The STEAM AUTOMOBILE

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COVER PHOTO: Edgar Bergen shows Mortimer Snerd, Charlie McCarthy and actress Devon Blaine the fun of steam travel in his 1908 White Steam Car. Charlie McCarthy, sitting with Devon Blaine, is evidently very steamed up about the trip! The Thermosludge Steam Generator is seen in the background.

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STEAM AUTOMOBILE CLUB OF AMERICA, INC.

The following article by courtesy of the Daily Camera, Boulder, Colorado, submitted to us by the author, Forest Crossen:

THE WONDERFUL OLD WHITE STEAMER

By
Forest Crossen

Vern and I were talking with all the enthusiasm and longing of our eighteen years about the automobiles we would like to own. All at once his mother, a pioneer of the Nederland tungsten boom, spoke up: "If I could dress for it, I'd like to own a White."

Her son informed her kindly that the White Company had not made a passenger car for years. In their day they had been fine automobiles, particularly the wonderful White Steamer. . .

I grew up with the automobile, fascinated as most boys were with this new machine. Very few people had automobiles, and they were the objects of envy and of many firm resolves to own one.

My favorite uncle in our small town in northern Missouri was a pioneer automobilist. He owned a four-cylinder Maxwell with genuine leather upholstery, brass headlights and dash lights and brass lever handles. The engine had to be cranked, and the acetylene gas headlights touched off with a match. I would go up often to visit him as he worked over it in his barn. Garages as such were unknown there.

One day I saw a big, fine-looking automobile parked ahead of his. It was painted red with black fenders and it had a big right-hand steering wheel with a small wheel mounted on top of it.

"What kind of car is that, Uncle Henry?" I asked.

"A White Steamer. Some boys left it here for a while."

I climbed into the driver's seat. The little wheel fascinated me. "What's this for?"

"That's the throttle. The more you open it, the faster she goes."

The car was cold, so all I could do was to play opening and closing the throttle wheel and imagine myself whizzing down the road.

A few weeks later the two young owners returned and fired up the steamer. They backed out into the street and looked at the crowd of curious boys who had assembled, as if by magic. "Get in," they invited.

I don't know how many of us managed to crowd into the big seven-passenger touring car body, but it was full. The driver opened the throttle and the big machine moved off without a sound. This was a novelty for Uncle Henry's Maxwell and all the gasoline-engine cars that I knew were noisy.

I enjoyed the ride more than the others, I think, for I had always loved steam engines. To own a car like this!

Our ride was a short one, and we soon learned why we had been invited. The driver pulled up alongside a well next to the street. He produced a couple of buckets, and we fell to work pumping water and carrying it to the car. The big tank must have held 30 gallons.

Anyway, we had fun, and I never forgot that first ride in a White Steamer.

Years later, after I had become deeply interested in steam for automotive power, I attended a Steam Automobile Club meeting in Woodstock, Vermont, Here many steamers had assembled from New England, among them a 20 horsepower White. The owner invited me to take a ride, which proved thrilling.

Three old Stanley Steamer plant employees were among the guests, and I heard them talking about steamers. They agreed that the "White was over-engineered for its day." Meaning that the White had had careful engineering and that it was far advanced for that time (up to 1911, when the company quit manufacturing steamers and turned to gasoline power).

In 1966, I flew out to the San Francisco Bay area to attend a steam automobile meet at Concord, California. There a proud owner invited me to ride in a restored 40-horsepower White. It had the same power as the first White Steamer I had ridden in, and it slipped along silently.

"This size White," the owner said, "was the White House car for two presidential terms, Theodore Roosevelt's and William H. Taft's. They cost $4,000.00 f. o. b., Cleveland, Ohio, and that meant without top and windshield. They were extras in those days.

I nodded, remembering what other old-time steamer men had told me about the high quality of materials and workmanship that had gone into the Whites. They had been built as well as men could build them.

Recently, I had the pleasure of visiting with Walter F. Mallory, retired professor of mechanical engineering at the University of Colorado. Walter had told me some time before that he had once driven a White Steamer.

Walter learned to drive a car about 1905 and to repair them, even though he was a youth. Few men knew the workings of these strange new machines.

"In the summer of 1912 a friend told me that there was a position open for a White Steamer taxi service. That was driving all over the mountains and Boulder. This was during my summer vacation. I was at the University at that time," Mallory said.

"I was somewhat dubious as to whether I should tackle a steamer. I had never owned nor driven one, although I knew quite a bit about automobiles, but not steamers.

"A livery man named Joe Simpson bought a White Steamer. It was a second-hand one. It was about a 1909 model. He hired me. We picked up passengers in Boulder, and outside of Boulder, some up at Kossler's Lake. The road was just a switchback up the face of Flagstaff Mountain then. Some places if you had a long car you had to back up to get around the corner.

"I remember one trip to Central City and Black Hawk to take the baseball team over and bring them back. I remember having to stop, coming back, up the canyon above Black Hawk. I had to stop to let a team (of horses) go by and, of course, they didn't think much of a White Steamer or any automobile. And in trying to get started up such a heavy grade, the rear wheels just seemed to jump up and down and the body did also, trying to take hold of the road. We finally did get going, but being so heavily loaded, it certainly was a job."

"Did you have any difficulty going up Boulder Canyon?" I asked. "Any lack of power?"

"No. In fact, never was the power insufficient; it was a question of whether you could get traction. It would spin the wheels on any kind of hill if you tried to deliver the power."

(continued)

"That must have been a good steam generator," I put in.

"It was. The harder you would force it, the hotter it would get And that brought about one trouble you would have under those conditions. Everything around the engine would get so hot and, being entirely automatic, the feed water pump would ultimately start to flash steam. When that happened there wouldn't be any water for the boiler, and the automatic controls would cut off the fuel to the burner. You'd set there until things cooled off."

"Did you have to stop going up Boulder Canyon with that car full of baseball players?" I asked him.

"No. I never had to stop once on that trip going over," Mallory said.

The White was a condensing car. The exhaust steam from the engine was piped up to a big radiator in front, where it condensed back into water. When the feed water in the supply tank became too hot, the above mentioned trouble developed.

"What fuel did you burn?"

"We burned gasoline ... but the poorest gasoline, the cheapest. We burned it in both the main burner and the pilot burner."

"Was the car smooth in operation?"

"It was just as smooth as it could possibly be. It was just like a dream to drive, because you had all kinds of power. There was no gear shifting. You drove with the throttle.

"Tires gave you some trouble, didn't they?"

Walter shook his head slowly. "That was the headache. You'd buy a new tire for thirty, forty dollars, you possibly could get two thousand miles. A thousand was the limit with some of them."

"When night came what did you have for lights?"

"We had oxy-acetylene gas headlights."

Author Forest Crossen in a restored 1910 White

"In old photographs of White Steamers," I said, "I've noticed three outside levers on the driver's right. I know one was the emergency brake. What were the other two?"

"One of them was to shift from direct drive to low (which he almost never used). It was a question of knowing - there was no clutch - you had to know where the gears were operating for the combination you were making, so the teeth would not jam."

"The other lever controlled the sliding valve mechanism on the engine. You pushed it forward to go ahead, brought it back for reverse. The valves on the engine did this; you had no reverse gear in the transmission."

I found that Walter Mallory was not the only Boulder area resident enthusiastic about the White Steamer. Ernest L. Malm, who lives on Cherryvale Road, once had an interesting experience with a White.

"This was shortly after I came to Boulder, about 1921. I was working at the Chevrolet garage, on 11th Street. One day, near the end of the week, a man came in and said that he was having trouble with this White Steamer."

"I think the water pipes are corroded," he said. "I can't get enough water into the generator to make steam. If you can get a plumber, we'll put in new pipes."

"I made arrangements with a plumber, and that Sunday we put in new pipes. He fired it up and took me for a ride out to Lyons" Ernest's grin was broad. "Man, there was no holding it back! That White Steamer is a terrific car."

The White Company began as an off-shoot of the White Sewing Machine Company of Cleveland, Ohio. In the early days of automobile manufacturing, the company engineered and built a superior little steamer that looked like a buggy. All automobiles looked like buggies or carriages then. In fact the manufacturers advertised them as horseless carriages. The Stanley Brothers, builders of the Stanley Steamer, told that the first car they built had a buggy body, complete with leather dashboard and socket for a whip to make the horse go.

The White Company continued to make engineering improvements. They built a larger, more luxurious car. Finally, they were building the truly fine 40-horsepower automobiles in which presidents of the United States rode proudly.

In 1911 the company dropped their steamers in favor of gasoline-powered vehicles. They continued their high quality manufacturing. They had no idea then of air pollution.

Not long ago, in California, a 1905 White Steamer went through operation tests for air pollution. The flue gases from the burner contained almost nothing that would produce smog. This was not surprising to the experts, for modern steam automotive units have produced the same results.

Life has a habit of running in grand circles. Wise men tell us that there is nothing new under the sun, only modification. Some of these days, because of the increasing danger from air pollution caused by the exhausts of internal combustion engines we will return to steam power. Only it will be tar superior, with all the advantages of nearly 60 years of progress since the White Company ceased building their wonderful steamer.

STEAM CARS - FULL THROTTLE AT LAST?

By
Karl Ludvigsen

In this age of air pollution, steam power's near-pure exhaust has drawn attention to its many other advantages. And at last the big companies are ready to bet big money on the future of steam.

Your car — yes, that one out in the garage — is powered by a "steam engine". The engine under its hood converts heat into power and uses steam, in part, to do it. In fact, under the right conditions you could collect as much water from your car's exhaust pipe as you put into it in the form of fuel. British researchers, looking for a source of drinking water in combat, actually did this during World War II.

When gasoline and air (oxygen) react in your engine's combustion chambers, they generate heat. They also generate "waste gases", which actually hold the heat and put it to work, driving down the pistons. One of these gases is carbon dioxide, the other is steam — water in superheated form. Less desirable gases, such as carbon monoxide, vaporized hydrocarbons and oxides of nitrogen also emerge from a gasoline engine's exhaust pipe, making their well-known contributions to the air pollution problem. They are there because it's very difficult to get the fuel and air to combine *completely* in the confines of an engine cylinder.

The "real" steam engine burns its fuel in a continuous flame, like a gas turbine and like a household oil burner, which, by the way, owes its efficiency to early steam car researches. The flame can be given all the oxygen that it needs for very complete combustion. Without problems or pre-ignition, the fuel does not require a high octane rating or lead additives. Kerosene and household fuel oil are fine for a steam car's fuel tank.

