M

1911 Overland Touring, Model 51

1912 American-LaFrance Aerial Ladder Truck



1911 Hupp-Yeats Electric

1917 National V-12 Phaeton

1912 Jackson Touring, Model 32

1908 Menard Auto Buggy, a sole survivor

UNLISTED ANGELINOS

by J. H. Valentine

There were many autos built in Los Angeles in the early days which do not appear in present-day lists, usually one-only experimental cars or prototypes. Many were homemade and not adaptable to production, often intended only for the builder's personal use.

In 1900 a Los Angeles bicycle and motorcycle dealer, Ralph C. Hamlin, built himself a buckboard type auto, using a three horsepower, one cylinder motorcycle engine using belt drive, later converting it to include a more traditional clutch and transmission. Hamlin soon became a well-known local motorcycle and auto racer, as well as a Franklin auto dealer. His early car was still in use in the Pasadena area in 1906.

Oscar Werner, proprietor of the Golden State Garage and also in the auto rental business, had built a prototype three-wheeled delivery vehicle called the GREENDUCK. The single wheel was at the rear, providing both steering and power. The operator sat directly ahead of the rear wheel, with either payload or two passengers riding in front. The rear wheel of this tricar had much trouble negotiating streetcar tracks, much to the builder's despair.

Frederick B. Stamm of Los Angeles built his first auto in 1901, a plain-looking two passenger chain drive vehicle with many innovations. The single cylinder four horsepower engine was coupled with a two-speed planetary gearset in a three-point mounting. The body was mounted using a double three-point method, but Stamm experienced difficulties with control linkage flex, so the body was eventually converted to conventional mounting. The auto saw regular service for years, still able to climb the San Gabriel Canyon grade in 1906.

Fred Stamm, along with Godfrey T. and George T. Stamm, had opened the Los Angeles Automobile Company, a retail auto firm, about 1902. In its shops, in 1905, George built an atteactive five-passenger, long wheelbase touring car of 40 horsepower. This vehicle was quite a contrast to the Fords they were then selling. The engine was $4\frac{1}{2}$ inches square, four cylinder, two cycle, air cooled, with dual carburetors, one for the front two cylinders, the other for the rear two. George felt the engine had sufficient power to be able to run on only the front two or rear two cylinders alone when not under heavy load. He said that this gave his two-speed transmission four speeds forward when needed by the driver. The engine had high compression and dual exhausts, and would operate on gasoline, kerosene or alcohol with only minor carburetion adjustments. Drive was shaft to bevel gears, ground clearance was only nine inches and the complete car weighed 1600 pounds. George was said to be at work on a second car late in 1905, featuring friction transmission and greater ground clearance.

Machinist William J. Wilkinson of Los Angeles built himself a trim four-cylinder, two-passenger auto during his off hours at the Johnson Machine Works. The builder put much time and attention into the chassis and steering design, hoping to have a good-handling racer as well as an auto to drive to work. The machine featured narrow tread and his specially designed steering for easy everyday use in the city streets. Its speed of 40 miles per hour was quite sufficient when he first drove it in 1904.

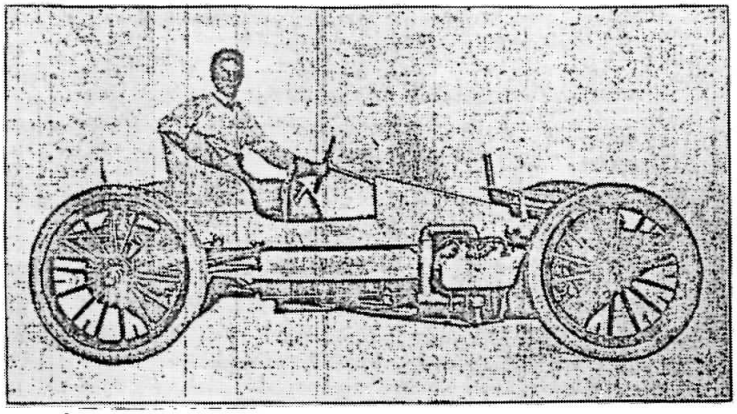
H.H.Custead, of suburban Whittier, California, began working at home on his light two-passenger auto in 1905, spending two years and trying several designs before proceeding with one that was feasible. Its proprietary engine was a one-cylinder air cooled unit using Mr. Custead's own lubrication system. He wrapped the cylinder with wire gauze which was connected to a "radiator" to increase heat dissipation. The engine fed power through a two-speed planetary transmission, batteries were beneath the seat, and the entire vehicle weighed but 440 pounds. Fuel mileage was above 30 miles per gallon and its top speed of 35 miles per hour was considered adequate for its intended inter-urban use. It had run several thousand miles by the end of 1907 with no repairs required.

