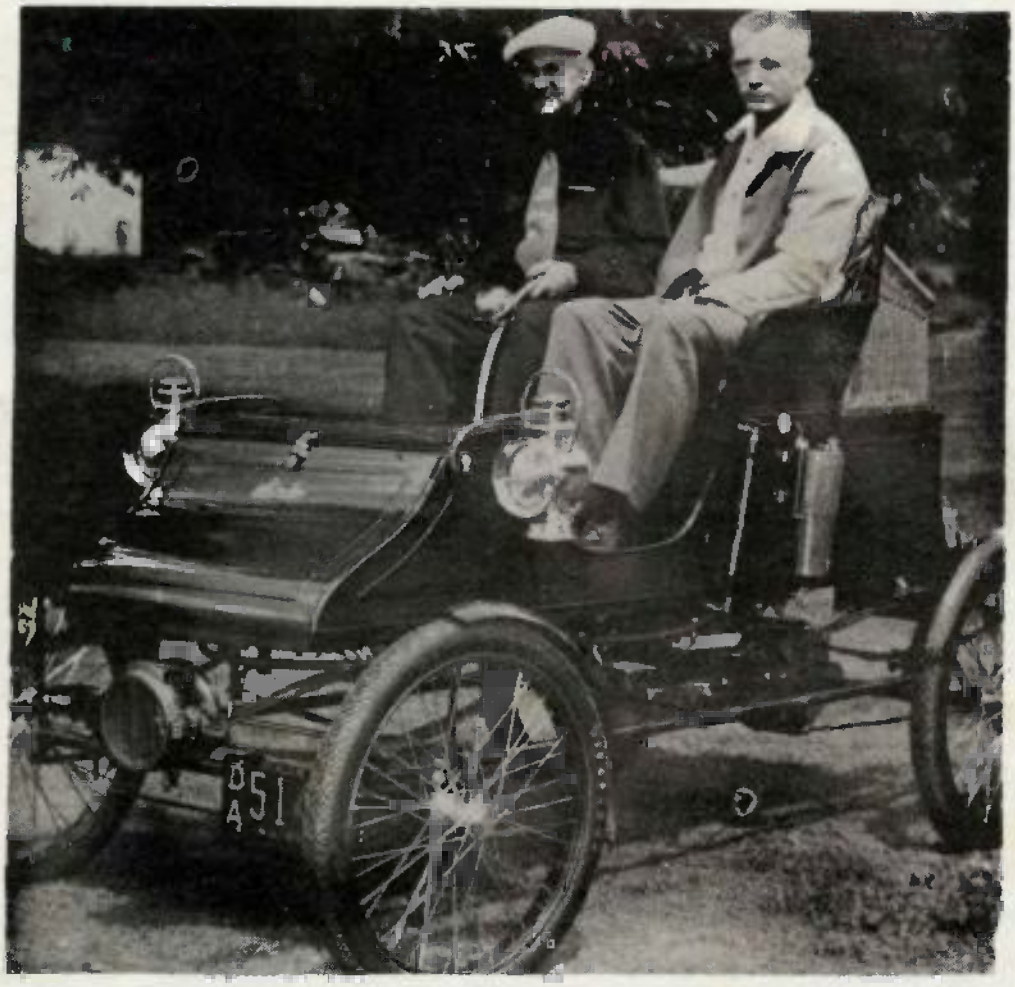
# THE STEAM AUTOMOBILE



Vol. 1 Fall 1958 No. 1

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## THERE IS A MODERN STEAM CAR IN YOUR FUTURE

If anyone can tell which of the several groups that have recently designed and built experimental modern steam cars will be first on the street with a successfully operating steam car, I'm sure we would all be at ease.

The Detroit iron is running out of sales ideas and steam is still uppermost in the public mind as being the ideal power for cars. Its smooth silent power is something to be desired in automobiles.

The Steam Meets around the country have brought together the hobbyist with his outstanding restoration of antique steam cars of all makes, some we didn't know existed.

The recent card survey indicated high interest in Steam Meets everywhere and in both modern and antique cars. In 1959, the Steam Automobile Club of America will have three Steam Car Meets, date and location to be announced.

One thing I can say is that all of the Steam Automobile Club of America members are certainly interested in the Steam Meets, Each is doing a marvelous job cooperating with all the activities and events. Those who are working on modern steam cars are keeping us informed of their progress.

Your officers and directors are striving to make your club and the Steam Car Meets the most interesting possible. However, your cooperation is needed. We do need an editor to write up articles about steam and our Steam Meets.

Robert L. Lyon
President

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# The Steam Automobile

Vol. 1 Fall 1958 No. 1

Official publication of the Steam Automobile Club of America, Inc. Mailing address: Box 335C, Staten Island 8, New York

## Contents



Cover: Photo shows 1903 Stanley owned by Earle S. Eckel, Washington, New Jersey. Probably the best of any antique restoration, it is rated by True's Automotive Yearbook as one of the ten most cherished cars.

We'd like to include the car that YOU cherish most in the next issue of the Steam Automobile. Send us a photo of your car or steam experiments. Just be sure to put the name, address of owner and a short explanation of the picture, on the back of the photo, or paste description to the

We hope you like this first issue of The Steam Automobile. It has been edited especially for the U. S. steam enthusiast. Your opinions, suggestions, and especially, your contributions will be appreciated. Keep them coming.

The new Steam Roster will be mailed to all paid members in December. Look for it. We've had to wait for some late returns.



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## Editorial

During the year we have attended Steam Gar Meets at Lakeville, Connecticut, and Lake Forest, Illinois. Aside from enjoying the steamers, there was the opportunity to talk personally with a few hundred of the most active and enthusiastic steam fans. Almost overnight the number of restored steamers, conversion projects, and modern attempts to harness steam to the automobile have mushroomed into a great national hobby. For some of us the steamer is nothing new. Our fathers had a Stanley and we grew up around them. All the adjustments and firing-up proceedure are so simple that we have no need to study about them..

But for the majority of the new steam enthusiasts, this is not so. Caught up by the silence of a passing Stanley, a short ride at some charity bazaar, or just from reading one of the many articles about the old steamers, is an ever growing 'new generation' of steam fans. Most of them keyed up by a brief encounter with steam, want to restore the Stanley they have finally found, but how do you go about it? Others want a conversion unit to drop into their gas car in place of the noisy engine made in Detroit. Some want to build a boiler with 75 feet of tubing. Another wants to heat the water with an electric hot-plate. One fellow wants to build a small turbine on each wheel.