But how does this flame put its heat to work in the steam engine? Instead of mixing with the working gases it is separated from them, applying its heat to the gases through the thin walls of a heat exchanger. The gas system is water/steam, and the heat exchanger is the boiler. From the boiler the steam carries the heat to the working cylinders, where it's transformed into rotary power. The steam is ultimately condensed again into water and returned to the boi ler for re-use.

In a modern mobile steam system, the working fluid is re-circulated endlessly in an almost completely sealed cycle. Unlike the steamers of old, you don't keep adding water and throwing it out as steam exhaust. With modern recycling systems designers can consider other working gases, such as Freon or even mercury vapor. This makes the "steam" designation a little archaic, but it is easier to handle and more specific than the alternative: "external combustion engine".

So the gasoline engine mixes its steam directly with the heat of combustion, while the steam engine separates the heat source and the working gas by a metal wall through which the heat must travel. The presence of this barrier, with its limitations of declining strength at high temperatures, hints at one of the points where the steamer gives way to the gasoline engine in overall thermal efficiency. It also hints at additional bulk and complication in the steam engine. But today both of these drawbacks look minor when viewed through the rosy lenses of steam's super-clean exhaust.

Just how clean is the steamer's exhaust?

That's what Ford wanted to know late in 1966 when it asked the Mobil Oil Company's New Jersey testing laboratory to run the complete California emissions test cycle on a prototype steam car built by the Williams Engine Company. The results were dramatic. Unburned hydrocarbon emissions were only 20 parts per million, far less than the 275 parts per million allowed by Federal Law on 1968 cars. The carbon monoxide level was only 0.05 percent of the exhaust, a thirtieth of the currently allowable level, and other emissions such as oxides of nitrogen were also very low.

These tests were run on an early Williams steamer with a 43 cubic inch engine. Now being built is a new 105 cubic inch engine which, Williams feels, "will cut down considerably on our already low emissions. We feel that we can make it practically nothing." General Motors, in a heavily anti-steam power unit comparison, showed it agreed fully that steam's emissions were low, at the same general level as the gas turbine and Stirling engine.

Late in 1967 a spot-check on emissions was made in California on a Volkswagen converted to steam power by Richard Smith and Karl Petersen. It showed results similar to the Williams car with hydrocarbons at the 30 parts per million level and carbon monoxide at 0.08 percent. Oxides of nitrogen were at 60 parts per million. Both the builders and the testers were surprised to find that a hunter's or camper's Coleman stove, tested at the same time, had some five times the steam VW's output of undesirable emissions.

These facts about steam found their way into a report on urban transportation technology authored by Dr. Robert U. Ayres of Resources for the Future, a research firm financed by the Ford Foundation. Ayres'early findings came to the attention of Ralph Nader, who wrote letters about them to two influential men in government: Senator Warren G. Magnuson of Washington, chairman of the Senate Commerce Committee, and Senator Edmund S. Muskie of Maine, chairman of the Senate Public Works Committee, which has an Air and Water Pollution Subcommittee. These groups, which had held hearings in March, 1967 on electric cars, scheduled a session on steam for May 27 and 28, 1968.

Irritating though they undoubtedly were for the auto makers, the Senate hearings on steam did it a great service by dignifying it in terms of modern needs and technology. The hearings brought forth some valuable technical facts about steam's recent progress and potential. They also uncovered vigorous activity by engineers and entrepreneurs eager to hop aboard the steam-powered bandwagon. *(continued)*

Fledgling firms with names like "Thermal-Kinetics" have suddenly materialized as experts on steam cars, floating stock issues and inviting government research contracts. Dr. Richard Morse, who headed a pro-steam Commerce Department panel on air pollution, has set up a firm called Energy Systems, Inc. to develop his ideas on steam. And Dr. Robert Ayres, who started the whole thing, has established the international Research in Technology Corporation to investigate these promising new pastures.

At the hearings in May, legislators were able to see and ride in some modern steam cars, of which the most advanced was a roadster built in 1960 by the Williams Engine Company of Ambler, Pa. Since 1936 Calvin C. Williams and his twin sons, Charles J. and Calvin E. have been working on automotive steam, and experts feel that their engine design, a high-speed four-cylinder, is one of the best available today.

Late in the thirties and during the War, the Williamses pioneered in advanced steam engine design, raising efficiency with a pressure-balancing valve which, they say, departs from the traditional steam working cycle. To test their theories they've built radial as well as in-line engines, and also a V8 based on a Ford block. Their engines have been fitted in a 1950 Ford and a 1961 Mercury Comet, as well as the roadster shown to the Senate.

For $6,450.00, the Williamses recently announced, they'll deliver a complete 650 pound steam power package. It will develop 150 horsepower continuously with a peak of 250, and with 1105 pound feet of torque from rest. For $10,250.00 they said they would sell a Chevrolet Chevelle fully steam converted. But after more than 30 years of non-profit operation the Williams Engine Company is low on capital and though it has orders for such units, it is not ready to build them. Most of the Williams patents have expired, leaving the father and sons reluctant to discuss their ideas openly with would-be financial partners. These problems should not becloud the fact that the Williamses have the elements of a fine steam system for full-sized American cars.

Much newer and much more research-oriented is the work of Richard J. Smith and Karl A. Petersen of Midway City, California — makers of the famed "Steaming Beetle". Both are engineers, specially skilled in bearing and seal design, now developing, full-time, Richard Smith's 17-year part-time interest in steam. They are not planning to manufacture cars, but they are designing and building several steam prototypes for other firms, under contract.

Their Volkswagen steam conversion was built in one month in early 1967 to show what their equipment could do. For the engine they adapted a four-cylinder two-stroke Mercury outboard unit, admitting the steam through the former spark plug holes and exhausting it through the old transfer ports, down into the crankcase. The tough outboards, with their roller bearings and high-speed potential, have proven ideal as experimental engines for Smith and Petersen. As used in the Volkswagen, the four-cylinder engine alone weighs only 32 pounds. It is capable of absorbing 200 horsepower continuously at 5600 rpm and can deliver 300 pound-feet of torque from rest.

Unlike some other steam developers, Smith and Petersen have innovated in the design of the steam generator (a term preferred to "boiler") and condenser. They found they could use copper tubes instead of more costly alloys in the generator, greatly reducing manufacturing expense. They use a jet spray for internally cooling the condenser, a common method in big generating plants, but oddly rare so far in steam cars. And Richard Smith's new and patented rotary valve is an important feature of their control system.

Both the engine and the steam generator fit easily within the original engine compartment of the "Steaming Beetle", and the total weight is less than that of the air-cooled engine it replaced, even though Smith and Petersen left the four-speed transmission in the car. Up to 45 mph, to which the car is limited by some of the engine's electric accessories, the steamer performs as well as a stock Volkswagen, showing 25 horsepower at the rear wheels. Not yet tested on the road is their contention that the steamer will get better fuel mileage than the engine it replaced. Future comparisons may be made also with Karl Petersen's current conversion of an MG 1100 front-drive sedan to four-cylinder steam power.

Smith and Petersen have provided steam generator and condenser equipment and know-how to many other steam experimenters, including R. A. Gibbs and Thomas A. Hosick, of Greensboro, North Carolina. Long-time steam hobbyists, Gibbs (owner of a machine shop) and Hosick (a research chemist) became steam pioneers in 1964 when they started developing a barrel-type steam engine, with the operating cylinders parallel to the output shaft. Within their "Elliptocline" engines there are nine longitudinal cylinders, each with two pistons. The arrangement is extremely compact and strikingly similar to the layout of the best modern air conditioning compressors — which are basically steam engines operating in reverse.

The original Gibbs-Hosick Elliptocline engine of 1965 could develop 100 horsepower. The latest, substantially larger with a displacement of 200 cubic inches, weighs 300 pounds and can absorb 1000 horsepower at 2900 output rpm. It's now being tested in a 1941 Chevrolet truck chassis, as Gibbs and Hosick are specially interested in truck applications.

Another producer of quality modern steam engines is the R. R. Ferrier Company of Los Angeles, California. From fabricated aluminum parts Roy Ferrier makes simple uniflow engines, a sample type being a vee-4 of 17 cubic inches, weighing 40 pounds. Ferrier's small engines are used mainly for industrial purposes now. He's not actively seeking automotive uses, though some of the auto industry's steam researchers have paid him the compliment of an exploratory visit.

Several other companies have auto-related steam projects, the actual progress of which is sometimes obscured by political or technical double-talk. Since 1963, Thermo Electron Corporation of Waltham, Massachusetts, has been working on a three-cylinder double-acting steam system to power a silent, portable generator for the Army, under a contract for which Stirling and other engines are also in competition. Using a working fluid/gas other than water/steam, Thermo Electron's engines are efficient

though not yet suited to operation over a wide speed range.

Two events early in 1968 brought extensive publicity to Thermo Electron. One was its receipt of a patent on a miniature steam pump, powered by a radioactive isotope, which could serve as an artificial heart implanted in the body. The other was the signing of a two year agreement with Ford covering the joint development of a small steam engine. Thermo Electron is to provide the ideas and men and Ford the development assistance and finance up to $1 million. The agreement licenses Ford to use Thermo Electron's steam patents for vehicles and also gives it an option to buy up to 100,000 of the smaller firm's shares of stock.

Equally ambitious and publicity-oriented are some of the projects of Controlled Steam Dynamics, Inc. President Don E. Johnson has recently moved his firm from Arizona to the Orange County Airport, near Los Angeles, California, and with it the helicopter in which he plans to install a steam power unit. Since 1966 Johnson's firm has been working on high-intensity steam generators, barrel-type engines and a steam turbine he says will absorb 150 horsepower. On Johnson's project list is a possible Indianapolis contender, an ambition he shares with several other super-sanguine steam experimenters.

Most of these developers, starting with the Williamses, have worked out individual devices and pieces of hardware which could contribute to a light, compact and efficient modern steam power unit. Some of them have worked out very good complete steam systems, or can see how they'd do it if they had the money.

How has this happened? Have these men made major design "breakthroughs" to reach their present state of near-competitiveness with the internal combustion engine? Have they, as some like to claim, harnessed "space age" technology on behalf of the modern steam car? Not at all. No such assertion would be true. Today's best steamers show a vastly better grasp of steam cycle theory than their antique forebears, but even their creators would readily admit that their mechanical design is still at the backyard level by comparison, say, with an automatic transmission. The achievements of today's steam researchers on practically zero financial backing merely hint at what steam might be able to do with a full-scale industrial push behind it.

In the early days of the industry steam played an important role, nowhere more so than in the United States. But steam's engineering pioneer was a Frenchman, Leon Serpollet. In 1875, he was one of the first to use the flash-type steam generator, in which water is continuously vaporized as needed. Before the turn of the century, Serpollet was producing cars with poppet-valve uniflow engines, with special systems to meter water and fuel to the steam generator at coordinated rates.