In 1906 Royal H. Crist of Los Angeles began building a two-passenger roadster of his own design. Mr. Crist had been secretary of the Western Iron Works, a firm that manufactured engines, machinery and also from 1900 to 1902 claimed to build autos before turning to a temporary alliance with the Winton factory. A blacksmith aided Mr. Crist in fabricating many of the parts, notably the forged steel frame. All body and fender parts were hand-forme The 30 horsepower engine and three speed transmission were proprietary, but used a clutch lever system of Crist's own design. A single coil with distributor provided the spark, the radiator was quite large, and wheelbase was 100 inches. The auto was geared for hill-climbing in the downtown Los Angeles area, yet was capable of 55 miles per hour on a level road. The car was so well liked by Dr. William J. Hayden of Los Angeles that it was purchased by him from Mr. Crist shortly after its completion in late 1907.

THE STEWART-GARBUTT RACER

The 1904 Stewart Garbutt Racer was built in the shops of Alfred C. Stewart at 1008 South Santee Street in downtown Los Angeles. The concept of the auto was determined by its buyer, Frank A. Garbutt of Los Angeles. He was president of the Loma Oil Company, but the racer was intended for personal use rather than advertising purposes.

Garbutt was a local amateur racer of repute, having successfully campaigned a White Steamer the previous season, setting many west coast records in the process, regularly beating West Coast White distributor Charles A. Hawkins own machine. Garbutt was also interested in yacht racing, often giving up the auto for the boat, then the boat for the auto.



This picture of the Stewart-Garbutt Racer, with John Pierson at the wheel, was made from the microfilm files of a February, 1906, edition of the Los Angeles Examiner. The torque generated by its 796 cubic inch engine must have been enormous, for with engine speed governed to 350 RPM, the car was capable of speeds well in excess of 60 miles per hour.

The racer was almost totally composed of special parts and components, with the actual design by Stewart and his staff, including Addison L. Banks. Alfred Clement Stewart had come to Los Angeles from his native Santa Clara two years previously to set up his automobile machine works. He had tinkered with auto designs earlier, but felt his chances were better in a larger city.

The engine for this racer was a new design, a four-cylinder flat opposed layout. It was a four-cycle with $6\frac{1}{2}$ inch bore and 6 inch stroke, yeilding 796 cubic inches. It had low compression, as it was intended to operate at a very slow 250 RPM, with a governor limiting it to 350 RPM. It had automatic spark advance, and the radiator for this giant water-cooled engine was constructed of copper, with much copper gauze used to dissipate the heat. The planetary transmission has two speeds forward and one reverse, with shaft drive to the bevel gear differential. The chassis had long, soft springs and rode on 34 inch wheels running on roller bearings and carrying $3\frac{1}{2}$ inch G & J tires. Wheelbase was 96 inches and weight 2075 pounds. The car was designed to conform to the Class B requirements of the Automobile Association of America, and was arranged to permit easy tonneau installation when desired. Horsepower was initially mentioned as 40; however, it was often referred to as being 20 on race entry forms. This rating was generally mentioned with a laugh or a wink.

The racer was first shown in May, 1904. It had its first public tuneup run on the one-mile track at Ascot Park in June, running slow break-in laps at about 40 miles per hour, some with Mrs. Garbutt riding along. By the end of that month, Frank was setting and breaking local one-mile records with lap times as low as 1:15.

At the Agricultural Park one-mile circular track on October 22nd, Garbutt clocked 5:15 for five miles as he "drove around everything on the track" in an early race. He came back in the finale to beat Bert Dingley, who was driving a Pope-Toledo, in 5:23 for the five miles. Back at the Agricultural Park on December 22nd, Garbutt ran three miles against Charlie Burman's Peerless Blue Streak in 3:12, winning by three feet. A special match race found Barney Oldfield avenging a loss to Garbutt the night before. The race day was closed out by the solo run of the Stewart-Garbutt car in an attempt on the world's amateur record for one mile. It failed to set a record, but did run the mile in under a minute. The mechanical inspector for this race meet, as for many others, was Fred Stewart, the racer's builder. In January, 1906, Garbutt announced that due to the press of business he must temporarily end his auto racing, and would be leasing his car to John Pierson, a local mechanic and long-time friend. Mr. Pierson was soon seen at the Agricultural Park, tuning the car for upcoming challenges scheduled with Whistling Billy, the White factory's steam racer. On March 3rd their first confrontation was a two-car race, as the Napier also entered had arrived too late to be prepared in time. The first four laps were evenly matched on the Agricultural Park track, but on the fifth and final mile Pierson's racer was able to outlast Bert Dingley in the steamer for a win, though all four laps had been run at speeds slower than a mile in a minute. The following day, running against time on a rain-dampened track, John went five consistent miles in 4:55 2/5. His fast lap was run at 58 2/5, still two seconds short of the current world's amateur record time for the mile.