These are all noble attempts to develop steam cars, but they lack proper direction and basic principles. Talking with the designer of a modern steam project which has cost over $50,000. for development, he admitted he had designed the steam engine although he had never even ridden in a steamer. Such activity can only lead to a lot of wasted money; resulting projects, if publicized, will literally ruin the steam car reputation, and possibly nay even result in a serious boiler explosion which might not only create great local injury, but could also instigate legislation to rule steamers off the road for us all.

Our aim, then, is to maintain the high level of steam restoration, the congenial steam get-to-gethers, and the joy of operating our steamers safely. Our hobby is one of many choices which give us countless opportunities to disagree. Be it flash vs. fire-tube, or antique vs. modern; all these are personal preferences and have their place.

We feel that the establishment of a steam car enthusiasts club is necessary as a common medium to give and receive information, and promote steam car Meets, so that we can continue to enjoy our hobby together with all our new friends. We are counting on everyone to help make this club a success. Lets all work together to keep steam alive.



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## California Steam Meet

Steam went West this year, with a bang-up Steam Car Meet Sept. 19-20th. Buena Park was the location of the first Meet sponsored by the Steam Automobile Club of America, under the direction of Treasurer Ken Maxwell, Carl Guth, and Dick Philippi.

Nothing held the steamers back. Carl Guth started at 1 A.M. from Phoenix, Arizona, in his 740 Stanley driving much of the way through the desert. Including stops for visits (and water) he made the trip in 18 hours. Barney Becker drove his Doble <E-14) down from Walnut Creek, California, a distance of about 450 miles.

All Friday morning (Sept. 19th) the steamers kept coming in, a total of 15 in **all.** Ted Frost brought his steam boat the S.S. Dory. Heard he rode a tidal wave part of the way. Herb Ottoway came all the way from Wichita, Kansas with his very hot 1901 Locomobile.

Altogether 93 steam enthusiasts registered for the Meet, and enjoyed the activities including a parade through Disneyland (here the parade was delayed till the steam men got off the kiddy rides) and Knotts Berry Farm. The evening meeting included a summary of Modern Steam Developments in the East by Club President Bob Lyon. Bill Besler was on hand to give a brief insight on Modern Steam Development which was somewhat of a departure from current thinking.

The Western Region of the Steam Automobile Club voted unanimously to hold TWO Steam Car Meets a year in the West. Barney Becker volunteered to make arrangements for the next Meet in the San Francisco area in April. With steam pressure at a high at the end of the second day, it was decided to make the next Meet a three day event.

## Steam Meet Preference

The recent questionaire was mailed to 604 of the steam car roster members, and 412 replied as follows:

387 wanted a convention for solving steam car restoration problems and convention for engineering of modern steam cars, and a winter conference.

209 want Meet at a College. 213 want Meet at a resort inn,

176 want a Meet in June 111 want a Meet in September

327 want a Meet in Ohio or the Middle West.



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# The Whitney Motor Wagon Co.

32 New Street, East Boston.
Office, 86 Equitable Bldg., Boston.

1897

## BUILDERS OF SELF-PROPELLING VEHICLES OF ALL STYLES AND FOR ALL KINDS OF SERVICE.

By experience in different towns and cities of the United States, I find that the list of answers herewith presented cover about all the common questions asked by the ordinary observer.

In answer to the most common question, as to speed, I have all the speed necessary for traveling ordinary roads.

Can run from Boston to Providence in three hours—fifty one miles. *Could* run at the rate of thirty miles per hour if conditions of roads would allow.

Steam the motive power, produced by the evaporation of common water and the burning of common oil, which supplies can be obtained on any public highway in this country.

Built in East Boston.



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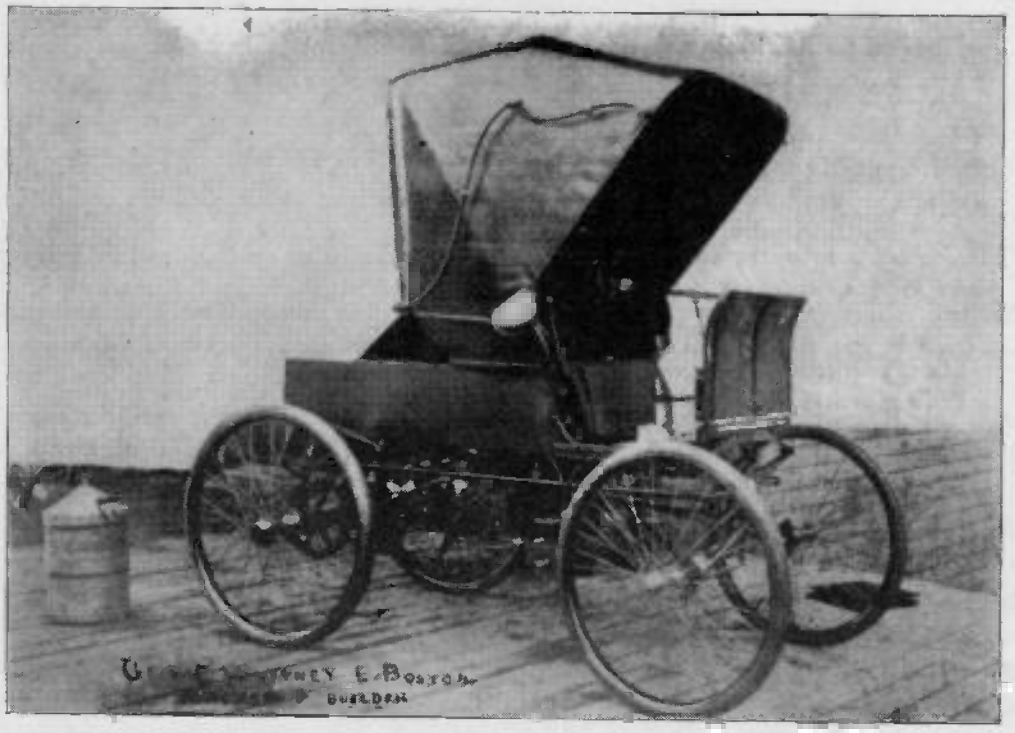

# Points

*No* electricity about this wagon. Weight about 700 lbs.

Tires Rubber — either Pneumatic, Cushion, or Solid.

Fuel, Kerosene, Gasoline, or any common product of Petroleum Oil.

Frame and gear all of steel tubing with brazed joints.

Will climb a hill of 20 per cent. grade.

Will run in soft sand or mud, and will go anywhere that a common carriage will go, and at a less cost per mile.