Sometimes called the Bugatti of his day, Serpollet brought his steamers to a very advanced design level, one which few of today's steamers actually exceed. He demonstrated this in 1902 with a special racer which he drove to a new Land Speed Record of 75.06 mph. Serpollet died in 1907; however, and seemingly with him the creative attitude toward steam died also.

A steamer did hold the Land Speed Record one more time, the Stanley "Beetle" in 1906 at 127.66 mph. The twin Stanley Brothers spanned thirty years of steam; from 1897 to 1927 their cars were in production. Stanley's steamers were cars of quality, but were relics of the locomotive era in design and complexity of operation.

During the Twenties the famed Doble brothers, led by Abner, built a total of 42 Doble steamers. These were fantastic $11,200 cars, shot through with automation and complexity, what one writer called "masterpieces of misguided genius". The Doble was a fit competitor for a Rolls-Royce or a Hispano-Suiza, but what steam needed then to survive was a Henry Ford, not a Henry Royce.

Steam by no means languished after Doble production stopped in 1932. Abner developed Sentinel-Doble steam trucks in Britain during the Thirties, while his brother, Warren, worked on similar lines for Henschel in Germany. In 1933, Herman Goering paraded in one of the experimental Henschel-Doble steam automobiles, an important idea then because Germany needed vehicles that could run on its domestic supplies of low-grade petroleum product.

In Britain, young Alex Moulton converted a small cyclecar to steam in 1936, then drew up several advanced schemes for steam cars after the War before becoming famous as the inventor of the rubber springs in the BMC "Mini". Before it was absorbed by Rootes, Singer of Britain experimented with a vee-4-engined steamer. Britain's E.R.A. also investigated the possibilities of steam.

Designs similar to Moulton's were used for the 3-cylinder compound engine of the Paxton steam car, an elaborate Los Angeles project of 1951-54. Abner Doble was a consultant on Robert Paxton McCulloch's abortive attempt to add automobiles to the two-stroke engines and chain saws he already manufactured.

Critics of steam often cite the failure of the Paxton Phoenix as evidence that the principle has already written its own epitaph. But the project was stopped arbitrarily, before it was fully matured. Moreover, with its classical low-speed engine and its excessive elaboration, the Paxton should be considered the last of the antique steamers, the ultimate Doble, not the first of a new modern breed of steam automobile. And it's ironic that some of the best current engines are based on two-stroke blocks like those that made Robert McCulloch's fortune.

So some good work is being done on steam cars today. How much progress has really been made? What obstacles still remain? We can best find the answers by posing some more questions, the ones the critics of steam most often choose:

Isn't there a serious explosion hazard?

Steamers must work at high temperatures to be efficient, and high pressures are needed to superheat steam to high temperatures. But the pressures used, from 1000 psi to no higher than 2000 psi, and not more than 750 psi in some cases, are not vastly higher than those in an automotive air conditioning system. Containing them safely is no problem. Even if a pipe rupture should occur,

(continued)

very little vapor is available for release in a flash-type steam generator. The total water capacity of one of the Smith-Petersen systems is no more than double that of a normal car's cooling system. For crash safety, the steam generator would have to be given the same care in placement as the fuel tank.

Don't steamers freeze up in cold weather?

This was a serious problem with the old open systems, which would rapidly boil away any anti-freeze additive. Even the pilot lights they relied on were not dependable. Modern semi-sealed systems are pressurized, however, with very effective condensation under almost all working conditions. They can retain anti-freeze just as well as our car's cooling system can. Those who choose Freon as a working gas avoid the problem, because it doesn't freeze until -185°F.

Isn't contamination of the water with lubricants a problem?

Yes, it is, and will still be as steamers reach for higher operating temperatures. Freon, again, is helpful, as it has a lubricating quality. Modern synthetics can also replace older materials in bearings and seals in contact with water. The problem can also be attacked head-on by deliberately putting the lubricant in the water in the first place and designing it to stay there. Smith and Petersen oil the bearings of their engines with 5% soluble industrial lubricant. They've developed their own oil mix to raise its stable, non-decomposing temperature from the usual 400°F. to more than 700°F., which is where they run their engines. Williams and Gibbs-Hosick also have adopted this technique.

Aren't steam cars very difficult to run?

The Dobles helped perpetuate this idea with their dashboards covered with esoteric dials, though at the same time they were taking some of the mystery out of steaming. The Williamses have been reluctant to give up manual control of the all-important steam cutoff valve, though it's no more the modern motorist's affair than the manual spark advance. Paxton's Phoenix had the cutoff control automatically regulated, and Smith and Petersen tie it in with the throttle linkage. In such ways the steamer can be made even easier than the automatic transmission car to operate.

Isn't there still a noticeable starting delay?

At the end of the Doble era, with the 1954 Paxton, the gap between turning the key and driving away with substantial pressure had been cut from 20 minutes to 20 seconds. The Williams cars aren't that fast, requiring more than 30 seconds. With copper tubing in the steam generator, Richard Smith and Karl Petersen can drive one of their cars away in 8 to 15 seconds, which is pretty quick. And Petersen points out that "the complete system is 'warmed up' after less than a block of running, even on a cold morning." In summary: There is still a starting delay, but it's been drastically reduced and can be cut still further.

What about steam power's excessive bulk and weight?

It no longer exists. The complete power train of the Paxton Phoenix, including differential, weighed 953 pounds. The engine was far too heavy at 285 pounds, and the steam generator weighed 223 pounds. With more power, the Williams power packages are lighter but still bulky, with the engine in front and the steam generator in the trunk. "We know how to move it up front and make it smaller," says Charles Williams, "but we don't have the money."

Richard Smith's small steam engine was not only lighter than the Volkswagen powerplant it replaced; it also fit entirely within the Volkswagen's cramped engine room. In his testimony to the Senate, Ford's Herbert L. Misch showed a possible front-located steam power unit. "It represents," Misch said, "that from a bulk and arrangement standpoint, the steam power plant will fit in cars."

Aren't gas turbines and electrics tough competition for steam?

In emissions, bulk and torque characteristics, the steam engine and the gas turbine have much in common. The regenerative gas turbine is an extremely costly machine, however, conceivable for trucks, but much too expensive for cars. In contrast, a steamer could cost about the same as a low-emissions engine-transmission package, and could be made much more readily on Detroit's present Machine tools.

Steam is far closer to use as a practical car engine than electricity, which is heavier, higher in original cost, and limited in range. Steam proponents also like to point out, as does Karl Petersen, "that 85% of the electricity in this country (more in urban areas) is produced by fossil-fueled steam-electric plants. The maximum theoretical efficiency from fuel to wheels in the battery car comes out to about 4%, while fuel-to-wheels efficiency of a good steam car is about 20%. Thus, even if the steam-electric power plants burned fuel as cleanly as the steam car, electric transportation's contribution to pollution would be about 5 times that of an equivalent number of steam cars."

In the light of these facts, it is not surprising that there's so much interest in steam for automobiles. At the Senate hearings, General Motors tried its best to put a damper on steam. Yet it admitted that it is exploring a possible joint project with Dr. Morse's Energy Systems, Inc., and even top General Motors people were surprised when the Corporation said it would supply 6 Oldsmobile Delmont 88 chassis and $120,000 to the State of California for conversion to steam-powered pursuit cars for the California Highway Patrol.

The General Motors offer depends on the passage of legislation authorizing this unique test of steam, the results of which would be made public. Reasonably enough, General Motors also asked that the cars be test-driven by state troopers only and that recognized California authorities supervise the emissions tests. The actual steam engine installation would be made by a California firm, or, under certain conditions, by an out-of-state builder such as Williams.

Ford has taken on even more active and open attitude toward steam. In 1967, it ordered a complete Fairlane conversion from the Williamses, one the straitened brothers have not yet been able to build and deliver. Then there's Ford's agreement with the Thermo Electron Corporation. And the Dearborn firm has its own steam power program, which its engineering

vice president, Herbert Misch, says is "in the analysis or study stage. Whether or not we proceed to a design and development program," Misch adds, "will depend upon how encouraging our findings are. The next logical stage would be component development, just as with our gas turbine program, before we move ahead to a prototype vehicle."

As with electrics, firms outside the auto industry see steam as a new doorway opening for them into the transportation field. Bill Lear, active in aviation, radio and undersea research, is personally investigating the potential of steam. Agents of Howard Hughes, who once owned a souped-up Doble, are contacting steam car developers. And the California Institute of Technology's Jet Propulsion Laboratories, famed for its final success with the Ranger moon photographic mission, is canvassing the state of the steam art. Through Jet Propulsion Laboratories, steam might be the beneficiary of America's premature and shortsighted shutdown of space exploration beyond the moon.

From the rear ranks, steam has suddenly stepped forward to be counted a serious competitor to the gas turbine and the electric, and a potential challenger to our old friend, the piston engine. Though the impetus came from the smog crisis, steam developers are certain they can maintain their new-found momentum on the basis of their baby's many other desirable characteristics. They plan to put a real steam engine under the hood of your car-after-next. With a little luck they might just manage it.

NEWS and IDEAS from MEMBERS

Steam Engine Tests *Submitted by William E. Swigart, Jr.*

It was announced in Washington this week (week of February 23, 1969) that steam engines will be installed in four buses operated by the San Francisco Municipal Railroad, AC Transit Company, Oakland, California in 1970.

Financing will come through a $450,000 Federal program and $160,000 in services from the State of California and the two utilities. They are going to try to determine the efficiency, cost of operation, pollution output, maintenance problems, power, noise, performance and public reaction in regard to the steam engine.

This is to be the first of federal projects for demonstration, of the feasibility for this method of power.

Also, we have William P. Lear, Sr. embarking upon a $10,000,000 program to develop, test, race and produce steam turbine and reciprocating steam engines for the automotive, aviation and industrial fields.

Three steam turbines and two reciprocating steam engines have been developed and are in limited operation in Nevada. They supposedly are pollution-free, quiet, smooth, powerful and economical.

The basic construction is that of the steam cars around the turn of the century. His advance is their being able to get better heat transfer, through a technologically improved radiator, allowing greater horsepower development. Supposedly, now he is able to develop 400 to 800 horsepower units.

Two cars are being developed for Indianapolis that will have four-wheel drive, 40% torque to the front wheels and 60% to the rear wheels, and will be powered by steam engines rated from 500 to 600 horsepower.

California Highway Patrol Seeks Smogless Steam Auto With High Performance

Submitted by William C. Williams, Covelo, California

The California Highway Patrol, searching for a smogless steam auto, has geared its requirements high.