Mr. Garbutt showed up for the 1907 sailing season with a new 98-foot yacht, and also had the Stewart shop preparing a 300 horsepower marine engine. His Stewart Garnutt race car was in later years converted to a touring car of sorts, as Frank had always maintained the design was street-driveable. His earlier wins, as well as those of John Pierson, were considered to be in the amateur catagory, though the opposition to the car, often known as the Grey Wolf or the Greyhound, was often profes - sional in nature as well as name. Their competition was the likes of Barney Oldfield, Charlie Burman or Bert Dingley, often driving factory specials not available to others.

The DUROCAR
by J. H. Valentine

Watt Moreland began his career with Alexander Winton. After a stopover with Haynes, he tried to build and market the Magnolia auto in Riverside, California. He next joined the Auto Vehicle Company of Los Angeles when founder Ralph Hain was leaving. Watt helped design the next generation of Tourist automobiles.

Moreland left the company in November, 1906, to be able to concentrate on his new prototype auto, named the Durocar by his Tourist associate, Walter Sahland. All casting and machine work was being done at the local McCan Mechanical Works on Long Beach Avenue. The single Durocar sample, a runabout, was first shown at the Los Angeles auto show in January, 1907. This car had a two-cylinder water cooled engine under the hood, with a two-speed planetary transmission and drive shaft.

Moreland had already found partners for his new venture, and the Durocar Manufacturing Company began business in February of 1907. The firm was initially incorporated for $25,000. The president was William M. Varney of Long Beach, a dealer for the rival Tourist autos. N. L. Clayburg, a Santa Paula rancher, was vice-president, and Moreland the secretary as well as superintendent. George W. Shugars, also part owner of the Auburn factory, was made general manager.

Work progressed at the McCan works on parts for an initial group of 50 cars while the firm was searching for a suitable factory building. In May they began moving into a four-story brick building on the northwest corner of Los Angeles and Tenth streets in downtown Los Angeles. The building was 80 by 135 feet, with an auto-sized freight elevator at the rear.

The factory opened officially during the first week of June, with work progressing on the fifty cars intended for delivery in July. Castings for the engines were basically the same as those used by some models of the local Tourist automobile. They were procured from the same foundry, with each factory doing its own finishing work and adding accessories. The flat opposed engine had a $5\frac{1}{2}$ inch bore and a 5 inch stroke for a displacement of 238 cubic inches and a rating of 24 horsepower. Production units used a three-speed sliding gear transmission with multiple disc bronze and steel clutch. 32 inch wheels were mounted on a 102 inch wheelbase. A runabout weighed 1750 pounds, and a touring car just under 2000.

Initially available were runabout, touring and landaulet bodies, produced by an eastern factory. All bodies were available in one model only, with no engine or chassis differences. Only seven cars had been finished through September. Several early vehicles were landaulets, though few of these were sold later on.

Once all the equipment was in place, 70 workers were employed and production rose to the rate of five cars per week. This was felt to be half capacity, due to shortages of supplies and of some vendor parts. Tops were built in the plant and custom paint was available. Engines were run in on stands, then installed in a chassis and driven about the city for a day before body finishing work and painting was done. Horsepower was now being rated at 26 at 600 r.p.m., though estimated to be 30 at 750 r.p.m.

The firm began serious advertising in December of 1907. The cars were not identified by a model name until during the 1908 season, when they began calling the runabout the Model K and the five passenger touring car the Model L. Prices were $1550 and $1600 respectively, with the 1908 models essentially identical to the 1907's. The 1909 models were announced in August of 1908 but were not produced until November. Bodies were higher, with the lines changed and the wheel size increased from 32 to 34 inches. Prices and model identities remained the same. The Model N tourabout was added to the line at $1650, with an easily removable full rear seat. Ads stressed the reliability of Durocar's Thermo Siphon Circulation.

Durocar had begun setting up agents throughout the far west, though selling a majority of its products from its factory showrooms. Dealers existed as far away as Montana and Salt Lake City. Late in 1908 an agency was established in Honolulu, with the first 10 autos already sold. Employment at the factory was at the 100 level.