Only one handle to operate the whole.

Will start from cold water in six minutes.

Steam pressure regulator set at 100 pounds, unless otherwise ordered.

Boiler built in accordance with the U. S. Marine Laws, and allowed a pressure of 150 pounds. Tested to 300.

Ten pounds pressure will run the wagon on a level in either direction.

Can carry a supply of fuel for sixty miles run, and water for thirty miles on ordinary roads.

These wagons are fully automatic, for to operate, one has simply to see that there is water in the water tank and oil in the oil tank—common supplies that can be obtained anywhere.

Any one of ordinary intelligence can be instructed to operate one in one day.

Can be built with wood wheels, and any Tires desired. We recommend at present the use of Pneumatic Tires, on account of their superior traction power and smooth running on pavements. For further particulars address

**GEO. E. WHITNEY, East Boston,**

**Or, WHITNEY MOTOR WAGON CO., 86 Equitable Bldg., Boston, Mass., U.S. A.**



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# Building the Stanley Steamer

A Water Glass Open at the top on a Boiler Carrying 500 Pounds of Steam. Ball Bearing Crosshead, and Some Other Interesting Details

Here is one case at least where the old saying about the prophet being without honor in his own country seems to have slipped a cog, for of all the 7000 or thereabouts Stanley steam automobiles that have been built nearly every one has been sold within 50 miles of the factory at Newton, Mass. Those who remember the early stages of the automobile will recall the multitude of little steam cars that were made and sold under the name of Locomobile and Mobile, and it is interesting to note that both of these were built under the patents of the Stanley Brothers, who have kept right on along the same line, while both the others have long Wen ancient history.

## MAKING THE BOILER

While many of the details have been improved, the engine placed horizontal so as to gear direct on the axle without the use of a chain, the boiler placed in front, etc, and the general principles remain the same. Beginning with the boiler, which is of the fire-tube type, very similar to those

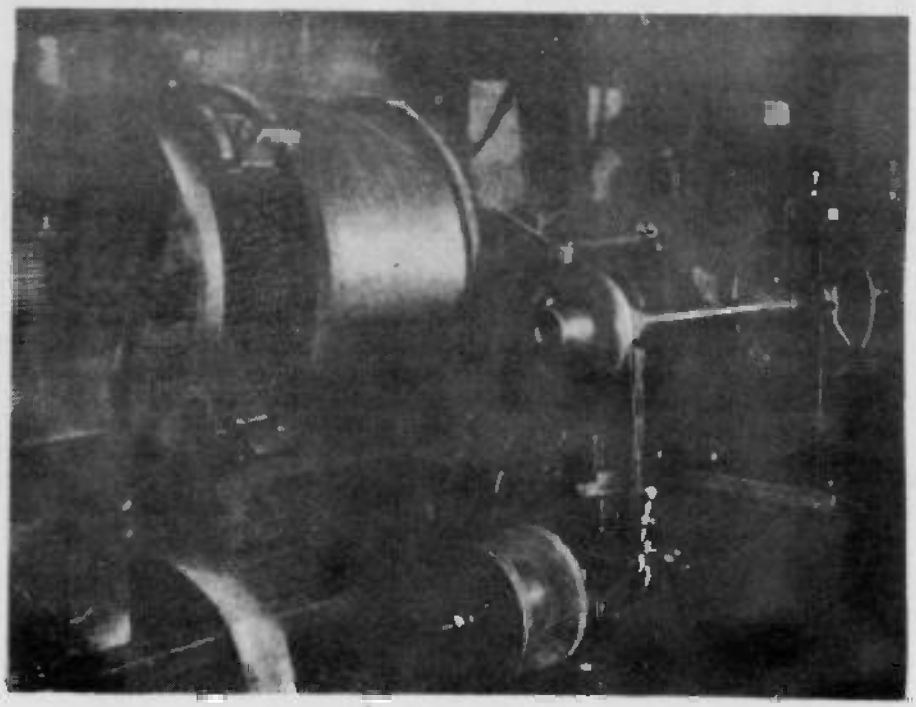

FIG. 1. WINDING BOILER WITH PIANO WIRE



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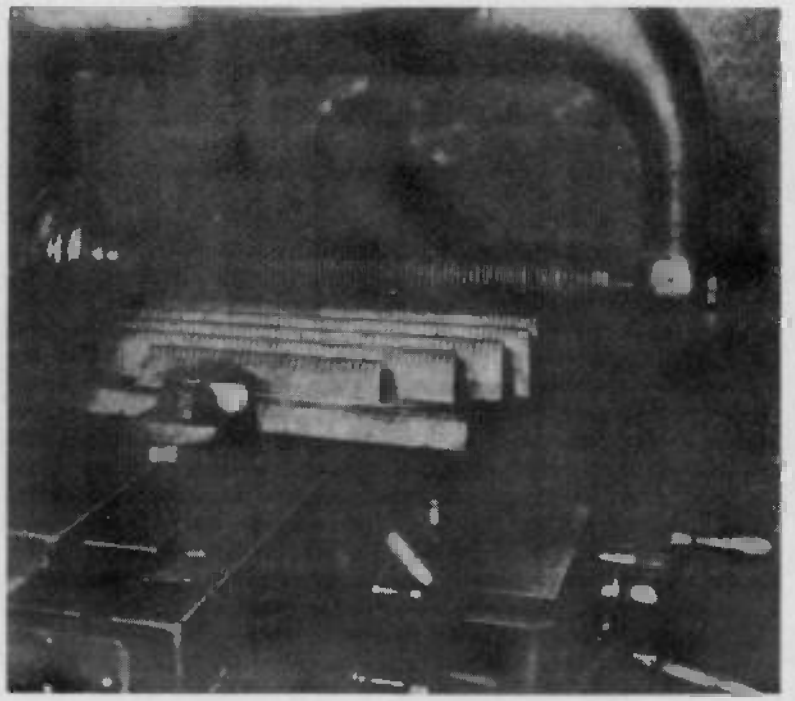

FIG. 2. SLITTING THE BURNER

used in steam fire engines, we find a steel drawn shell, without a seam and with one head drawn in place. The other head is slipped in and the shell beaded over. Both heads are drilled and tapped so that when the tubes are expanded into them it forces the metal into the threads in the tube sheet and adds to the resistance against bulging. This is especially desirable when it is remembered that these little boilers carry 500 pounds steam pressure. The tubes are expanded as usual and each end of the boiler has a steel ring shrunk onto it as can be seen in Fig. I, where the final touch is being given in the shape of the outer winding of the best quality of piano wire. Four separate windings are made and each wire fastened independently so as to secure the maximum strength and prevent any possibility of accident from explosion. This view shows how the boiler is mounted in a large lathe and how the wire is fed on to lay evenly by using the carriage feed. The wire goes from the reel to the small guide wheel, then over the larger pulley above, making several turns around this to secure tension enough to be controlled by the brake" at the other end of this same shaft, and then to the boiler. In this way a very nice job is made in a minimum of time.