No old Stanley Steamers need apply.

Under a 1968 directive of the state legislature, the patrol will test a steam engine car under the usual operating conditions for its cars. Then it may decide whether the entire fleet of combustion engines should be replaced with the steam engine.

Folks who thought the old Steamer sank forever into oblivion 50 years ago soon may see uniformed patrolmen tearing down a freeway at breathtaking steam speeds — speeds that would wrinkle the goggles of the old steam car drivers.

The steam engine has to be a complete replacement of an internal combustion engine in a patrol car, said Supervising Inspector David Luethje. It must operate at speeds well over 100 miles an hour and be able to negotiate all kinds of roads, at altitudes ranging from about 200 feet below sea level to 10,000 feet above sea level.

Temperatures to which the vehicles would be exposed would range from minus 20 degrees to plus 120 degrees.

It will be required that the vehicle acceleration must be capable of reaching 82 miles an hour from a standing start; 87 miles an hour in a quarter-mile from a flying start of 50 miles an hour; 115 miles an hour in one mile from a standing start, with a top speed of 125 miles an hour at the end of a two-mile run.

The top speed of the vehicle is required to be 130 miles an hour and should be attained in not less than a three-mile run, Luethje continued.

In addition, it should be possible to drive the vehicle at 100 miles an hour for a distance of 25 miles without slackening the speed or making any unusual adjustments. Also required are certain safety features to provide adequate visual and audible warnings to indicate any malfunction in the pressure or other critical systems.

Provisions must be made to provide the necessary power for the operation of the braking system and alternator, even though the vehicle is either stopped or standing. Because of the emergency type operation of the patrol, it is required that it be able to start and get under way within 30 seconds, or preferably less.

"As you can see," said Luethje, "the department did establish some rather stringent standards. However, we felt that because of the requirements of the legislation that we should start with our maximum requirements.

"We also established some rather stringent testing and evaluation procedures, which include safety, performance, fuel economy, maintenance, general operations and such tests concerning exhaust smog emissions as may be required by the California Air Resources Board."

Twenty-eight specific items will be evaluated during the testing. The "request for proposal," sent to various auto manufacturers, consisted of 22 pages of detailed information.Quite an order. Luethje said the favorable outcome of the quest is vital to the welfare of the people of California, *(continued)*

"The quest will continue and I am confident that we will see such a vehicle in the not too far distant future," he predicted.

This new law enforcement "steamer", unlike its ancestors of the early 1900, won't have a heavy, dangerous boiler that might blow, will be able to make a cold start in 30 seconds and won't have to stop for water every half-hour.

Interest in the auto steam engine never died, and that is one reason scientists say an acceptable steam auto can be put on the road "in a not too distant future."

Ironically, some of the research and testing on the modern steam engined auto was paid for by gas war profits.

(From a newspaper article in the Santa Ana Register)

STEAM CAR ADVANTAGES

Submitted by
L. E. Sevison, Toledo, Ohio

No Transmission

A Smaller Engine

One-fourth as many engine parts

Quieter

No Monoxide Gas

Needs no Starter

Warm in Winter

No clutches

Cheaper Fuel

Oil Stays Clean

No Engine Idling

Oil does not deteriorate as in gas engines

Greater clearance under car

No hump in the center of the floor

No exhaust pipe to hang down

A lighter car in weight

Better distribution of car weight

A quicker acceleration

No jerks when starting

No cylinder spark plugs to clean

No fan belts to replace

No ignition distributor or breaker points

No air filter to clean

No transmission oil level to watch

No transmission bands to adjust

No radiator anti-freeze to put in

No mufflers to replace

No radiator grills to become cracked

No booster cables to carry

No universal joints to grease

HEW Charged With 13 Years of Inefficiency

It has been reported that the Chairman of a House investigating subcommittee sharply attacked the Department of Health, Education and Welfare recently, charging Health, Education and Welfare with "13 years of inefficiency" in cutting down the amount of sulphur dioxide poured into the air.

The Chairman of the government operations subcommittee Rep. Henry S. Reuss (D-Wis) claimed that 30,000,000 tons of sulphur dioxide are gutting the American air each year. Sulphur dioxide comes mainly from coal and oil industrial and power generating furnaces. It is now second only to carbon monoxide which is produced from autos at the rate of 71,000,000 tons per year, as the main cause of air pollution.

The Reuss-report says that from 1955 to 1969, Congress appropriated $121,000,000 for an air-pollution research and development program.

However, Rep. Reuss also pointed out that it was not until August, 1968, that Health, Education and Welfare started to adopt the sulphur dioxide abatement program, that the Congress first authorized in 1963.

"Thirteen years of inefficiency would be deplorable in any area of federal responsibility," Reuss has stated.

He also commented that it was intolerable when health as well as money is being wasted. Some immediate reforms are in order was his conclusion.

IN MEMORIUM

We have just learned of the sudden passing of another of our long time members, Charles F. Keen, of Madison, Wisconsin. Mr. Keen suffered an apparent heart attack Monday, May 5, while stopping at a motel in Toledo, Ohio, on his way home from a business trip which had to do with developing steam projects.

Mr. Keen was a great steam car enthusiast who built several steam cars. His family had worked with steam for more than 100 years and Mr. Keen began building steam-driven passenger autos in 1940. His great-grandfather, George Keen, helped build some of the early locomotives in the 1840's. His father built a steamboat which plied the Mississippi and Ohio Rivers.

A prime feature of Mr. Keen's steam propulsion system was a flash-type boiler. Unlike steam cars of former years, Mr. Keen's steam cars were ready to go almost the instant the boiler was ignited. A condenser took the place of the conventional radiator.

Mr. Keen had recently been consulted by designer William P. Lear regarding steam propulsion specifications for projected Indianapolis "500" racing cars.

This is another great loss to all and we express our deepest sympathy to Mrs. Keen and family.

CAL TINKHAM SPEAKS AT SPARKS, NEVADA - OCTOBER 25-26-27,1968

Karl Petersen, Chairman of the Western Region of the Steam Automobile Club of America, Inc., was Master of Ceremonies at the evening meeting and introduced Bob Richardson of Detroit, Michigan and S. S. Miner, editor of "The Steam Automobile", club magazine.

Introducing the speaker of the evening, Karl said, "A lot of us feel we have a great interest in steam, but when the wife says 'You're not really going to buy that steam engine?' well, what do you do, invest in a steam car? Build yourself a boiler? Some have figured how they can work the cars and make a living too. The gentleman who will speak to you about steam cars is in a most enviable position. He can have his cake and eat it too. He is Cal Tinkham, a long time enthusiast and is with Harrah's Automobile Collection."

Cal Tinkham stated that as long as everyone was going to Harrah's Collection the next day, he wanted to give a little background on the particular car of his talk, the Abner Doble personal car. We now set forth Mr. Tinkham's speech:

The car was the focal point in many of the places Abner worked on steam, such as the New Zealand Steam Bus projects. In one instance, Abner took the draft booster from his E-24 to install in the bus. After the New Zealand work, E-24 appeared in the Doble-Henschel developments in Germany. There steam automobiles, buses and railcars were developed. E-24 was a rolling test platform. It was sold around 1934 to Harmon Lewis in England and was lost sight of until the McCulloch Motors project of the Paxton-Phoenix.

Abner Doble was a consulting engineer on the Paxton-Phoenix project and asked that E-24 be brought from England.

This was done and during driving tests by McCulloch engineers, the engine crankshaft broke. So, E-24 was out behind the McCulloch factory with the engine out of the car and on small sawhorses. Its condition was very critical, but everything was still there. It was later purchased by Richard Hempel of Kansas City, Missouri. Hempel did considerable restoration work on the car and had driven it about 60 miles when the crankshaft broke for the second time. It was later sold to Harrah's Auto Collection. Many of you who were at the meet in Sparks in 1962 may recall seeing it in the receiving condition. In 1963, Roland Giroux was working with Harrah's in restoration of the car. The man who dismantled the car left Harrah's employ and I (Cal Tinkham) was asked to join the staff. There were also two 1909 Whites dismantled. I started on the Whites in 1964 and finished them in 1965.

On August 17, 1965, I started work on the Doble E-24. I'll mention dates so you can get some idea of how much time Harrah's Automobile Collection does put into a restoration. The first step, of course, was checking blueprints, our library files, and anything I could find on this automobile to further the restoration, to make it as technically correct as we possibly could. I found out there was not enough material in our library, so during the time we were searching for more, I went on with the mechanical work that I could do there — this was the fan turbine and the feed water heater section. The turbine was in very bad shape. I don't know how many piston rings had dropped through the blading, but it's not good for turbine blading to have piston rings go through it. I think I spent about two weeks just straightening blading in this turbine, and during this time, there was a lot of discussion on the steam generator — exactly what we were going to do with this old generator. The next step was the rebuilding of the carburetor, burner and lower assembly, and I had set up a test firing arrangement of the burner just to see what it would do and what its characteristics were. We also made contact with Mr. William Besler of Besler Manufacturing Company, in Emeryville, California, the receiver of the Doble plant, who took over from the Dobles, and who still had quite a bit of information on the Dobles. It was extremely wonderful to be with Mr. Besler and enjoy his hospitality. He turned over their file cabinet to me with all the original Doble tracings, and I found the material that I needed there to complete the mechanical work on this car. Also, we looked at his Doble, E-23, and I asked to get it out for extensive photographs so I would have something to copy, too. Mr. Besler told me, "Well, you won't need photographs, take the car." He loaned me E-23 and we proceeded to drive it to Reno the next day. That was a trip I will never forget in my life. It's a grand automobile — it was a pleasure to drive, it's a fine running car. However, in Sacramento, we were getting a little low on fuel and Mr. Besler was a little tired, and since I was accompanying him in my car, we were swapping off driving my car and the Doble, he said he would nap for a while, and I'd go out and get some fuel. We stopped at the house of the fellow who was rebuilding our crankshaft, Mr. Shorty Tompkins, and I took Shorty with me to hunt up some diesel oil. We couldn't find any where Shorty lived and we had to drive into Sacramento. At the time we were driving into Sacramento, the fuel filter plugged and we lost fuel pressure to the burner, but not entirely, just enough so it would not ignite, and we were draining diesel oil into the hot combustion chamber and out behind the Doble you could not see the Freeway. I could see cars kind of diving off to the shoulders and we pulled over and stopped and the filter was the kind you could clean by turning the little handle, so we turned it, and I got the fire started and got out of there before any Highway Patrolmen came. We got to Sacramento, into a truck station, and filled up with diesel oil, and, of course, it was mentioned here about pulling into a service station and people seeing a steam engine under the hood - well, it throws them when you drive in with a touring car and ask for diesel fuel. The fellow said, "What kind of an engine do you have under that hood?" And I said, "Well, I don't."