In November a reorganization took place, with Watt Moreland leaving because of a policy disagreement. He and Shugars felt they needed four-cylinder engines, but the other directors preferred to remain with the reliable two-cylinder unit. Capitalization was increased to $50,000 and a revised board of directors was elected. Calvin A. Leighton became vice president and Charles N. Flint the treasurer. The board was composed of Varney, Winthrop H. Pinkerton and E. D. Jackson of Long Beach, Joseph P. Melcher and L. Eugene Parker of Los Angeles, and A. P. Johnson.

Less than a month later Mr. Shugars resigned his duties as general manager and sold his stock to Varney, Jackson and Melcher. Head bookkeeper William H. E. Pendeltonton became factory manager and Charles Walter Sahland was hired as sales manager. A new board of directors consisted of Varney, Jackson, Melcher, Parker and Pinkerton. Edgar E. Mason moved from the Auto Vehicle Company and with great fanfare was sent to

the San Francisco Bay area with plans to expand the company's sales outlets. He was lost to the Maxwell distributor three months later. Mr. Shugars opened a top shop down the street from his former company.

With the company's power struggle over, president Varney set out to prove that Durocar didn't need a four-cylinder engine by embarking on a racing program, something the rival Tourist company had done for years with its two-cylinder cars. Durocar entered hill climbs, endurance events, road races and track races. When it was a casual event, factory officials drove. Serious events were most effectively driven by Clifford McKeague. When Durocar won the ads screamed "Two Cylinder Durocar Wins. Famous Eastern Make Four Cylinder Cars Also Ran." Duro won a 50 mile race at Pomona in May, 1909, and was first in class and second overall in Ascot Park's six hour derby a few days later. A stripped-down Durocar was entered in the Santa Monica road races in July, but lasted just 23 laps before breaking its crankshaft.

Meanwhile, Watt Moreland had surfaced with new partners and his Moreland Motor Car Company, capitalized at $300,000. He had produced a prototype auto with a four-cylinder engine having a $4\frac{1}{2}$ inch bore and a $5\frac{1}{2}$ inch stroke. His engine was a water-cooled L-head layout with integral intake manifold and cylinders cast in pairs. It was connected by a multiple cone clutch to a four speed transmission. Plans for a new factory with its own foundry progressed very slowly, and after waiting out the Selden decision the plant was erected. The firm had been reorganized as the Moreland Motor Truck Company with the revised intention of truck, rather than passenger car, production. Several prototype trucks were built in the three year period before the new factory completed its first unit in January of 1912.

During 1909 Durocars became popular as stages in the nearby desert and mountain regions. Several eight-passenger Duros were in use, one with tandem transmissions for a greater choice of power ratios. In September the 1910 models were announced. Prices were reduced $50 and the wheelbase length increased four inches. Little else was new but the introduction of a standard model commercial car, a half-ton unit on the old chassis. In December, sales head Walter Sahland left.

In February, 1910, Durocar sprung its surprise at the Los Angeles auto show. What we would now call the $1910\frac{1}{2}$ models were presented, including two new four-cylinder models with proprietary power. The old Models K, L and N were now called the Model 26, still at $1500. The little car had grown, with a new wheelbase length of 112 inches. The new Model 35 was a four with a 4 1/8 by 5 1/4 inch bore and stroke, 281 cubic

This advertisement appeared in Los Angeles newspapers in June, 1909, just after the Durocar had won a 50-mile race at Pomona, California.

inches, and 34 by $3\frac{1}{2}$ inch tires on a 114 inch wheelbase. The Model 45 was a four with 4 3/4 by 5 1/2 inch cylinders, 390 cubic inches, and 35 by $4\frac{1}{2}$ inch tires mounted on a 124 inch wheelbase. Model numbers reflected the rated horsepower. Prices were $1750 and $3500 respectively for the Models 35 and 45. Toy tonneau, touring, surrey and roadster bodies were offered on the Models 26 and 35, with several seven-passenger bodies available on the Model 45.

In November, 1910, the factory entered a stripped Model 35 in the Los Angeles to Phoenix desert road race. Its driver nearly demolished the car in practice, so after it was rebuilt, old reliable Clifford McKeague became the driver. The Durocar finished a creditable seventh of 14 entries for the 418 mile run, competing against many larger cars. Its time was but eight minutes behind the previous race record. The run was highlighted by the near scalping of a company director, thrown against a shovel blade while helping the car out of some sand near Dos Palmos. The car stayed for the Arizona State Fair races, where it won its class, finished second in a free-for-all, and concluded with the second fastest time in the one-mile time trials, beaten only by a much larger Apperson.