An excellent example of gang slitting is shown in Fig. *2* where the burner that goes under the boiler is being cut. The vaporized gasolene comes in under this after passing over the top of the boiler, as shown in Fig. 4, through the coil of pipe, then down to three pipes running directly through the fire and out through jets under the burner plate shown. This makes a fire like a young blast furnace and the way it gets up steam is a surprise to those who are not familiar with gasolene as a fuel.



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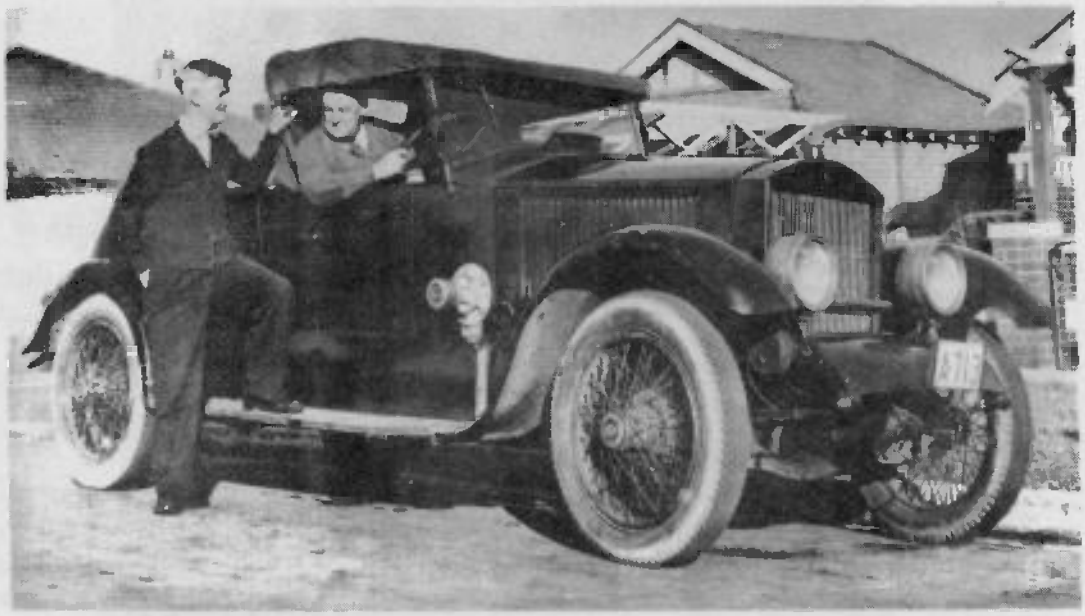
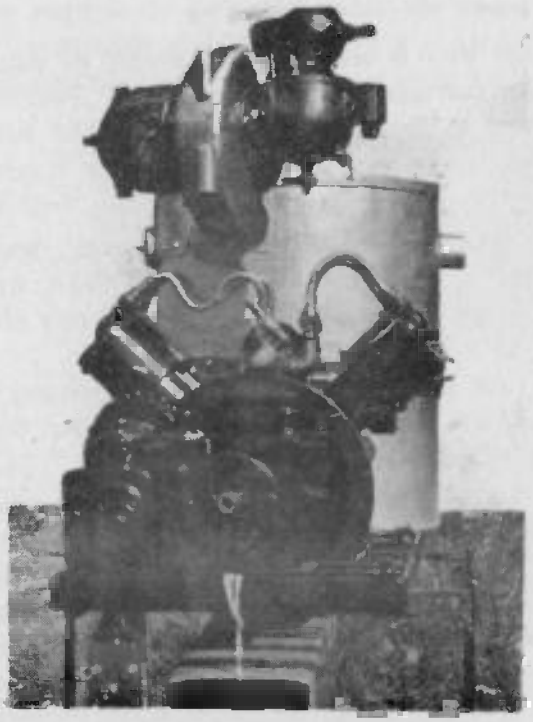
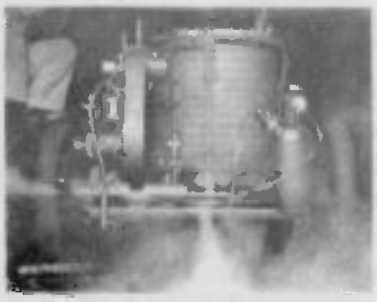


Stanley Roadster. Note gun burner in front. Owner-Driver is Frank Lynon. Sydney Clement standing alongside.



Flash Steam Power Unit. 90° V-4 engine, rotary valve with uniflow exhaust. Built by P. K. Mernasher, Sydney.

Steam Yacht 'Thistle' owned by W. Kerrs.



Forced Circulation boiler under test by J. Eggleton.