I told him the engine was in the rear end, so he asked what was under the hood.

So, I said, "Well, there's a steam generator under the hood."

Then fellows came from all around the service station and had to see in the car. We opened the hood so they could see the generator, and they gave us all the service we could stand, practically. And then of course, they stand around because they have to hear it start. While I'm sitting there the steam generator is hanging on about 1000 pounds pressure, so this man is leaning in the car, and said, "What do you do to start it?", and I stepped on the throttle and the car started to move away, and he said, "Hey, wait a minute, it's going."

All these fellows are hollering, and this is one of the things you can do with a car like the Doble. One time at a service station, a fellow asked me, "What kind of a car is this?"

"It's a Doble," I said. He said, "I never heard of it." I replied, "Yes, it is quite unusual. It has 4 cylinders and 1 spark plug, and it has no transmission and the engine exhaust is in the radiator."

He was ready to throw me out, until I showed him what was under the hood. On the way back from the service station to Shorty Tompkins place, fuel burners, especially of the spray type, sometimes have a carbon built up on the electrodes which ignite the flame and it so happened that *(continued)*

we had that problem, and that generally results in a back fire. Everything was going along beautifully and Shorty was enjoying the ride — he had never ridden in any kind of a steam car before in his life — when all of a sudden, the Doble let go with one of the most beautiful back fires I've ever heard in my life — it actually had fire coming out from both sides of the car, and Shorty was just about over the side. He settled back down in the seat and he turned and looked at me and said, "You Know, I REALLY don't like this."

We stopped at his house and we cleaned the ignition points and from there on we had no trouble. Back to Reno, it was cool over the mountains, but on a Doble you can remove the carpet on the front of the first toe board and release the toeboard and you can drive along in below zero weather without a coat. It's very nice.

Anyway, we got the car back to Reno and we got the prints. I was set to really dig in on E-24 on this operation. It did create quite a sensation at the Collection when I drove E-23 to work — they didn't know I was bringing it. They all rode in it and saw how nice it did run. The car was purchased by Harrah's Automobile Collection and it is in a showroom there at the present time. I set up our burner for a test fire, and found out it would burn only on gasoline. Firing into a nicro fire box, getting the firebox heated to practically white heat, and then took the suction hose from the fuel pump from a gas can to a kerosene can and the kerosene will put the fire out. That showed me I had some problems there. We were going to have to do some work to make this car satisfactory, insofar as the burner was concerned. About November 4, we started the chassis restoration on E-24. As to the mechanical on that job, I had to take care of everything, not just the steam plant — everything — the steering, the wheels, the axles, every part of the chassis that is mechanical in the mechanical field in my classification, and final assembly, would be in my hands, so I had to do it all. You not only have to know steam, you have to know automobiles. It did help to have a good mechanical background in this line. Valves, valve stems, piston rods, and all that were sent out for hard chroming, and I consider that a must, especially in a museum situation where maybe the car will be run for a day or two or run in a series of things over a week, and then let sit, for maybe a couple of months in a showroom.

Acids will develop in your backing and will pit your piston rods. These pits will just tear the packing right out and you've got problems. With the hard chroming you eliminate a tremendous amount of problems.

Around December 7, we started work on the steam generator. Now, this, as I said before, was the old four control generator of the Doble sample project. The generator was in extremely sad shape. It has the multiplicity of strewed connections inside the fire — it had circuitry like you would not believe. It had the wildest connections I've ever seen in my life. Feed water heater up at the top, a pipe running down through to the bottom, that goes around and runs back up to the side that goes through and runs back down to the bottom, and it was just fantastic. Many of the connections were corroded and rusted, so we decided that the best thing to do with that particular generator was to build an F type boiler inside the case. We went ahead on this course. Another thing, the quadcontrol thermostat was quite a device. It was a U-tube type of thermostat where the steam went in on a small pipe, went around the end, and came back out at the same end. Below that would be another U-tube welded to it. Below that there was another one welded to it, so actually, it had six pipes welded into one solid unit. In the center of this was a small tube that carried the quartzrods.

That gives the expansion and contraction to this thermostat in the control box. But what happens? We have six pipes stacked up — the top pipe carrying superheated steam, the center pipe is carrying saturated steam, from the saturation zone the bottom tube is carrying cold feed water. Everything is going along fine until your feed water pumps come on and your thermostat goes out. I have the thermostat in our parts warehouse. It was also said that the car is very unreliable as far as temperature control is concerned. We went ahead with putting the F-type steam generator inside the original case. Now this did reduce the capacity of the generator in the car, so its performance would probably not be as great, say, as Barney Becker's Doble or Mr. Besler's Doble, which have the full sized stat type generator. However, it is very reliable and it works well and the car cruises nicely at 60, and I am quite satisfied with the performance of the steam generator. It is a little small, but it does work well, and we are glad that it does.

Another thing, on his quadcontrol generator, he dumped his normalizer water right in at the throttle valve, and then ran the throttle steam right back into the generator for another 30 feet before it came out and went to the engine. If you fill the amount of water from the normalizer past the throttle and it goes into the superheater coil, which then become evaporation coils, you can shut your throttle off, but this water will be evaporating and turning to steam in these coils and you just keep right on going. I had a very sad experience with that at the railroad one time when I opened the throttle in the locomotive and it came back out in my hand — the pressure had kicked it out — we carried a lot of water over to the superheating. I shut the throttle, but the steam evaporated in the superheater coils and I coupled up 7 locomotives that were in line. Something like this could be disastrous. So much of this generator had to be rebuilt in the shop. The helicon coils, the wall coils, the insulation (which is the insulation to keep the heat within the generator), and transfer to the water, not to let it escape out the side walls of the generator. It is built like a wall coil around the firebox at the top and also there is a road coil in this particular generator — it comes up over the top of the firebox, a conical coil was worked into the circuitry, and some of the old outlet fittings were worked into the circuitry to bring the saturated zone back down to the normalizer connection and into the superheater zone of the steam generator. We also had to lay out a new thermostat — it was one of the standard type and it does perform beautifully, and it regulates perfectly.

The next step was to build a firebox. Now it had a nichrome firebox, but it was designed to work next to a little small feed water heater coil about the size of my finger, and here I was working next to a saturated coil about the size of my thumb, but actually about 3/4 inch, but it was too big to fit into the case, so I had to form a new firebox out of stainless, along the same design as the nichrome, only slightly smaller in diameter. So, there I was, one mechanic having to do all of this, from building boilers and welding stainless, to getting into practically every type of fabrication, and machine work that I could get. Restoration covers a great scope, as far as the mechanical field goes.

After the coil stack was all built up, I assembled it as it would sit in the case, only sitting outside the case. I just stacked it up, put it all in one place, made all the connections into it, and then pressure tested this coil assembly at 2000 lbs. psi, which is not much for a tube, actually it could have taken 5000 lbs., but 2,000 is a good test - it will show your leaks. The next project was setting up the

burner and blower for more burner tests, trying to get a better combustion to make this burner perform better, so that we would not have to run the car on gasoline. I found one thing — that with the carburetor burner it worked quite a bit better with a back pressure, so that your combustion chamber was under pressured and I did that by setting up an outlet stack on top of the firebox, which was running upside down, and covering the outlet, graduating the opening sizes, my stack at the time was a 5 gallon bucket. You do not have to be very complicated to build something like this — only do not run it too long, or it will melt, but it does prove what is going to happen.

I did manage to blow that bucket up in the air a few times, and they were about ready to throw me out of the shop. However, I did prove the fact that it would burn much better under pressurized combustion and if we could burn about half gasoline and half kerosene mixture, the kerosene would burn if the fire was established, but after the firebox was hot, it still would not ignite. There was still more work to be done on that.

Another problem we had with this quadcontrol generator which we were going to carry over to our restoration was the fact that the outlet of the generator was extremely restricted by the tightest wound steam generator coil I have ever seen in my life. The coils were practically laying one tight against the other and to get the exhaust gas down through this coil stack would be like trying to blow through a spool of water. I do not know how it ever did anything at all. It was plugged with soot — the spacing could not have been a sixteenth of an inch on that coil. One big problem was if you had a backfire with this situation, where could the blast go? It could not go out through the coil stack — it was too restricted — the cast aluminum case was pretty strong, so the only place it could go was back into the blower. The blower was built of a very light aluminum casting and it had been blown apart and put back together quite a few times. This was renewed. I then set up the generator, installed the coils in the case, mounted the generator on legs and it was hooked to an electrically powered water pump to supply it with water and battery power for the blower motors and was set up as it would be in the car and the test firing of the generator first took place. It worked fine on gasoline, it would generate quite a degree of superheated steam and the controls worked fairly well. I was pleased with it, but still with kerosene I had my problems. I had some beautiful back fires out there — one of them especially when the secretaries were walking out to their coffee break. They did not like me much after that for a month or two, because I kind of scattered them. This also showed me the need of an outlet hood for the exhaust box, smoke box, whatever you want to call it, for the bottom of the generator, which would include explosion doors to relieve this pressure of a back fire. I built this in through the exhaust bonnet, and it worked beautifully. I know at some steam meets we have had ruptured steam generator cases. It does not take much spring pressure to hold against 3 or maybe 5 inches of water pressure, but that kind of a lift will let your blast out and you have no danger of anything going anywhere. The explosion doors are not new by any means, they used them on pulverized ball bearing boilers for years, wherever there was a chance for firebox explosions. This, I felt, was a good safety measure on this car. It might keep it in better shape. However, I found out later that I could have alleviated that — but I will go into that a little later. Also, a feature that I felt was important was putting in proper temperature indicating equipment and this we did with an electric thermo-couple barometer, multi-point barometers, so I could pick up the various number of readings at different points on the car and I feel this is great protection for the automobile itself. Then, the next project was to start on the auxiliary system of the car. I know quite a few of you are familiar with the Doble, but for those of you who are not, I would just like to list the functions of the auxiliary system of this car. It is driven with a drive shaft from the engine, it supplies the water, it carries the water pumps to the steam generator, it carries vacuum pumps for the condenser — it drives the electric generator to charge the batteries on the car — it operates the lubricators and puts the steam cylinder oil into the steam line and it also drives the speedometer. It has a dog-flush in it and a motorizing switch to disconnect the drive line and motorize the generator to pump water into the boiler while the car is setting. Consequently, it has quite a number of functions — it is a very complex drive, and as Abner Doble built everything, every bearing in the unit is a roller bearing. There are no friction bearings in this auxiliary unit, so to rebuild that took quite a bit of time. In the meantime, I took the time out to rebuild a steam launch engine out of the Averys, which is our small steam boat down at Lake Tahoe. I think some of you may have ridden in the boat in 1962. However, at the time I went to get the engine, it was about December, and Lake Tahoe in December is generally pretty snowy. We ended taking the engine out of the boat and sledding it up a hill, wading around in snow drifts. I felt like I was in Alaska, instead of Nevada. This is just one of the many things you get into at the Automobile Collection.