On Thanksgiving Day it won the 101 mile 'Little Vanderbilt' event at the Santa Monica road races, the medium car event for engines under 300 cubic inches. That weekend at the 'Pie-pan', the Los Angeles Motordrome, McKeague finished 1/5 second out of first in a three car photo finish. Next day he was third in a free-for-all and seventh in a two-hour race open to all engines.

At the Shrine Auditorium show for non-Selden licensed autos in December the factory centered its display with the victorious Santa Monica car. Also shown were a toy tonneau and a touring car, both with the same 35 horsepower engine and chassis as had the racer. In the following November,

Mr. Varney again entered the car in the medium car race at Santa Monica, with McKeague finishing three laps out of first place.

Production had been irregular during 1910 and 1911, due partially to problems with suppliers who often gave preference to Selden licensed customers. The Amalgamated Motors Corporation was organized to take over the Durocar assets and move production to a new location. New investors were involved, but Mr. Varney was again in charge, with Charles J. Schroeder of Los Angeles as secretary and F. G. Stone a director. They had offices at 215 West Seventh Street in Los Angeles, and later found a factory location in Alhambra, northeast of downtown Los Angeles. The machinery was moved to its new location at 400 South Raymond Avenue in 1912, and the Durocar Manufacturing Company was dissolved.

The new firm announced plans to build five models of autos and trucks, using engines ranging from the venerable 26 horsepower two-cylinder to a 70 horsepower six. With little but the existing machinery to work with, a few cars were produced, nearly out of style. The primary emphasis was on the half-ton delivery units, which were produced through 1915.

The old Durocar factory site on Los Angeles Street, along with the Tourist plant that stood back-to-back with it, has been replaced by a modern high-rise building. The Amalgamated factory in Alhambra is now part of a utility company maintenance facility.

Harrah's Automobile Collection in Nevada owns a 1980 Model L Durocar five-passenger touring car.

ROSS PHILLIPS and THE GOLDEN STATE MOTOR CAR COMPANY

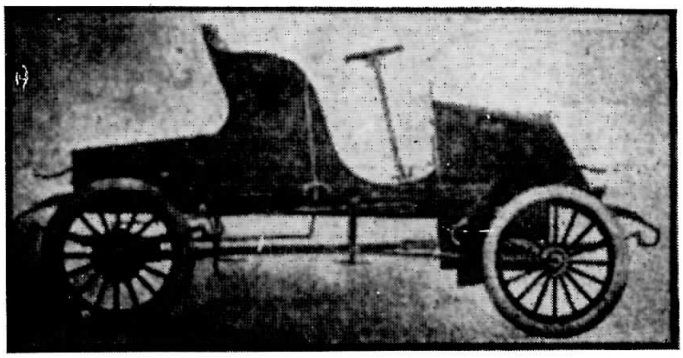
by J.H. Valentine

Ross M. G. Phillips of Los Angeles was a police officer at the turn of the century. His interest in his occupation had extended to the design of holsters and accessories for use with the weapons. His best known item was the patented "Phillips Hustler-Stock" for revolvers, developed in conjunction with the local Ideal Holster Company. Finding a flair for the design of things mechanical, Phillips left the police force during 1902 to devote full time to his new interests.

Phillips first designed an automobile with transverse front water-cooled engine, midships transmission and dual chain drive. He probably never took the time to build a complete car of this design, as he had soon designed another, with many unusual features. With the help of machinist James A. Walkley, he proceeded to build this in a West 37th Street machine shop, near the old Agricultural Park track. When the car was first shown during 1904, Phillips refused to discuss mechanical specifics due to patents pending. This first car was a two-passenger runabout, but he had designed other pleasing, interchangeable bodies. Almost every portion of the car was designed by Phillips, including most of the drive train.

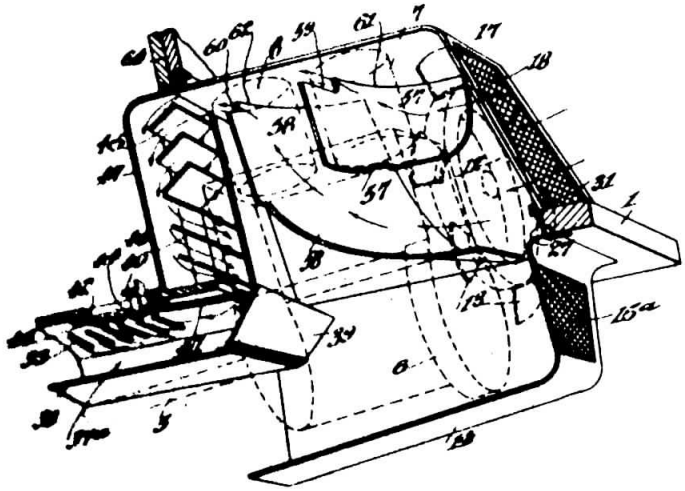
During 1905 several of his key patents were issued. and he began showing the car about town more freely, as well as seeking backing for possible production. The runabout weighed less than 1000 pounds and was powered by an inline vertical two-cylinder air-cooled engine of 14 horsepower. The transmission was integral with the rear of the engine, with the working parts fully enclosed. The clutch was of bronze and steel. The driveshaft was a flexible unit, reminding of that of the Pontiac Tempest of the early Sixties. The cylinders had horizontal cooling fins of copper, dished upwards, each having an irregular pattern of perforations. The connecting rods had special features allowing take-up of bearing wear in a matter of minutes. The rods and crankshaft were of nickle steel alloy, with both crank and cam shafts easily removable from the end of the engine. The engine had variable compression, automatic spark adavance and jump spark ignition.