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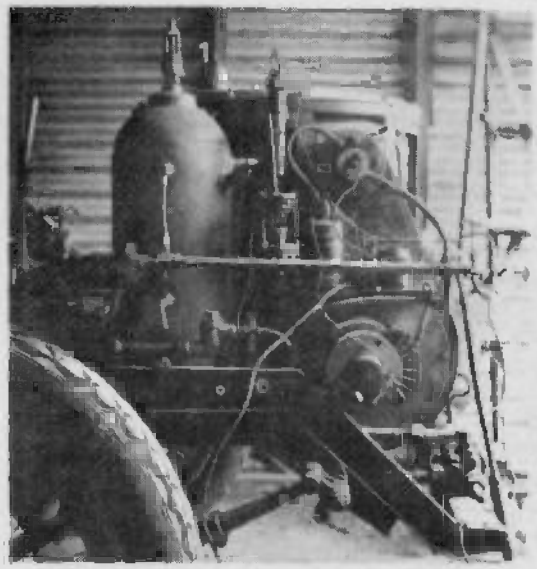
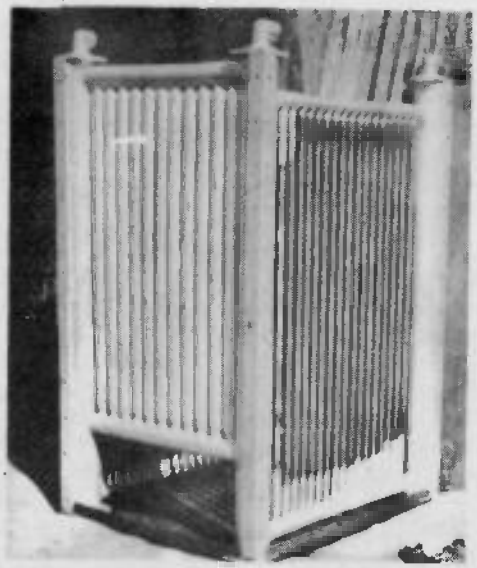
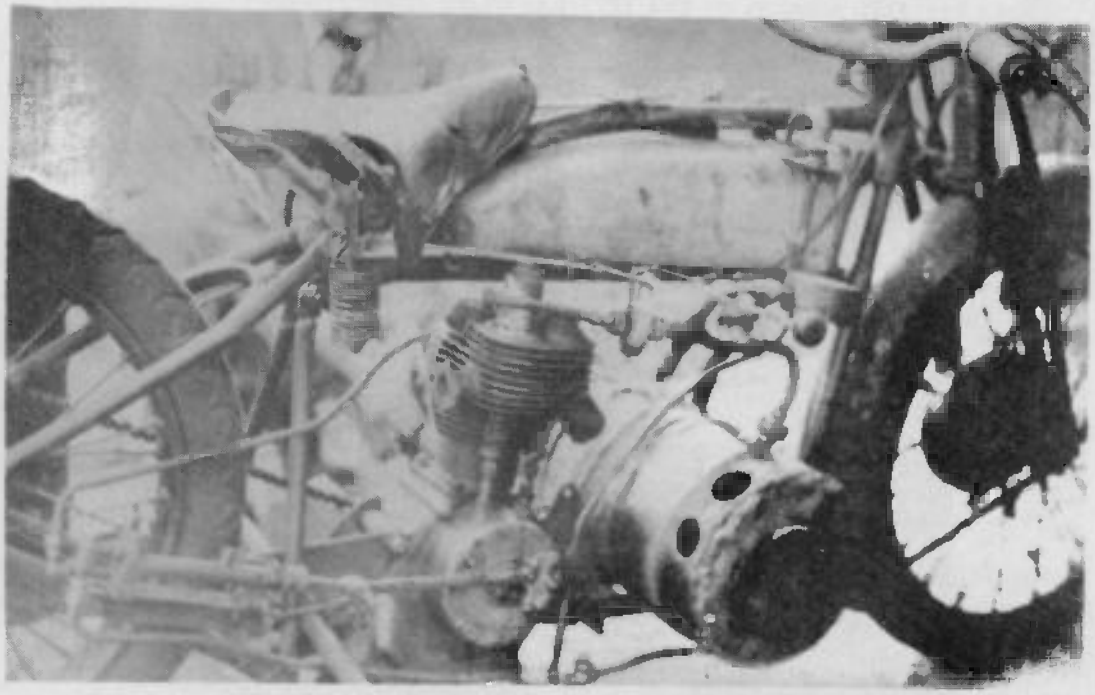
team Activities



Forced circulation boiler & auxiliaries mounted on White chassis by J. Eggleton.



Corner Post Boiler, Collective project of Sydney Branch, S. P. U. D. S. members.



Steam Motorcycle using converted 1924 550 cc. BSA engine Twist grip throttle , Horizontal flash boiler in front. Holes in front casing are for flue gas outlet. Water feed pump driven from timing gear. (Those Stanley pumps really get around.) Owned by Sydney Clement, Pres. Steam Power Unit Development Society of Australia.

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**WILLIAMS ENGINE COMPANY, INC.**

*efficient - STEAM - power*

FAIRHILL ROAD RD 1. HATFIELD, PA.

SOUDERTON 3-4436

There has "been a very favorable response to the Williams Steam Marine Brochure. Our manufacturing plant is small but well equipped to machine and fabricate the complete engine, water pump, steam generator, etc. As you know the first run (a minimum of 10) of manufacture on our steam power plant will be costly to make. Frankly at the quoted price we are working very close. We expect the volume to grow to where we can make a legitimate profit. Mainly due to the use of more automatic machine tools etc. which a larger volume would warrent.

Our marine power plant, with slight modifications, is ideally suited for replacing the gas engine in late model cars. The price is $4,190.00 F.O.B, Terms 50% deposit with order, balance on delivery. For a balanced foot throttle valve to replace the lever operated throttle there would be an additional charge of $150.00.

We are in a position to accept orders for a Williams Steamer complete and ready to drive for $6,650.

This car will consist of the Williams Steam Power Plant installed in a 1958 Ford 2 door 300 series Custom Sedan. The Williams Steam Power Plant to be used in the Williams Steamer will develop 300 B.H.P. NOTHING on the highways today will match its performance and economy.

The 1950 Ford with our little 56 cubic inch engine was clocked at 120 MPH on the Penna Turnpike. The rear axle ratio is 3.31 to 1 giving an engine RPM of 4,800.

A brief report on some of the thermodynamics of the Williams Steam Engine is enclosed. While the thermodynamics on the Williams Steam Cycle are highly technical, we feel that it may be of interest to some readers.

Williams Steam Sport Car
C. J. Williams at the wheel.



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**WILLIAMS ENGINE COMPANY, INC.**

*efficient - STEAM - power*

FAIRHILL ROAD RD 1, HATFIELD, PA.

WILLIAMS STEAM ENGINE

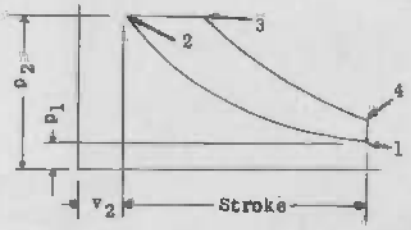
Thermodynamics of New Steam Cycle
Nominal 50 lbs. IMEP.

A 4 cylinder-in-line engine with the New Steam Cycle added to a Uniflow engine.

Patented and Patents Pending. The cycle patent is basic, and is the first innovation in the steam engine since it was invented in 1769 by James Watt.

After down stroke of piston, some of the steam escapes through the bottom ports and the rest of it remains in the cylinder. This remaining steam in the cylinder is compressed to 1000 PSI abs. (lbs. per sq. in, abs.) (if engine is made for 1000 PSI abs. It could be made for any pressure and temperature.) At end of up stroke the temperature of the steam in the cylinder is almost 1500°F. which is highly superheated. The incoming steam, is heated by this highly superheated compressed steam giving a substantial increase in temperature to the incoming steam at the point of cut-off. The result is an operating efficiency several times that of the conventional steam engine.