Also, we purchased a Stanley Mountain Wagon, and there was an effort to get this Mountain Wagon running for the Reno Tour. We worked quite extensively on this Mountain Wagon and I was, however, defeated by a very poor boiler, so it could not go on the tour.

In August of that year, the Doble crankcase and the shaft came back, so I could start the assembly of the engine. All my other components for the engine had returned, and the Doble engine is quite a complex device, because it not only entails the engine, it also is the differential, rear end assembly, and I also find out today that one of the very first to eliminate its split differential, so I was told by a man in Detroit who is looking up history on that. In September, the engine assembly was finished. I started mounting components into the chassis, fan turbine, steam generator, auxiliary unit and started connecting it up. There is more plumbing in a Doble than there is in an average home, I would say quite a bit more than any average home. It has pipes for everything, going in all directions. I also assembled the rear end and set the engine into the chassis. One thing that had been missing was a compensator valve, which had been lost through the many years. We managed to get another compensator valve and I rebuilt this piece of equipment and piped it into the circuitry of the F generator. It is a rather interesting little device. It is what is known as a differential compensator and its purpose is to take care of the varying amounts of water that are delivered to the steam generator at the varying speeds of the car. These pumps are run directly off the engine. If you are driving 60, the pumps are going fast, whether going uphill or down, or however you are doing it. This compensator will compensate for the varying amounts of water delivered to the car. It is an intricate little device, it is simple and it works quite well. It is noisy, though. That is one thing that I did not like about it. I did get quite a bit of help from Barney Becker on the piping of this compensator and he was another extremely valuable friend to have in this project of rebuilding the Doble. I spent more time with

(continued)

William Besler on the carburetor— we discussed carburetor burners — he showed me his stock of carburetors — some of the early twin-carburetors on the early E series boilers and some of the later F-carburetors, and I did get some ideas from that. Mr. Besler also donated a new water tank for our chassis. The water tank on E-24 at one time had exploded. I do not doubt that Abner tried a pressurizer for the water tank or something like that and he got carried away and the thing blew up. It had been rather badly mangled and put back together, so this water tank from Mr. Besler is still out of the old Doble original stock and was a Godsend to us. We did not have to build one.

With the engine in, hooking up the exhaust lines, steam lines, making steam lines and many other parts of the car, we were coming close to getting the chassis in runnable condition. Using the information from Mr. Besler on the carburetor, I redesigned the air coil in the Venturi — I was working also with our carburetion expert at the Collection — and we managed to make that carburetor output just kind of a long ragged stream that would shoot from the burner way down past the end of the table, to just a pretty stream of kerosene that would come out maybe 5 feet and pretty well dissipate. I figured we were getting better atomization and, sure enough, once the firebox was warm, it would ignite on pure kerosene, with very little back fire and I eliminated my explosion doors that way, but since they are there, they are going to stay there.

We fitted the priming tanks so we could prime the burner, the original E burners and carburetors, added the priming fuel tank up under the dash. If you have seen a picture of the Doble chassis, you wi II see a little black tank up under the dashboard. This was priming gasoline, so you could start the carburetor on gasoline and change it to kerosene once it warmed up. We had no room under our dash for that because of the experimental work that Abner had done, even part of the blower housing and air line extend back under the dashboard, so we had no room. We had to use a different form of getting the fuel there and that was with a small fuel pump. This was for priming the carburetor and it worked beautifully. We are still following the principles of trying to stay as close as we can to the original operation of the cars.

The next thing was to set up a temporary dashboard speed face on the chassis, because, not like a gas car, where you might just hang an oil pressure gauge on it, on a steam automobile, you have to have all your component gauges for this steam plant. It is just as complete in a chassis as it would be in a car, and you have to know your circuitry, especially if you are starting out from scratch like I was and you do not know where your controls are set. I built a complete dashboard and wired it in the car controlwise and instrumented the car the same as it would be with the body on it. So here I had this fine looking chassis, with a plywood dash covered with instruments, and this big silver steam generator out front with nothing in the back and the engine down below the frame and the plywood seats, based with a hydroplank seat mounted on that. And with this I was preparing for test driving the car. I also put a panic button on my dashboard. I wanted something that would cut the whole system, just in case I had an emergency, and you never know what is going to come up. As an experimenter, I think Carl Guth will go along with me on that — you never know what is going to happen, and it usually does. However, I was lucky, I never did have to use the panic switch.

January 23, 1967, it ran. I took it out to the wash rack, fired it up, blew out the coils both ways, to get rid of any debris that will end up in any steam generator coil, put it on stands and started rotating the engine, and it ran very nicely. It was taken off the stands and started running around the yard on its own power. It had been about the first time in 5 years that the car had run under its own power. I was very pleased with things, but there were little leaks and repairs and things that you see are going to be problems and you go back to the shop and you work on it for a couple of days and then take it out again. One of the important things I did there was put a pressure gauge on the cylinder oil line to make sure that the lubricator was putting out enough pressure to overcome our steam generator pressure, and force oil into the steam line. On a piston valve, it won't last very long if they are not getting oil, and especially at 750 degrees of superheat. I also found I had to install some heat shields in the steam generator around some of the threaded joints that were inside the case, and some of them were unavoidable, rebuilding it that way. On the second test run, the steam temperature was kind of wild, the water control was not accurate, and these were bugs that were worked out. We had to change the carburetor, normalize the jets and checkproof the operation. The Doble uses a pump that has the solenoid controls valve on each pump. The solenoid opens the inlet valve, either makes it function or not function. With a gauge on your board outlet line, just watch the gauge and you can tell what your pump wants you to do just by watching the rotation of the auxiliary unit. I found that I had one pump plunger that was not functioning, or, in fact, it was functioning too well. It would not unload, and it was shoving water into the boiler all the time, and these are just some of the test items that are made on the car that will improve the operation and make it operate correctly. Finally, everything was working fairly well, but the maximum speed of the chassis at that time was 50 miles per hour. 50 miles per hour is poor on a chassis, because when you put the body on it, this is going to drag it down another 20 miles an hour, so you do not have a very speedy car. For this we procured a draft booster turbine on the exhaust steam line where it belongs. I made some tests with an electric draft boost and proved to myself that the power was not in the electrical system, by burning out the generator. I used the exhaust steam turbine and boosted the steam in the car so I would not dare be able to put my foot in it and ran faster than I wanted to run it.

After the draft booster turbine was installed with only a 7½ lb. pressure drop across this turbine on the exhaust line, I boosted that steam pressure to where the steam generator cut off was hitting around 80 miles per hour. I did get up to about 85 once, and I was not too sure because the wheels had not been balanced on the car and I was hopping all over the highway, just sitting on an open seat on an open chassis looking like Snoopy when he's riding his camel and I decided that was about enough. That was the speed test and I was happy with it. We decided on a climbing test up the Geiger Grade, which runs from south of Reno to Virginia City. We call it the Highway in the Sky and it is quite an upgrade. The E-24 went over just like a happy, frisky colt — it would go around a curve much faster than I would care to drive it. About a third of the way up, she suddenly started to give a whir, whir, whir and kind of bucked a little bit, and I pulled her into a big wide area. It felt like a link-hanger had slipped in the engine and one side of the engine had reversed, as it has two link-hangers. I opened the crankcase cover and lo and behold, the crankshaft was hanging out of line and it was broken again. That put a stop to our running and testing, but did not put a stop to the restoration project. We brought the car back in and tore down the engine and started looking for a shaft. I immediately called on my friend, Mr. Besler,

again, and he tried, but he had nothing that could help us. He did bring some shaft sections but they were not usable. He also looked for some shaft sections, but there just are none, and they are not available. I found a Doble front engine, which was used on the Oakland bus for about 3 years at the time of a terminal contract between Doble and General Motors. We managed to buy that engine and tore it down to see if by any chance we could use the crankshaft sections from this engine in our automobile engine. The cylinders and crosshead guides on this engine were E-Doble, the same as in our automobile. However, the crankshaft was larger, the holes were a little bit larger and the main bearings set out wider. We just could not work that shaft in, and it was very disappointing, because it was in beautiful condition. The bus which we have out at the Automobile Collection is completely assembled, and it is in the showroom next to Doble E-23 and it has a plexi-glass case on it so you can see the valve connections, bearings, valve gears, etc. on that engine. It is similar to an automobile, except for the rear end axles. Of course, it is a heavy truck axle. In the meantime, we started preparation of the body of the car because that is just as important as the chassis and the running gear. At this time we also decided to go ahead and build a new boiler for our Stanley Mountain Wagon to replace the one which was giving me so much trouble, so I learned quite a bit about Stanley boilers. As I built the boiler from one end to the other, from drilling and drilling the shelves to drilling and reading and installing the wiring, I learned it all. This was the 30 horse power boiler, 26 inches in diameter and contains 999 tubes. We estimated it took 20 hammer blows to sledge each end of each tube, so we figured it took about 30,000 hammer blows. My arms were sore for about 4 weeks after that. It was a very interesting job, and it takes you further into the history of these cars, the way they were built, and the different methods people had. Back to Doble E-24 — the body assembly went ahead. There was an extensive amount of work on the body. Mr. Hempel had rebuilt this body back to a coupe again to make it look original, but, of course, he did not have the facilities that we have at Harrah's in our woodworking shop, so we had to remove his work. There is still some of the old fourseater top left in there. We built the top as Murphy in Pasadena, who built it originally, would have done. We followed his idea and got it as close as we felt it could be to the way Abner Doble had it.

In our research department, they go through a car very carefully, listing small items and pieces here and there, looking for leather scraps that might be under a piece of molding, looking for pieces that were under a body plate or behind a bracket so we can get the original color. We have managed to bring this not only to leather outside, but to the top and to the interior leather that was used in the car when it was made. That shows you how careful our research department is. There are times when we feel they are our biggest headache, but they also are our biggest blessing too. They spend many hours looking up information on this sort of thing, to make the car as accurate historically as it possibly can be. It is said that 100 years from now, if someone wants to see how it was done, they can go to one of the cars that has been restored at Harrah's and know just what was done when the car was made.