A 30 inch diameter, 16-bladed fan was built onto the rim of the flywheel, which was front-mounted, to assist air movement for engine cooling. The engine was cooled through the use of individual air ducts for each cylinder. The heated air then passed through a vertical chamber in the cowl, then into a chamber beneath the floor of the car. A foot-operated control permitted heated air to pass as desired through louvres in the floor to warm the passengers. The hood was split lengthwise, each half hinging outwards for engine access, or sliding off for major work.



The Phillips prototype car of 1904. This photo was made by the author, from the microfilm files of a Los Angeles newspaper.

The engine features were contained in U.S. Patent No. 797,533, the connecting rod design in Patent No. 800,592, and the flexible driveshaft was described in Patent No. 799,374. This shaft consisted of four concentric tubes closely nested, with spiral cuts through each (except at the ends) in alternating directions, with a tapered nut at each end to compress them together. A large pin through each end prevented rotation one to the other and seated in a slot of the mating shaft of the transmission or differential. This auto appears to be the same vehicle shown in 1904, with changes



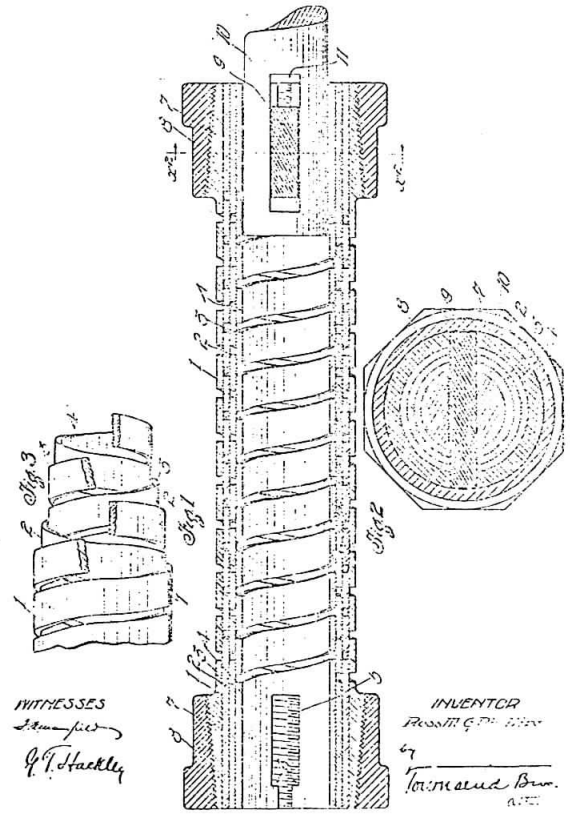
This drawing, from U.S. Patent No. 797,533, shows the heating system of the Phillips car, which was probably the first "factory installed" heater to provide winter comfort for the passengers (who probably needed all the help they could get).

to the engine cooling system, fan and hood and with the addition of the passenger heating ducts.