This thermodynamics is worked out from practical tests. A test by Professor Sloan of the University of Pennsylvania on December 5, 1942 demonstrates the New Steam Cycle very well.




A "Card" from the engine.

Superheated steam is compressed from point 1 to point 2, feed steam enters from 2 to 3, expansion from 3 to 4, and exhaust from 4 to 1.

There are 5 states of steam for a design or engine.
1. State of the exhaust steam at point 1
2. State of the compressed steam at point 2
3. State of the cut-off steam at point 3
4. State of the release steam at point 4
5. State of the feed steam

With each state there are 5 different items as p for pressure, t for temperature, v for volume, h for enthalpy or BTU and s for entropy. These items are given in steam tables. Each item is distinguished by a subscript corresponding to position on the card.

If 2 items of a state are known then the state can be calculated. When an item is equated to ? as $t_2$ = ? = 1493.2 it means that 1493.2 was calculated.

EXHAUST STEAM
$p_1$ = 14.7 lbs. abs.
$t_1$ = 300° F.
$v_1$ = 30.53 cu.ft.
$h_1$ = 1192.8 BTU
$s_1$ = 1.8160

COMPRESSED STEAM
$p_2$ = 1000 lbs. abs.
$t_2$ = ? = 1493.2° F.
$v_2$ = ? = 1.1477 cu.ft.
$h_2$ = ? = 1783.6 BTU

$s_2$ = 1.8160 $\frac{274}{588}$



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Many useful characteristics can be found from these 2 states. One is the compression ratio, $v_1 \div v_2 = 30.53 \div 1.1477 = 26.6010$ (diesel engines have a lot lower compression ratio). With this compression ratio of 26.6010 it requires an IMCP (indicated mean compression pressure) of 146.1 lbs. per sq. in. to compress to 1000 lbs. abs. (absolute).

The $p_4$ will be approximately 23 lbs. abs, (found by trial & error) and the state of steam at point 4 and point 3 can be found from Keenan and Keys steam tables, as follows:

RELEASE STEAM

$p_4$ = 23 lbs. abs.
$t_4$ = ? = 303.9° F.
$v_4$ = ? = 19.517 cu.ft.
$h_4$ = 1192.8 BTU $\frac{19}{97}$
$s_4$ = ? = 1.7671

CUT-OFF STEAM

$p_3$ = 1000 lbs.abs.
$t_3$ = ? = 1332.8° F.
$v_3$ = ? = 1.0464 cu.ft.
$h_3$ = ? = 1692.3 BTU
$s_3$ = 1.7671 $\frac{426}{641}$

The expansion ratio, re3, is $v4 \div v3 = 19.517 \div 1.0464 = 18.6516$. This expansion ratio gives IMFP (indicated mean forward pressure) of 195.6 lbs. calculated as follows:

$$IMFP = \frac{1000\,(1 + 2.3 \log r_{e3})}{r_{e3}} - 14.7 \qquad \text{Log } 18.6516 = 1.27072$$

$= 210.3 - 14.7 = 195.6$ lbs.

IMEP = IMFP - IMCP = 195.6 - 146.1 = 49.5 lbs.
Cu.ft. at cut-off equal $v_1 \div$ expansion ratio of 18.6516; or $30.53 \div 18.6516 = 1.6363$.

The states of the steam at the 4 points of the card are known and it is interesting to see how the state of the feed steam is determined, calculated as follows:

Weight (Wt) of steam at cut-off = 1 lb. compressed steam plus X lbs. of feed steam or (1 + X) = 1.6363 cu. ft.

$$\text{Wt of feed steam} = \frac{1.6363}{1 + X} = \frac{1.0464}{1} = X \text{ or; } X = .5637 \text{ lbs.}$$

The 1.0464 is the v from table above (Cut-off Steam)
Wt of steam at cut-off = 1 + X = 1.5637 lbs.
Heat balance: 1.5637 (1692.3) = 1 (1783.6) + .5637 h
or 1.5637 (1692.3) -1763-6 = .5637 h
.5637 h = 862.64951
h = 1530.3 BTU

FEED STEAM

p = 1000 lbs. abs.
t = ? = 1044.8°F.
v = ? = .8594 cu. ft.
h = 1530.3 BTU
s = ? = 1.6698

Heat of liquid $h_f$ = (1192.8 - 1150.4) + 180.1 = 222.5 BTU.

Heat supplied Williams engine = 1530.3 - 222.5 = 1307.8 BTU.



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Heat used equals $h_3 - h_4$ = 1692.3 - 1192.8 = 499.5 BTU.
Thermal efficiency equals 499.5 ÷ 1307.8 = 38.2%
Water rate / IHP/HR = 2544.1 ÷ 499.5 = 5.09 lbs.
2544.1 ÷ 38.2% = 6660 BTU / IHP/HR

High lights:

A high ratio of compression

A single expansion in one cylinder

only superheated steam in cylinder at all times.

.33 lb. ISFC (indicated specific fuel consumption.)

Williams Steam Bus

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## AN OPEN-TOP WATER GLASS

One of the most original features about this car is the water glass shown in detail in Fig. 3, which is in front of the dashboard in front of the driver. The annoyance and possible danger of having a water glass break with 500 pounds of steam in the boiler led to the designing of an indicator in which the water glass is open at the top, which means that it has no direct connection with the boiler, yet indicates perfectly the hight of water in it. There is a connection top and bottom of the boiler with the try cock *A* and connecting to the boiler chamber *X*, so that the water stands the same hight in this chamber that it does in the boiler, just as though this were a gage glass instead of being made of steel. A portion of this is partitioned off at *2* and through this the water from the feed pump goes on its way to the boiler to help cool this chamber and make the indicating tube *Y* more sensitive. This tube is filled with water to the top of its inner end and closed tightly at that end, the water then standing at a corresponding level in the glass on the other side of the dashboard. The steam in the boiler chamber above the water line vaporizes the water in the indicating tube *Y* and drives the water up in the glass to the hight shown. If the water in the boiler lowers, there is more steam in the boiler chamber and the water is forced higher in the glass, which it will be seen, indicates in a reverse manner but indicates very accurately according to those who have used it. This is also shown in Fig. 4, which also shows the location of the boiler and the water and gasolene piping in connection with it.