We were still awaiting our new crankshaft for Doble E-24. The body work was finished and the body was set on the chassis on January 17, 1968, which was just about a year after the car chassis was first run. We started wiring and gauge connecting fittings between the body and the chassis with various control points on the chassis and the steam power plant. February 2, the dashboard was set into the body and the instrument installation started going in. That was completed February 26, and that included connections between the fire control and the dashboard and pressurizing and electrical connections and mechanical connections, etc., and believe me, there are a lot of them beneath the dashboard. I don't know if any of you have ever looked under Barney Becker's dashboard. Of course, his has been augmented a little bit, but ours is almost as bad, and it is original. This work even included fitting the body trim, the trim around the molding and around the leather tops. We rebuilt bumpers and brought them back to the original, right down to the original emblem on the front of the bumper. The chassis wiring was done, and then I started rebuilding the crankcase of the engine in preparation for the reinstallation of the crankshaft. We had the same problem in our crankcase which many Dobles develop. You have a center main bearing which supports the two center main bearings of the crankshaft. The crankshaft is in 2 pieces to install into the case and install the center gear and the two halves of the shaft go into the case. They come into the top and lock into place. The case is weak in the center section because there are two big studs coming up to hold the main bearing in place. The webbing on each side of the studs is thin and the stresses are high, and, consequently, the cases are cracked on each side of these studs, all four studs. Your center section of the main bearings and crankshaft and everything will rock back and forth with the pressures involved in this steam engine, and they are tremendous. When this center section is rocking, the outside edge cannot rock because it is webbed right inside the crankcase, so your shaft is actually flexing back and forth, and that can only lead to one thing — lurching. I made and added braces to this crankcase and made new through studs, which were taken to the main bearings. The studs come up into the braces, and these braces were pulled down solid over the center main bearing. Braces were brought to the front of the engine and

(continued)

Calvin C. Tinkham, Mrs. Abner Doble, (widow of the late Abner Doble, builder of the Doble Steam Automobile), grand daughter of Mrs. Abner Doble and friend.

connected into the crosshead guide bolts to put a solid connection on both sides of the crankshaft, and now that crankshaft is as solid as a rock. If you can put in the time, do line up the main bearing. However, it was very successful. There is not a sound out of the engine. At least it sounds like an electric motor running back there. One of the projects that was done in the restoration of the car was the manufacture of a new condenser. Mr. Hempel had fitted a thin tube condenser to the car which would be the same as a big truck radiator, and it worked beautifully. However, it was not original, so we built a Honeycomb condenser which is the hexigonal tube all stacked together. In this condenser there are 9,600 individual tubes soldered together. We are unfortunate in one thing — the condenser was built a little too tight and the tubes are spaced too closely. The volume of steam could not penetrate through the tubes and into the condenser and prevented full condensation. We have a back pressure problem, but this will be taken care of and we will make another one that will work. This shows the perseverance that the Collection has for its goal, not only because it looks right, because it looks beautiful and it looks correct, but we want it to work right. Anything on the car, any automobile in the Collection has been restored by the Collection, will run and meet the specifications of its time of manufacture. It has to run well; it may look pretty, but it performs pretty too. ! think Jim Crank would be willing to testify to that. His hair is still kind of flattened out from one experience. The car was completed in time to make the Concourse in Pebble Beach. That was the big time of our completion date that we were shooting for. It took first in its class, which pleased me tremendously. It was also shown at the Silverorado Concourse in Sacramento where Mrs. Abner Doble was the guest of honor, and she was extremely pleased to see the car again. I took her for a drive in it, which was quite an emotional experience for her and it got to me, too, because she was talking about the many miles she and her husband had in the car in England, Germany and New Zealand, and it was quite a thing to see this car back the way it was when her husband had it. That was the restoration of E-24.

IN MEMORIUM

We were most saddened to learn of the passing of Wayne 0. Nutting and his wife, Beth, following an accident caused by butane gas tank failure. Mr. Nutting passed away Monday, April 28 and Mrs. Nutting, Wednesday, April 30. Burial for Mr. and Mrs. Nutting was Saturday, May 3, in Inglewood Park Cemetery, Inglewood, California.

Mr. Nutting was a member of the Steam Automobile Club of America since 1959, was extremely active in the club, and did much to interest others in steam automobiles. Mr. and Mrs. Nutting attended many of the steam car meets held by the Steam Automobile Club of America. This was a great loss to all and our sincere sympathy is extended to the entire Nutting family.

It is with deep regret that we learned of the passing of two other long time members of the Steam Automobile Club of America, Inc., Luther T. Cloud of Richmond, California, and Einar Petersen, of Hollywood, California. Mr. Cloud had been a member since 1960 and was always most interested in furthering the development of a modern steam car. Mr. Petersen had been a member since 1958 and also had added much to the club by his attendance at meets and constant interest in steam cars, both antique and modern. We will miss these members greatly and our sincere condolences are extended to their families.

QUIZ FOR ANTIQUE CAR BUFFS

(This quiz is strictly for antique car buffs. It was made up as a promotion by the Chase Manhattan Bank in New York City. It should be especially tough, even for an expert, since the original quiz had some photographs of the cars in question. Anyhow, give it a whirl. The answers appear on page 18.

1. America's first mass-produced gasoline car; this little buggy-like vehicle sold for $650.00 in 1901.
2. In 1902, this popular car featured an engine under the seat and back-to-back seating. The name was discontinued after 1913, but has been revived.
3. In production between 1903 and 1924, this was America's most popular and best-remembered steam automobile.
4. Known fondly as the "Tinlizzie," more than 15 million of these cars were made between 1909 and 1927.
5. Considered the single most desirable item to collectors of antique automobiles, one of these cars recently brought $45,000.00 at an auction.
6. This elegant vehicle featured a canework paneled body and lavish interior appointments. It was powered by an extraordinary 16-cylinder engine, which produced the effect of quiet and effortless motion.
7. One of Europe's most celebrated luxury cars, this model was intended for use by crowned heads only. It was probably the largest and most expensive automobile ever made. Only six were known to have been completed.
8. Since 1906, this has been one of the world's great prestige cars. Although this make is usually associated with formal closed cars, they also produced closed cars; it also produces roadsters.
9. This was one of the finest cars ever made in America. Custom built to the buyer's specifications, no two were alike. With a supercharged engine, it could accelerate to 100 miles per hour in 17 seconds from a standing start.
10. With its futuristic styling, this was the sensation of the 1935 New York Automobile Show. It was the first car to feature retractable headlights, a disappearing top and to do away with running boards.
11. This was one of Europe's finest and most glamorous pre-World II sports cars. It could cruise easily at 105 miles per hour and was capable of even greater speed with super-charger engaged.
12. Considered to be one of the most beautiful American Classic cars, this automobile was exhibited by a museum for excellence as a work of art.

William D. Thompson Plans to Race a Steam Car This Year

It has been reported that William D. Thompson, of San Diego, California, a retired automotive engineer, is in the process of developing a smog less automobile.

Thompson has stated that he has been working on the production of a steam car since 1961 and it has passed operational tests at a plant in Philadelphia.

Much discussion has taken place recently as to the practicality of steam cars. Several engineering experts have stated that due to cost factors, feasible engineering and design of a steam car are in the future several years from now.

However, Thompson feels those who made these statements were without knowledge of his invention. Thompson says he has solved all of his problems. He has stated that thermal efficiency is far higher than in a diesel, and that his engine is smogless and the exhaust emission could be breathed because it is just warm air coming out of the pipe.

Thompson disclaims the statement that he will have a steam racer ready to drive in the Indianapolis 500-mile Memorial Day Classic. He stated the car will not be ready at that time, but he does hope to have it ready for the Can Am series and the Watkins Glen Grand Prix this year. He plans to enter a steam car in the Indianapolis 500 and at Le Mans in 1970.

Thompson is not only going to build 250 luxury cars (his original thought), but also a race car and a medium sized steam car.

The selling price for the luxury model will be $35,000.00 and nearly all 250 of these luxury cars have already been spoken for.

The smaller version will be about $2,000.00, but Thompson, personally, will not produce it. The same power plant will be used in the smaller car, but it will be subject to the changes by a potential manufacturer.

Thompson estimates his race car will have a top speed of 228 miles per hour with an engine speed of only 3600 revolutions per minute. There is no transmission and the direct drive to the rear axle is via standard differential gears.

Other features which make Thompson's steam plant more efficient and practical than others are:

1. A tankful of water will need more water added only after each 2,000 miles,
2. The whole assemblage runs silently.
3. It is absolutely pollutant-free. Exhaust from a small starter engine is piped to a reactor for complete burning.
4. Fuel economy of approximately 50 miles per gallon (one part gasoline and two parts kerosene) can be expected.
5. Water is also used as a partial fuel; an electrical energizer decomposes water to help supply oxygen.
6. Fuel oil or diesel oil can be substituted for kerosene.
7. Aluminum, stainless steel, and brass is used in components to give a favorable power-to-weight ratio.

Once the starter button is pushed, a small specially designed gas-powered internal combustion engine located in front is started by a standard battery distributor-spark combination. This motor and a vacuum pump generates electricity via an alternator — 7½ kilowatts at 120 volts. Waste heat from the internal combustion engine pre-heats the water. It is further heated by electric power before entering the steam generator, and current from the alternator excites the reactor as well. The reactor — placed in the rear — burns kerosene and gasoline mixed with pure oxygen plus outside air which is pumped in. The oxygen generator also produces hydrogen which is separated by a patented separator. The hydrogen is then introduced into the combustion chamber at a different point than the oxygen. The fuel is gravity-fed to electronically controlled fuel valves, which feed hot, vaporized and pressurized fuel to the combustion chamber.

Exothermic heat is provided by the post-ignition injection of pure hydrogen, super-heating water for high pressure steam. Almost-instant steam from the steam generator coils surrounding the reactor drives six opposing pistons in a compact, lightweight engine, which has only 14 moving parts. Piston bore and stroke are 2¼ x 4¼ inches. The pistons float in a vacuum, eliminating pressure. Minimum

William D. Thompson ~ Article (continued)

and maximum horsepower will be 220 and 575, respectively, and is controlled by the driver with a flip of the switch.

A computer — actuated by the accelerator pedal — regulates and controls the amount of steam needed to achieve desired speeds. Acceleration characteristics will be far superior to standard gas-powered cars, Thompson asserted.

An electrically powered refrigeration unit in front serves for interior air conditioning, as well as keeping the steam condenser regulated for proper water temperature.

Superior braking ability is expected by three independent systems.

Non-skid, pulsating-type electrically operated brakes.

A conventional dual hydraulic system used as a secondary brake in conjunction with the one above.

A dynamic-type rear-wheel brake.