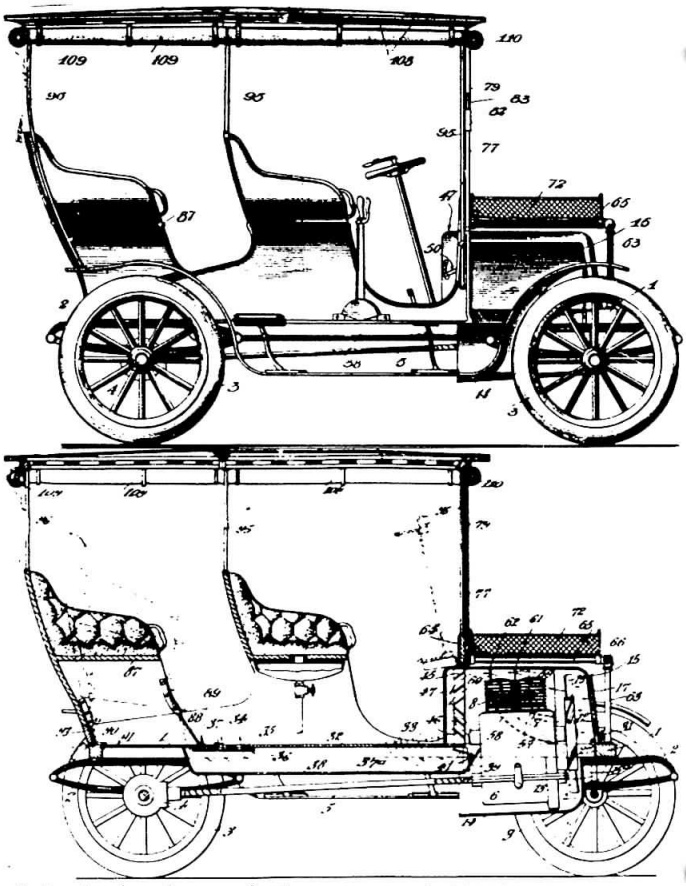
In January, 1906, advertising appeared for the sale of stock in the Golden State Motor Car Company. It was proposed that the company build the Golden State auto, similar to Mr. Phillips prototype. It would be the Model B, with a three-cylinder engine of $4\frac{1}{2}$ by 5 inch bore and stroke, giving 213 cubic inches of displacement. It would have a quickly-romovable rear seat, surrey top and fold-down windshield.

The firm opened offices and had machine shop facilities at 621 North Main Street, Los Angeles. Officers were Charles F. A. Last, president; Francis M. Townsend, secretary; and John T. Jones, Sr., treasurer. Others associated with the venture were Ross Phillips and his patent rights, John Hauerwaas, Joseph Singer and Jacob C. Feiber. Townsend was Mr. Phillips patent atorney, Singer had been a machinist with the Auto Vehicle Company, and the rest were local business or professional men. Advertising of the company's stock continued until late May of 1906. Plans for the construction of a new auto factory do not seem to have been fulfilled, and there is no indication of any cars being built at the Main Street shop. Both Phillips and James Walkley were working at the nearby Maine Machine Works as machinists during this period. One of the firm's backers, Mr. Hauerwaas, died during the company's promotional period, perhaps causing problems in the conduct of business. In some manner, things came to and end and Ross M. G. Phillips left the area, moving to the midwest and then to the east, applying his talents to the design of stoves - presumably a more stable business field.

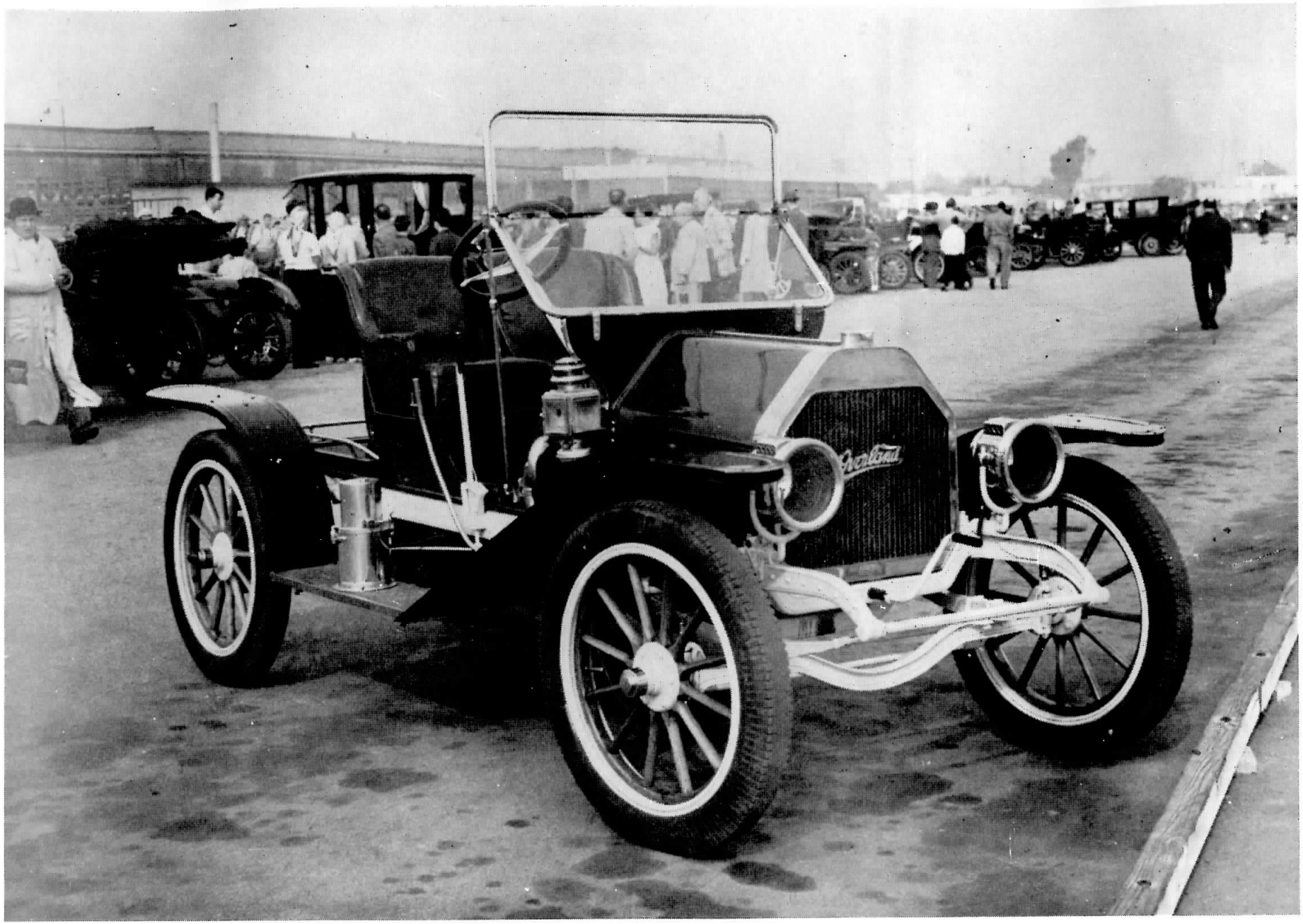
The 2-cylinder air-cooled engine of the Phillips car, showing the cooling fan blades mounted on the rim of the front-mounted flywheel.



Ross Phillips' flexible drive shaft coupling, as shown in drawings for U.S. Patent #779,374, dated January 3, 1905.



Patent drawings of the proposed GOLDEN STATE car, which was never produced, although possibly a prototype was constructed. Note flexible couplings at both ends of the drive shaft.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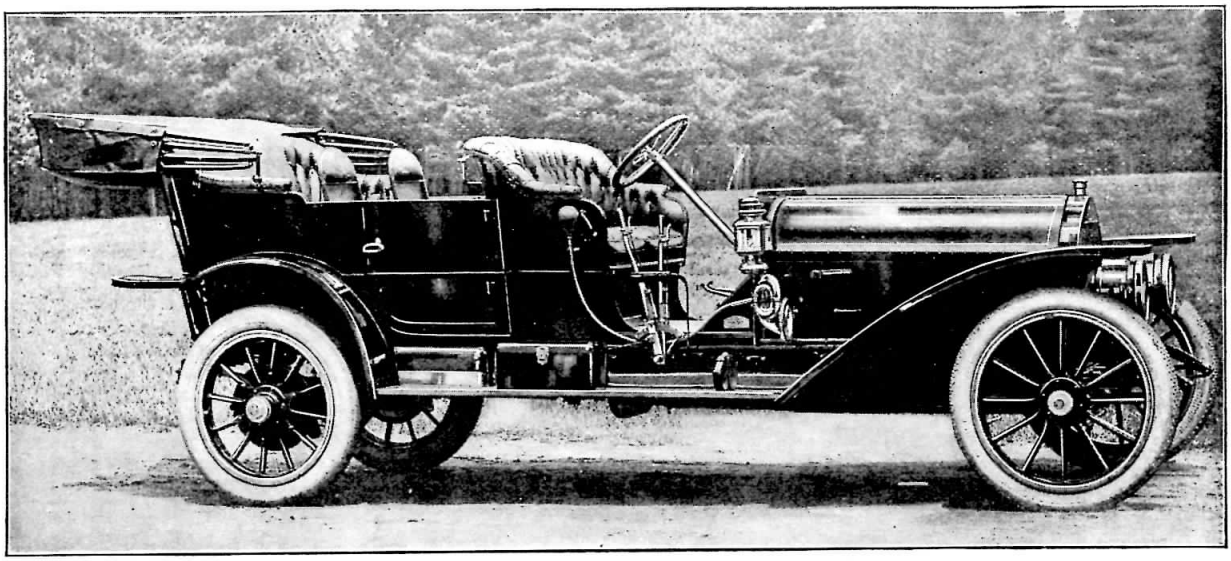

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