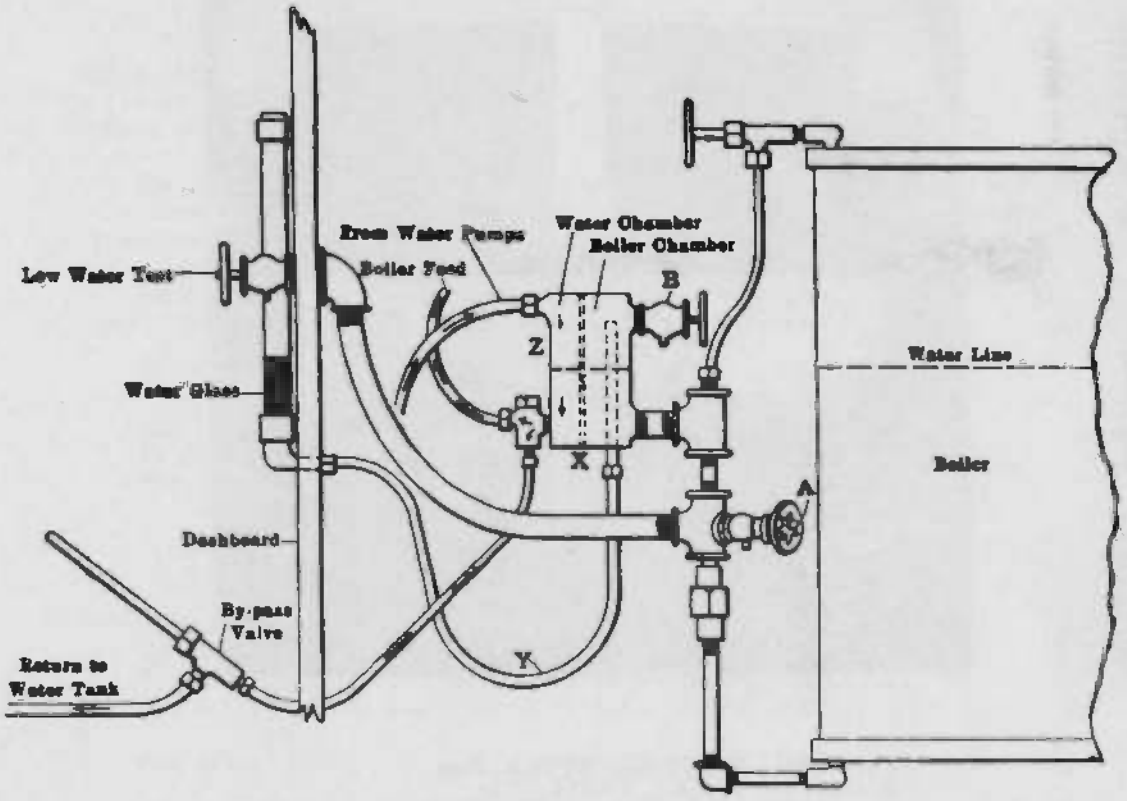


FIG. 3. HOW THE OPEN WATER GLASS WORKS



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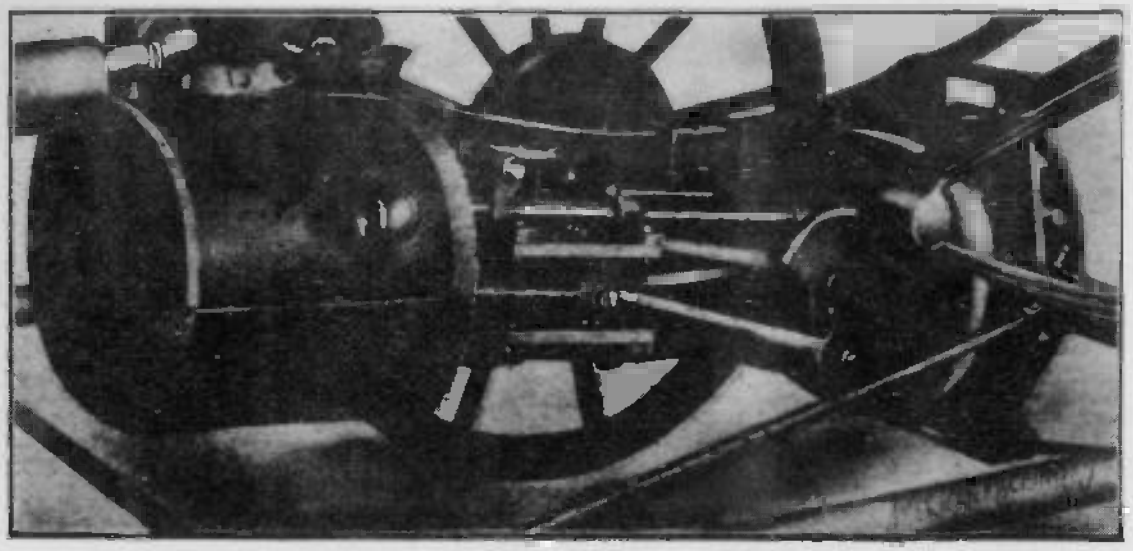

FIG, 6. THE ENGINE AND ITS CONNECTIONS

Fig. 6 gives a fair idea of the engine itself as well as the way in which it is connected up to the carriage. It lies nearly horizontal and gears direct with the differential or jack-in-the-box on the rear axle. Drop forgings are used throughout, the connecting rod being of a forked construction so as to reach around the crosshead and make the wrist bearing. The ends are spread apart and coned with a hollow mill to fit the cone bearing in the crosshead, and with this exception all the other bearings on the engines are of balls, even the crosshead, as can be seen. The main bearings have ¾-inch balls white the rest use ½-inch balls, and there seems to be a lack of trouble in the bearings that is not always found in other styles, in spite of the fact that balls are not in general favor in such places.

### A BALL-BEARING CROSSHEAD

The crosshead bearing consists of two ½-inch balls, one on each side, as can be seen by a careful examination of the engine. This strikes one as peculiar until we stop to think that they must always be opposite, and that the pressure is never on both sides at once, but always alternating from one guide to the other. There is a stop pin at each end of the guides to prevent the balls getting out of place and these also keep the two balls exactly opposite each other fit all times. As a test of this Mr. Stanley had an engine on the test rack stopped and one ball pushed to one end of its travel sad the other to the opposite end. On starting the engine again it took only a half revolution to bring them both into their proper relation and there they stay as they ran back and forth at any speed up to 300 or more turns a minute.

The valve gear is the plain link which has withstood the shock of so many improvements, and is still the acknowledged leader for simplicity and effective steam distribution under the conditions which present themselves to a locomotive or a road carriage. But one cutoff is provided, that at one-quarter stroke, which is plenty good enough for almost any running and avoids complication and confusion to the average operator. The quadrant, or what serves for one, is shown right over the front cylinder head in Fig. 6.



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## Magazines

The magazines listed below cover a variety of steam applications, and are all well worth reading if your interest lies in these areas.

IRON MEN ALBUM - Published bi-monthly by The Iron Men Album, Enola, Penna. Subscription $2.00 per year Deals mostly with Traction Engines

STEAM ENGINES - Published monthly by Campbell Printing Company, P. 0. Box 857, Pairfield, California Covers steam railroads and traction engines. Subscription $5.00 per year.

ENGINEERS and ENGINES Published monthly by T. H. Smith 611 Darcy Ave., Joliet, Illinois. Subscription $5.00 per year. Shows early traction and stationery engines.

LIGHT STEAM POWER - Distributed in the U.S. bi-monthly by Steam Developments, Box 335R, Staten Island 8, New York. Covers steam application to cars and boats both old designs and modern trends.

## Classified

Restoration and repair on all makes and models of steam automobiles. Will also convert your car with modern steam equipment. Write for quotations. E. 0. Herman Momence, Illinois

New boilers for Stanley Steamers made to order. Also produce ½in. ferrules. Frost Steam Company, 1249 So. Harbor Dr., Riveria Beach, Florida

New and Used parts for Stanley, White and Locomobile. Complete line of Books, Plans, Castings and Parts. Steam Developments, Box 335R, Staten Island 8, N. Y.

A must for your steamer. Oil separator plus boiler compound for long boiler life and improved performance. Details from Calvin Holmes, 62 linwood St., Abington, Massachusetts.

Ads accepted from members subject to space available, and editorial policy. Submit on Post Cards.



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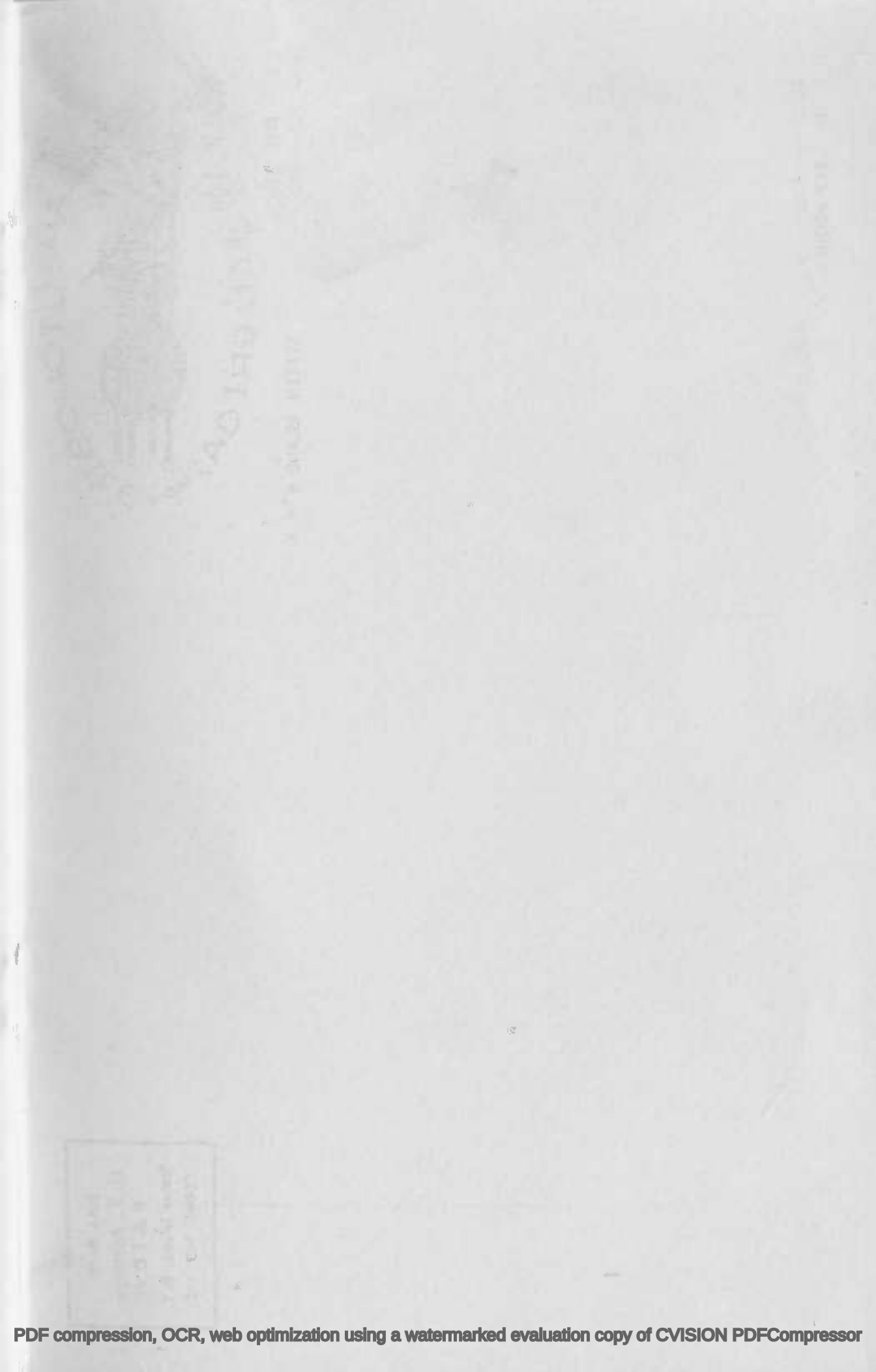

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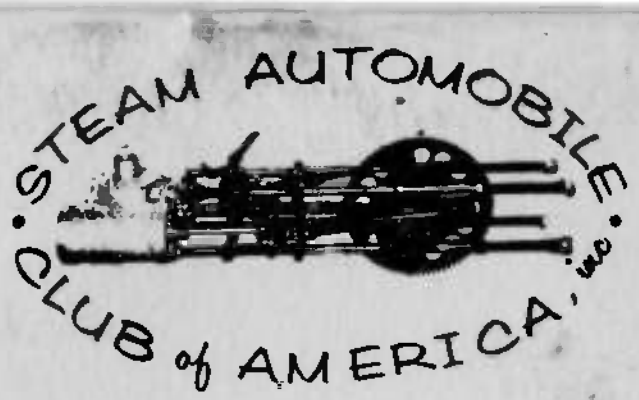


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