A Touch of Humor

Carbor: *— Yes, by a long period of self-denial, I have become the owner of a motor car.*

Rettor: *— Better keep in training, old man; your self-denial has just begun.*

ANSWERS to Quiz for Antique Car Buffs on Page 17.

1. Curved-Dash Oldsmobile; 2. Rambler; 3. 1910 Stanley;
4. 1911 Model T. Ford; 5. 1913 Mercer Raceabout;
6. 1931 Cadillac V-16 Town Brougham;
7. 1931 Bugatti Royale 8. 1931 Rolls Royce Phantom II
9. 1934 Duessenberg SJ Torpedo-Phaeton
10. Cord Convertible 11. 1939 Mercedes Benz 540-K
12. 1941 Lincoln-Continental.

What If They Had Bought LOCOMOBILES?

In the days of the horse-drawn carriages and farm wagons, a pioneering North Carolinian named J. Franklin Dunlap bought a Dodge automobile.

At this time, he was operating a country store at a rural crossroad about half way between Winston-Salem and the Virginia line. The store was a meeting place for the young folk; the spot where they gathered to talk about crops, local politics, and the new horseless carriages. One of the frequent visitors to the store was Alex Flinchum. He liked Dunlap's car and bought a Dodge just like it. The fact that there were two cars there was news. The fact that both cars were Dodges caused the people to refer to that crossroad as Dodgetown.

Fifty years later, local residents and state maps still do.

See Cover Photo

New Thermosludge Steam Generator Delivered to Me Culloch Oil Corp.

Edgar Bergen cranked up his 1908 White steam car for a trip to Brea, California to see the new Thermosludge Steam Generator that Gas Processors Inc. was delivering to McCulloch Oil Corp. Accompanying the famous entertainment star, who is Hollywood's most dedicated steam enthusiast, collector, and historian were Charlie McCarthy, Mortimer Snerd, and the beautiful young actress, Devon Blaine.

The steamer was delivered to McCulloch for installation on its Belridge lease in Kern County, California. It is the first steamer that McCulloch Oil has purchased for that area, reports Pat Fazio, McCulloch Vice-president.

Using untreated waste water, the Thermosludge plant generator can produce 100% quality steam from water that is hard, salty or oily. Water flow, heat and fuel are automatically adjusted. Automatic blowdown of wastes and the uniquely designed, inherent chemical reaction process keep the boiler maintenance free for continuous operation and thermal efficiency.

The McCulloch unit can generate up to 23,000,000 BTU's an hour and can be fired with a crude, diesel or fuel oil, as well as by LPG or natural gas. It operates with pressures up to 1500 psi and delivers 100% of its net output as steam, reducing water saturation in the oil producing formation and scale around the well bore.

The entire plant consists of several assemblies, all of which are skid mounted. The unit is fully fabricated and tested at Gas Processors' Brea plant, and is then broken down and trucked to the drilling site, where it is easily reassembled. This technique also enables the steamer to be economically moved from one field to another.

The success of the Thermosludge Steam Generator in California's oil fields has created intense interest in its industrial applications, for steam power, sulfur recovery, and the abatement of water pollution.

Gas processors' President, Ralph Thompson, and McCulloch's Pat Fazio, presented a commemorative plaque to Edgar Bergen on his visit to the colorful dedication ceremony ". . . in appreciation of his interest in steam technology". A large crowd of other steam enthusiasts, as well as young children who wanted to talk to Charlie McCarthy, made the event one of the most entertaining and unique send-offs any oil field equipment ever had.

Hollywood's most zestful steam enthusiast, the famous star's engineering hobby takes him all over the United States, collecting old steam machines, and learning about the latest inventions in steam power.

Bergen's 1908 White steam car still takes to the road and can reach speeds as high as 80 miles an hour — with no smog. His collection ranges from an early popcorn maker to a wheat threshing machine — all run on steam. It's a lifelong hobby that has made the famous entertainer Hollywood's leading steam expert and historian.

Advertisements. *Classifieds:* $1.00 minimum for 4 lines or less. 50¢ ea. addtl. line. Photos included at display ad rate. *Display ads* (boxed, and with various type) $3.00 per column inch for printed matter and camera-ready copy. *Full page rate:* $50.00 subject to special layout costs. *Preceding rates* are on one-time basis; 10% discount on consecutive additional insertions. *Please send* requests for information, all advertising copy, and payment therefor, to: Advertising Manager, The Steam Automobile, 1937 E. 71st St., Chicago, Illinois 60649. Payment should accompany orders for ads, where possible. Inquiries are invited.

FOR SALE

BROOKS ENGINE, BOILER & LUBRICATOR, mounted in a Graham Paige Chassis. 2 extra boilers and 1 engine, and a White Compound Engine and other odds and ends... E. J. Groves, 9 Cascade St., Parry Sound, Ontario, Canada

---

STEAM TRACTOR and 4 SEAT TRAILER with awnings and lights as seen at Worthington, Ohio meet in 1968. Trailer for tractor, snow blower, and a 2 blade rotary grass cutter, cuts 48" wide. All components can be transferred to a car as a conversion. All controls are automatic. . . $5,500. Phone or write: HAROLD G. JANSON, 6255 N. Hiawatha St., Chicago, Ill. 60646 — Phone: Area 312 — 631-6567

1918 STANLEY — 5 Passenger Touring Car — Has Williams Steam Generator and Controls. Just turn the ignition switch and go. Needs paint and reupholstering. Engine and pumps recently rebuilt. Priced at $7,500... Robert L. Lyon, 1937 E. 71st St., Chicago, Ill. 60649 — Area 312 — DO 3-4216

MODEL 735 7 Passenger Stanley Limousine, Excellent condition, unrestored, mechanically perfect.... $4,200.00.... Carl R. Guth, 10215 N. 38th St., Phoenix, Ariz. 85028

FOR SALE

ELECTRIC TUBE WINDER. Originally purchased to make coil boilers for steam cars. Excellent condition. 3/4 horse motor, on rollers. Must sell. For more information and to see, contact David Krall, 4218 Torrence Ave., Hammond, Indiana 46327

WANTED

CONDENSER and SHELL; also front hub for late model Stanley. Need 4 wood wheels and rims using 600 x 20 tires. Wheels only, no hubs... Fred A. Buess, P. O. Box 967, San Jacinto, Calif. 92383

$200 REWARD for information leading to the apprehension of person or persons who broke into and stole 1 1904 10 H.P. Stanley steam engine; 1 Locomobile steam engine, brass antique auto lamps and other antique auto items valued at over $1,000 from the premises of A. W. Fogelstrom, 543 Blair, Eugene, Oregon. Please contact Glen Fogelstrom, 1050 West 5th, Eugene, Oregon, Area 503, 345-5107, or Detective Gusse, Eugene Police Dept.

MEMBERSHIP APPLICATION to: STEAM AUTOMOBILE CLUB OF AMERICA, INC.

Annual Dues: $6.50, membership includes "The Steam Automobile," for one year. Make Check or Money Order payable to Steam Automobile Club of America, Inc., and send to the Steam Automobile Club, 1937 E. 71st St., Chicago, Illinois 60649.

NAME_____

ADDRESS_____

If available at reasonable cost, would you be interested in purchasing steam car?

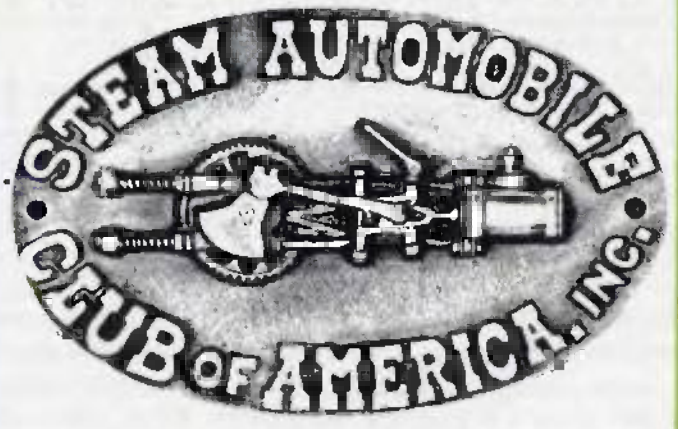
Yes ☐ No ☐

Please list any Steam Cars, Steam Boats, Steam Engines, Steam Tractors, etc., you own:

	Engine No.	Serial No.	Body Type

Condition: A. Restored, Running; B. Restored, Museum; C. As Found; D. Restoring; E. Running.

S.A.C.A. EMBLEM



- It's a heavy bronze casting, 4½" long, suitable for mounting on the dash of your car, or as a paperweight or desk ornament.
- The engine, cast in deep relief, is a representation of the original engine, now in the Smithsonian, with which Fred Marriott set the World's speed record of 127.6 M.P.H., at Daytona Beach in 1906.
- Get your emblem from The Steam Automobile, 1937 E. 71st St., Chicago, Illinois 60649. Price $5.00. Make checks payable to The Steam Automobile Club of America, Inc.

When sending in your membership dues, or whenever you correspond with the

STEAM AUTOMOBILE CLUB OF AMERICA INC.

PLEASE be sure to supply us with your Postal ZIP CODE NUMBER.

Proposed 1969 Steam Car Meets

Further information and exact dates and locations, where not given, will be published in next issue of THE STEAM AUTOMOBILE:

AUGUST 15-16-17 — Oberlin Inn, Oberlin, Ohio

SEPTEMBER 18-19-20 — Wilmington, Delaware Tour

OCTOBER 17-18-19 — Western Region (Location to be Announced)

NOVEMBER 14-15-16 — Ramada Inn, Deerfield, Florida

You are cordially invited to attend the 15th Annual National Antique and Classic Car Tour, July 26, 1969, at Hamilton, Ohio. For complete information and details, please write:

Paul Lashbrook
15th Annual National Antique & Classic Car Tour Headquarters
6 Court St. • Hamilton, Ohio 45011

Dear Members:

"The Steam Automobile" is your magazine and we would appreciate receiving articles, stories, experiences with antique steam cars or projects with modern steam engines, etc. from you for publication in the magazine. When sending material, please indicate that it *is* for publication. Do not be discouraged if you do not see your work in the very next issue, for these articles are scheduled according to space and particular interest at a given time. We try to provide something of interest for all — antique steam car buffs and those ready to build, or buy, or interested in the possibility of a modern steam car.

Let us hear from you.

Send all material, together with pictures, graphs and charts if possible, to:

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1937 E. 71st St. • Chicago, Ill. 60649

The Steam Automobile Club of America, Inc.
1937 East 71st Street
Chicago, Illinois 60649

Mail to: