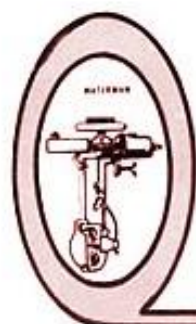


VOLUME 5

NUMBER 1

JANUARY 1970



THE ANTIQUE OUTBOARDER



Johnson
WATER-BUG

LIGHT TWIN

The Antique Outboard Motor Club Inc. is incorporated in the State of Texas as an Educational Institution. The Club is devoted to people all over the world who are interested in the search for, restoration and preservation of old time outboard motors. Regular membership dues are \$7.00 per year. Other membership information available on request. Address membership requests to A.O.M.C., Inc., 20505 NW 3rd Av., Miami, Florida 33169.

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Early control systems; Balancing antique
power heads; Full membership list; Gas tank
repair; Regular features and other stories.

The Antique Outboarder

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CLUB BRIEFS

CONTRIBUTORS OF ARTICLES, PICTURES AND OTHER DATA FOR PUBLICATION IN THE MAGAZINE should send their material to R.W. Brautigam, 2316 W. 110th Street, Minneapolis, Minnesota 55431. Please indicate if photos are to be returned and include captions for each. All members are urged to submit any items for publication that you think might be of interest to other readers.

THE REGULAR MAILING DATES FOR THE QUARTERLY OUTBOARDER ARE THE FIRST OF JANUARY, April, July and October. All input from contributors should be received at least three weeks prior to mailing dates in order to be included.

THE CLUB IS INTERESTED IN MORE MEMBERS AND A WIDER CIRCULATION OF THE ANTIQUE OUTBOARDER. Don't overlook the possibility of giving a relative or friend a gift subscription to the magazine at Christmas time or for a birthday, etc. The rate is \$4.00 per year. Let the Editor know too of any ideas you have for selling advertising space in the magazine. A better Outboarder will result from having more dollars available.

RICHARD M. JONES, 20505 N.W. 3RD AVE., MIAMI, FLA. 33169 IS NOW RESPONSIBLE FOR PROCESSING all memberships, membership records, address changes and dues transactions. AOMCI membership dues may be sent directly to Dick.

TREASURER JOHN HARRISON WILL NOW HANDLE ALL CLUB FINANCES TO INCLUDE BANKING, DISBURSEMENTS and funding control.

YOUR ATTENTION IS INVITED TO THE LIST OF NEW MEMBERS APPEARING ON THE INSIDE BACK cover. Extend a cordial welcome to the newcomers by writing or visiting. Who knows, one of them may have an extra Waterman for sale.

FINALLY GOT A RESPONSE TO MR. JIM WEBB'S REQUEST FOR IDENTIFICATION OF HIS MYSTERY Motor (Antique Outboarder, July, 1969, pg 5). Mr. Jack DuPlex writes that the machine looks like something his Father's Simplex Angle Iron Shop in Rodelheim, Germany, produced in 1906 and 07. Jack says he didn't think the Shop had made an outboard motor though since at the time there was this big backlog of Government orders for Type II Power Potato Mashers. Looks like another wrong guess, right Jim? Unless... you don't suppose.....?

MEMBERS ARE REMINDED TO REGISTER THEIR MOTORS WITH BOB HAMPTON, 54 CLINTON AVENUE Eatontown, N.J. 07724. Include the engines you intend to keep - especially the more unique models.

DAVE REINHARTSEN STILL HAS COPIES AVAILABLE OF THE "ANTIQUE OUTBOARDER": ISSUES April, 1966, July 1966 and October, 1968. Copies of January/April 1969, July 1969 and October 1969 are available from the publisher. Copies are priced at \$1.00 each.

OWNER'S ASSOCIATIONS ARE FORMING! JOHN HARRISON HAS THE JOHNSON SEA HORSE "32" SERIES engines; Dave Reinhartsen has the Lockwood Chief; Bob Zipps has the A model Johnson series and Bill Salisbury has the Johnson PO series. These associations are intended to provide a center for interested members to share knowledge, parts, literature, etc. Join the association of your choice! More coming too! Mailing addresses of association leaders appear on the inside front cover.

PLEASE SEND ALL ADVERTISEMENTS AND REQUESTS FOR SAME TO BOB ZIPPS (ADDRESS INSIDE front cover) Classified Editor, instead of mailing direct to the Outboarder Editor. Bob will see that your ad is properly processed and passed along to the magazine.

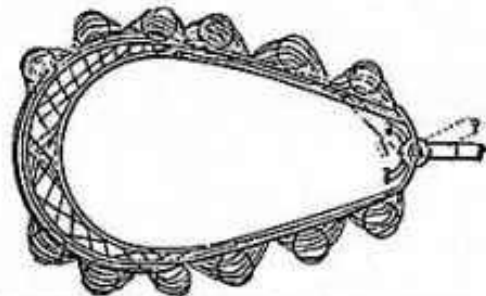
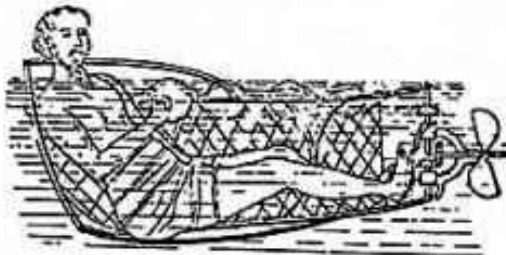


OF HISTORICAL INTEREST

..... *W J Webb*

When we think of what outboarding is today, it's hard to realize how many people were involved - and how long it has taken - to arrive at our present state of development. As with many histories, the first 250 years were the hardest. After reaching a last major plateau in about 1928, the design and operation of the modern outboard motor has remained relatively the same.

THE INTERNAL COMBUSTION ENGINE FINDS ITS WAY INTO BOATING

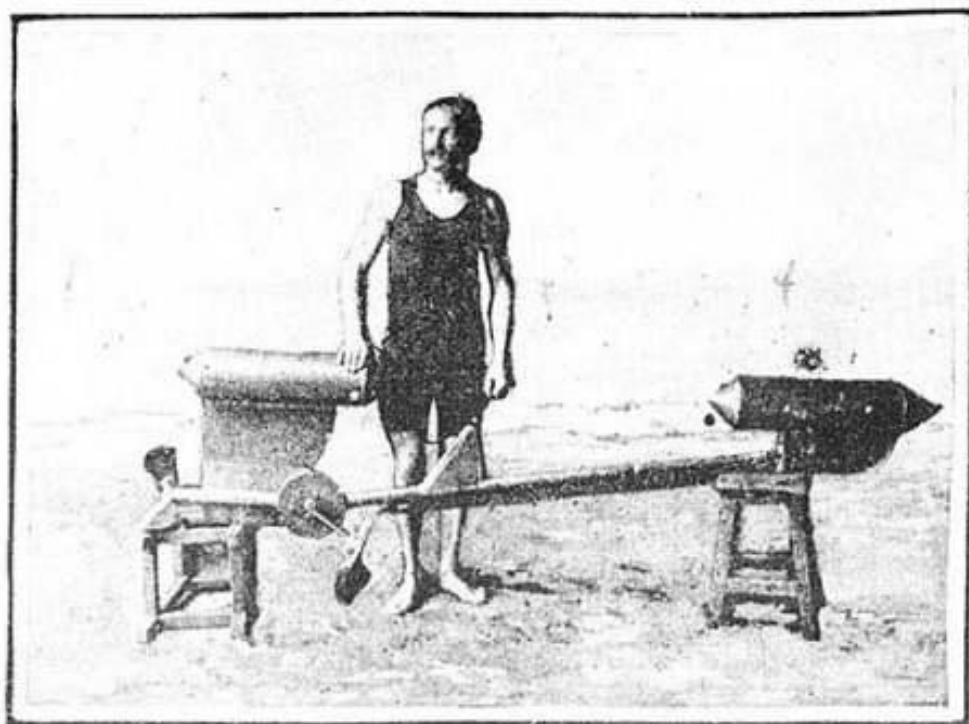


SKETCH FROM PATENT PAPERS ISSUED IN 1864 FOR BATHING MACHINE WITH AN OUTBOARD MOTOR WORKED BY THE FEET

Even with over 200 years experience behind the use of fuels to power engines, it was 1890 before the internal combustion engine found its way to marine applications. The outboard engine, as it's now called, was not so named until the early 1900's. The June 1915 issue of Yachting showed a "Bathing Machine" patented in 1864 - which the magazine described as an "outboard motor". In July of 1910, Rudder magazine carried a picture of a "Hand and Foot Swimming Machine". Although the magazine didn't say so, this outfit too is an outboard motor by the Bathing-machine standards.

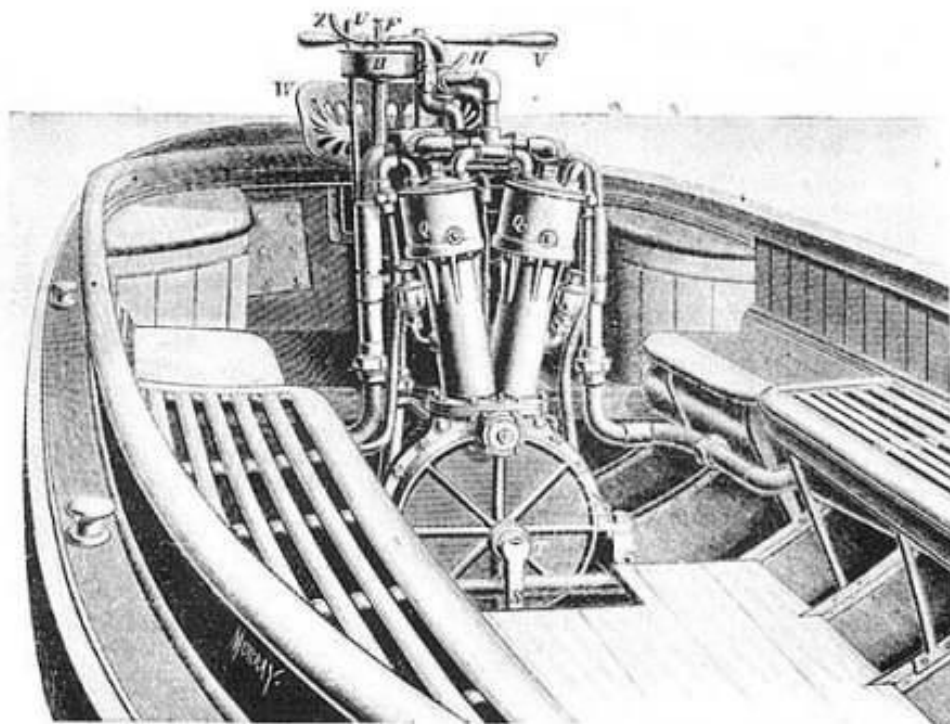
Inboard boating was never associated with the hand or foot propelled concept. However, there is a musical association. To William Steinway, the piano craftsman, goes the credit for introducing the internal combustion engine to boating. While it never was an outboard, the Steinway launch and engine is certainly a shirt-tail uncle.

In the late '80's Gottfried Daimler, accepted generally as the father of the modern gasoline motor, combined the contributions of all those who went before and produced a 4 cycle engine that was literally miles ahead of all others of its day. In 1889, William Steinway visited Daimler in Connstadt, Germany, and purchased the American rights for the Daimler engine. This day marked a great step forward, not only for boating, but also for automobiles.



A HAND AND FOOT OPERATED SWIMMING MACHINE.

Steinway began to build and market his beautifully built Daimler-powered boats in 1892. The Steinway boat proved a sensation at the Chicago World's Fair when, on September 4, 1893, six men were rescued by it from drowning in a Lake Michigan gale. Three boats were rushed toward the capsized boat, but Steinway's Daimler-powered craft beat the other two easily although it was said to have started last. The publicity attendant on this dramatic rescue did much to popularize the Daimler engine.



DAIMLER MOTOR APPLIED TO BOAT PROPULSION.

Pictured here are the Daimler engine as mounted in Steinway's boat, together with a reproduction of a Steinway ad of that time. This ad, incidentally, ran without a change for several years.

DAIMLER MOTOR COMPANY,

BUILDERS OF

Highest Grade Single and Twin Screw Launches.



Safest, cleanest and speediest power boat built. No smoke or smokestack, no boiler, no electricity. No steam or naphtha under pressure. Run on one pint of gasoline per horse power per hour, and are under way in less than one minute. No licensed engineer or pilot.

Also Stationary Motors.

Send for Illustrated Catalogue and Price List.

OFFICE AND WORKS, "STEINWAY," LONG ISLAND CITY, N. Y.

In 1896, Steinway sold his boat business and shifted his interest to automobiles but in that same year 1896, the American Outboard motor was built in a factory in Long Island City, N.Y. Oddly enough, the "Ole Evinrude Story", a film documentary issued in 1959 to mark the 50th anniversary of Evinrude's entry into the outboard business, was filmed in that same factory.

Twenty-five copies of The American outboard were produced, none of which are known to exist. The machine was air cooled and featured a reversible propeller.

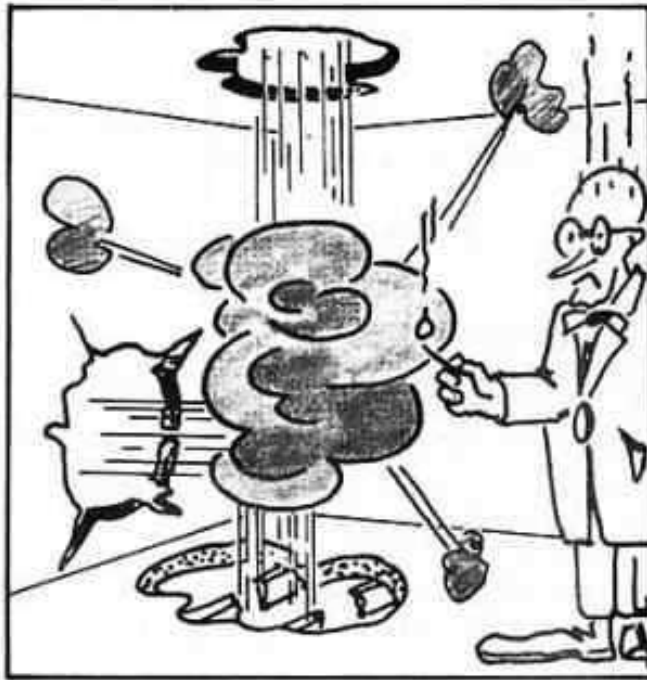
What great progress then, from the "American" of 1896 to the outboard of 1928, just 32 years. What took so long to get that far is anybody's guess but, as usual, hindsight is always better than foresight.

Since the internal combustion engine is by long odds the most popular type of outboard power plant, a brief account of its most interesting beginning is in order.

It all started back in 1678 when one Abbe Hautefeuille, a Frenchman, envisioned an engine delivering usable power developed through the combustion of gunpowder. The Abbe needed a waterpump, and beyond a doubt gunpowder was the best concentrated power fuel available. However, there is no record that the good Abbe did anything himself to remove it from the gleam-in-the-eye stage. But in 1685 another inventor, Huygens by name, actually designed a gunpowder engine and did some experimental work with it. In 1688 a man named Papin who also worked with steam did further work with a gunpowder power plant with valves. The work and thinking of these pioneers, while not directly productive, inspired those who followed to work with fuel combustion as a direct source of power. There seems no doubt that there was considerable helpful communication between them.

John Barber proposed and was granted an English patent on a rotary gas engine. This was actually a sort of turbine since it employed a paddle wheel device driven by the explosion of gas converted from coal, oil, or other combustible matter. A separate chamber was provided for mixing or generating the gas which was ignited as it emerged. Of special interest is the fact that at that early date Barber knew and recorded the fact that the strength of the explosion is greater if water is injected into the explosion chamber at the time ignition takes place.

The first reciprocating engine of record came along in 1791, when Robert Street was granted an English patent on an engine employing a piston and cylinder utilizing power resulting from the burning of gas obtained from the vaporizing of tar, coal, turpentine, or alcohol. Ignition was by flame set outside the cylinder.



- An early 3 stage gunpowder engine
- 1st stage- The head goes through the ceiling.
- 2nd stage- The flywheel goes through the wall.
- 3rd stage- The crankcase goes right through the floor.



Many of the improvements in gas engines were the result of careful laboratory analysis. Here an observant inventor gets the idea which led to what's now known as the push rod guide.

In 1801 occurred what was probably the first recorded use of electricity for ignition. In that year Franz Lebon described his engine which used coal gas and compressed air, ignited with an electric spark. This engine was designed for use with a water pump.. In 1823 Samuel Brown, another Englishman, invented what was called an atmosphere engine. This had a cylinder, piston, connecting rod, crank and flywheels. Gas was burned, forcing the piston upward, valves permitted the escape of burned gas, flywheels carried the engine over center, a vacuum of sorts resulted after escape of gas, and the flywheel inertia greatly aided by atmospheric pressure completed the down stroke. It is recorded that Brown actually propelled a boat on the Thames with this rudimentary engine. However, the Brown engine apparently never passed the experimental stage.

In 1844 the first American patent was granted to Stuart Perry of Newport, N.Y. for an inflammable gas or vapor engine. This engine employed the two-cycle principle in that there was a power and exhaust stroke complete in each revolution. Furthermore, it was double acting; that is, there was a power impulse on each side of the piston, similar to the steam engine idea. Inflammable gas was obtained from various volatile compounds such as turpentine, alcohol, oil, etc. This engine bore a closer resemblance to a steam engine than to the gas engine as we know it today. Gas was generated in an auxiliary cylinder and fed under pressure into the working cylinder. A hollow rotary valve was used for intake and exhaust outlet. Ignition was claimed by a lamp, furnace or other heating apparatus.

Two years later, 1846, Perry obtained another American patent for a gas engine with governor, water jacketed cylinders, and hot tube ignition, the tube being heated by gas flame jets from the outside. Cam operated poppet valves were used for intake and exhaust. Starting was by compressed air.

In 1860, Lenoir, a Frenchman, invented a two-cycle, double acting gas engine with electric ignition. As the piston moved downward, an inlet valve opened admitting a charge of gas. At half stroke the valve closed, gas was ignited, and the stroke completed

through pressure generated by the combustion. On the return stroke burned gases exhausted through another valve. Being double acting, the same process was repeated on the other side of the piston. A company was formed to manufacture the engine, but the whole project failed because of the excessive fuel consumption.

Up to this time none of the gas engine inventors had thought of compressing the gas and air vapors in the combustion cylinder before ignition. In 1862 another French scientist, Beau de Rochas, patented the first four-cycle gas engine. The four-stroke cycle or 4-cycle, as we say in interests of brevity, requires four strokes of the piston, two up and two down or two complete revolutions of the crankshaft to complete the cycle of operation. The strokes are (1) intake--when the piston is moving downward (away from cylinder head) drawing in a charge of unburned gas through a valve, (2) compression--when the piston is moving upward, compressing the mixture drawn in on the intake stroke, (3) power--when piston is moving downward forced by burning of compressed gases, (4) exhaust--when piston is moving upward, driving out burned or exhaust gas.

In 1867, the German, Otto and Langen, invented an engine with a free moving piston. This used a piston rod with a rack and gear arrangement to turn what was called the Axle shaft. Several hundred were manufactured during the 7 years the firm was in business. The Italians, Barsanti and Matteucci, had also done experimental work on the same principle as Otto.

In 1876, Otto discarded his design and, following the de Rochas' principle, produced a four-cycle engine which for economy and reliability surpassed everything then in the field. Competitors generally withdrew or built good copies of Otto's engine. The four-cycle principle has been generally called the Otto Cycle since it was he who perfected the production model. But it is generally agreed that Beau de Rochas was the real originator. So many mechanical improvements have been made since Beau de Rochas' time, that the highly efficient power plants of today bear little resemblance to their ancient ancestor.

So much for the four-cycle engine, which has found but limited use in the outboard field. The next U.S. Patent Office record after Perry's award in 1846 concerns a Frenchman named Millian. He sought, in 1867, to improve on Perry's two-cycle double-acting engine by using slide valves and electric ignition. The working piston was supposed to be driven by exhaust gases. In 1871, Charles Leavitt of New York patented a twin-cylinder--Perry and Millian type engine in which one cylinder operating 90 degrees ahead supplied the working cylinder. However, the Perry-Millian-Leavitt engines never did get off the ground, but did supply some valuable knowledge for later inventors.

In 1879, James Robinson, an Englishman, advanced the first really significant development in the two-cycle type engine. This did not utilize the crankcase as an intake reservoir as is generally the case today, but provided a compartment or intake and compressing chamber sealed off at the crankcase end into which fresh gas vapor was drawn from a carburetor on the up-stroke of the engine's piston and by-passed to a firing chamber on the down stroke. While very successful, this design made for an excessively high engine. Still, a great many stationary engines of this type were made.

The modern two-cycle engine which uses the crankcase as an intake chamber from which gas is by-passed to a firing chamber, was patented by Lewis H. Nash of Brooklyn, New York in 1888. The Nash Engine was a two port type - having a valve controlled crankcase intake with a by-pass and exhaust port in the cylinder.

Another American, Clark Sintz of Springfield, Ohio, working quite independently of Nash, patented a three-port, two-cycle engine in 1893. Here, intake into the crankcase as well as by-pass and exhaust are by means of piston controlled ports. The three-port engine enjoyed great popularity in the early years, but during the last 30 years the two-port type has prevailed. As in the case of the four-cycle engine, today's highly efficient and reliable two-cycle engine doesn't look a great deal like its grandparents.

W. J. Webb

THE NASH ENGINE

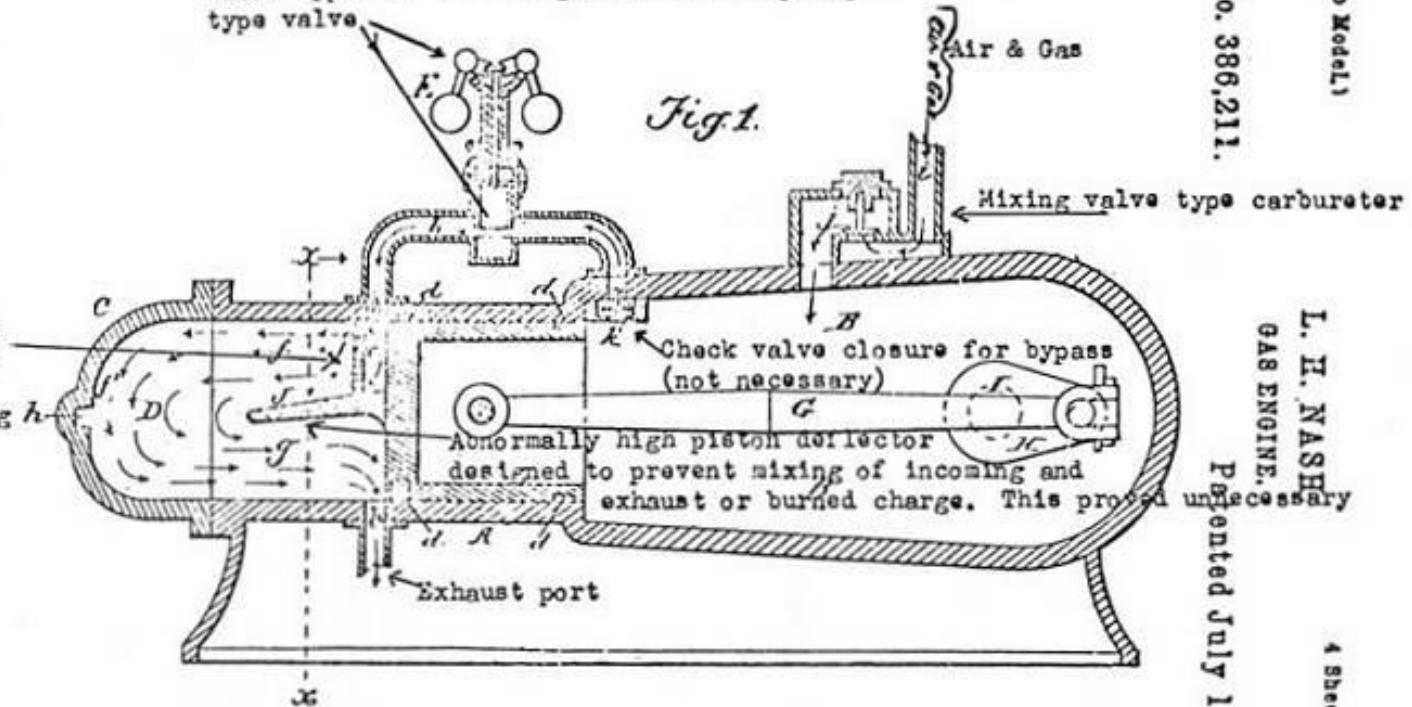
The sketches which accompanied the Nash patent application and statement of claims indicate that Nash had thought the various problems through in complete detail. However, as the patent sketch states, no model of any sort accompanied the application and this, together with a careful reading of Nash's several claims and statements, would indicate that Nash had never actually run, or maybe even built any of the several designs he put on paper. Subsequent wide experience by many other engine builders in the field might seem to bear out the feeling that Nash's fine looking paper theories needed plenty of the good old "cut and try" work that must always follow any new design before that design can actually find full acceptance in the field of use. This observation is by no way critical of Nash. He had lots of good, but apparently untried ideas.

Witnesses,
W. S. Grant,
McClintock,

Inventor,
L. H. Nash,
Attorneys,

Governor regulates speed by controlling gas vapor bypassed to firing chamber with plunger type valve

Fig. 1.



Gas vapor bypassed thru holes in head of piston (Better port timing would make this unnecessary)

Sketch does not indicate any ignition. Patent states "several" types of ignition may be used.

Apparently no running model built from this design was ever made, at least at time of patent application.

(No Model)

No. 386,211.

L. H. NASH
 GAS ENGINE.

Patented July 17, 1888.

4 Sheets—Sheet 1.



RICHARD A. HAWIE

NOTES FROM THE CURATOR

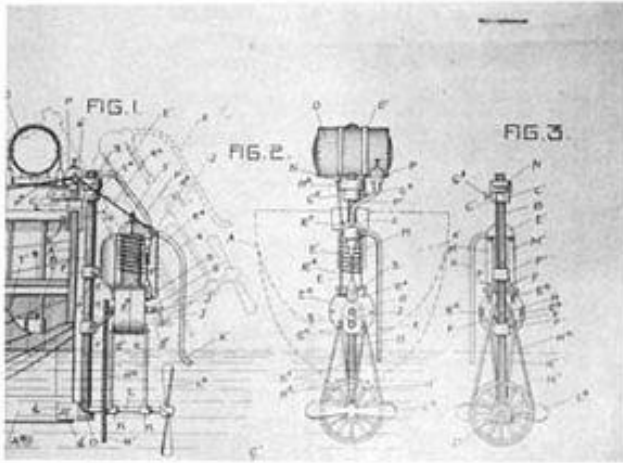
This month I've done some research on Waterman. Again, as in my last article on Koban, I am relying on many photos because I don't have a tremendous amount of information on Waterman.

The early history about Waterman is pretty well covered in the books by Jim Webb, Bob Whittier and Hank Bowman. Just briefly, Mr. Waterman applied for a patent Dec. 6, 1905; it was granted Apr. 23, 1907 and was #851,389. The first experimental model was built using an air-cooled Curtiss motorcycle engine as a powerhead. Mr. Waterman preferred an air-cooled motor for its lower weight, but feared the transom would cut off air flow and so he designed the cooling fins on an angle to promote cooling. He hired Mr. Oliver E. Barthel, an engineer, to design a production engine. One water-cooled model was made in 1906 and 25 air-cooled motors were produced in 1906, according to Mr. Barthel's letter in Bob Whittier's book. Provision was made for underwater exhaust, and Mr. Waterman recognized that the water would act as a muffler.

I don't know that anyone has uncovered any of these early Waterman motors. I think the chances of finding one are slim, but intriguing. The first picture shows the drawings submitted with Mr. Waterman's patent.

The 1907 model is pictured in all three books previously mentioned. I must admit that I am not sure about the next few years, 1907-1911. I have seen quite a few pictures of the water-cooled vertical twins and while basically the same, they differ from motor to motor! There seem to be two major variations in the spark plug location. One was a central spark plug location with the water exhaust tube directly astern and above the combustion exhaust as in the second photo. The other was an angled spark plug location with the water exhaust tube in the center of the cylinder head. The third photo is a motor of this type, though it is hard to see clearly because the equipment in the boat blends into the motor detail. There appear to be three batteries in the stern of the boat. This was obviously before electronic ignition. On page 469 of the 1910 bound volume of Rudder magazine there is a picture of Waterman's booth at the Chicago Boat Show; and with a strong magnifying glass I can make out a "Porto" with the central spark plug location! The picture is not clear enough to photograph.

The 1912 model was quite different from those preceding or following it, as the fourth picture shows. It has a horizontal cylinder facing rearward, the spark plug being out over the water. Through 1929 or 1930 every other single cylinder motor has the cylinder facing into the boat. This 1912 model has rudder steering and a cylindrical gas tank.



WATERMAN
PICTURES
SHEET 1

No. 1 Left, Waterman's Patent drawings.

No. 4 Right, 1912 Outboard model of the "Two-in-one" engine.



Co. Mystic, Conn. MAINE GASOLINE Engines

Cruiser or Canoe

At a 10-horsepower motor, this is a really compact, sturdy, dependable and economical power plant for a small boat.

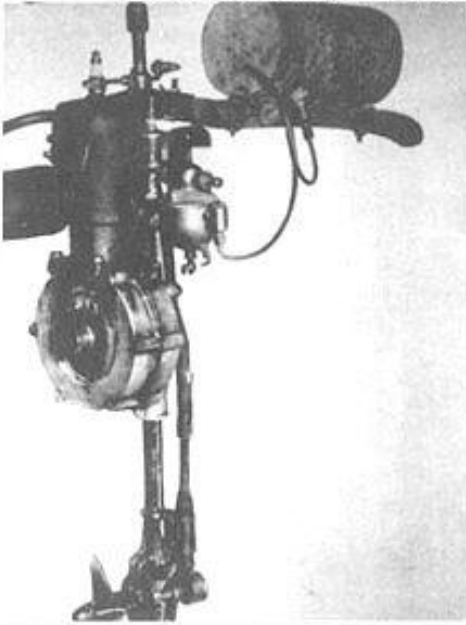
Waterman Speed Motors

are made with aluminum, brass, iron, copper, steel, cast iron and all other high-grade materials. They are built to last, and are guaranteed for three years.

1341 First St. W., Detroit, Mich.



No. 2 below, Early water-cooled model, motorcycle type crankcase.



No. 3 below, center, The outboard takes all the work out of fishing.



No. 5 below, 1913 C-14 model

WATERMAN'S... THE... 1913... C-14... model... This engine... is... a... truly... efficient... power... plant... for... a... small... boat... The... engine... is... built... of... high... grade... materials... and... is... guaranteed... for... three... years... The... engine... is... very... compact... and... is... very... easy... to... start... The... engine... is... very... economical... and... is... very... reliable... The... engine... is... very... quiet... and... is... very... smooth... The... engine... is... very... durable... and... is... very... easy... to... maintain... The... engine... is... very... safe... and... is... very... easy... to... operate... The... engine... is... very... light... and... is... very... easy... to... handle... The... engine... is... very... strong... and... is... very... easy... to... push... The... engine... is... very... fast... and... is... very... easy... to... maneuver... The... engine... is... very... efficient... and... is... very... easy... to... use... The... engine... is... very... reliable... and... is... very... easy... to... service... The... engine... is... very... durable... and... is... very... easy... to... repair... The... engine... is... very... safe... and... is... very... easy... to... operate... The... engine... is... very... light... and... is... very... easy... to... handle... The... engine... is... very... strong... and... is... very... easy... to... push... The... engine... is... very... fast... and... is... very... easy... to... maneuver... The... engine... is... very... efficient... and... is... very... easy... to... use... The... engine... is... very... reliable... and... is... very... easy... to... service... The... engine... is... very... durable... and... is... very... easy... to... repair...



In 1913 the model C14 was introduced. At this point we may engage in some interdepartmental strife, for sharp-eyed readers who got past the "Play Boy" cover of our October issue will note a Waterman ad on page 27. This ad is dated 1913; though as far as I can determine, it is a 1912 model. The address, 1507 Fort St. W. wasn't used in 1913. The 1913 address that was used is 205 Mt. Elliot Ave. In fact, I don't recall seeing any ads with a date on them in my research. Perhaps our editor can enlighten us as to the source of the ad and date 1913. (Glad to, see end of article. Ed.)

There is a good cutaway drawing in Rudder magazine of the C14. The models following this one were similar to the C14 though they differed in detail. The cylinder was a thin casting with no water jacket. A spun copper water jacket was threaded onto the cylinder. Ignition was usually by battery and "trembler" coil neatly boxed, though the Bosch model ZEI magneto was available at extra cost. This was not a flywheel magneto but a gear-driven external magneto. Picture #7 of the 1915 model shows this type of magneto. The C14 had bore of 2 3/4" and stroke of 3", and as far as I can determine, all the "Portos" from 1907-1928 were the same bore and stroke. Waterman also made inboard motors up to four cylinders, and these had various bores and strokes. The motor weighed 56 lbs. and surprisingly enough had a ball bearing as the bottom crankcase bearing. This bearing took up the thrust of the flywheel as well as the radial load of the crankshaft. The HP rating was 2 HP in 1913. Covering the flywheel and crankshaft end was a small hub cap which also served as an oil measure, one hub cap full of oil to one gallon of gas!

The 1914 Waterman pictured in #6 looks like the 1913 model. Unfortunately Waterman mentions most of the data of interest except the model number! This ad is unusual in that it is in four colors! It is the first color ad I have found. The HP rating is three, and the weight is up 3 lbs. to 59. To point up the problems we run into trying to collect data, the March, 1914 issue of Motor Boating has a Waterman ad which rates the Porto at 2 1/2 HP and lists the address as 201 Mt. Elliot Ave. The March, 1914 issue of Rudder has a Waterman ad which rates the Porto 2 1/2-3 HP and gives the address as 205 Mt. Elliot St., while the full color ad in April, 1914 Rudder rates the motor at 3 HP and has the address as 405 Mt. Elliot Ave.!

Picture 7 is of the 1915 model which has an external magneto geared to the crankshaft; it, of course, could be had with battery ignition. The outstanding feature is the "Sintz" reversing propeller which was infinitely adjustable from full forward to full reverse. The weight was raised to 65 lbs. and the HP was given as 2 1/2 at 750 RPM and 3 at 1000 RPM. On light boats it was claimed that the speed could be raised to 1200 RPM.

It seems a good time to pause and completely confuse the issue by mentioning that in 1915 and 1916 the Sweet Manufacturing Co., 81 Griswold St., Detroit, Mich. made a motor they called the Sweet, and the darned thing looks just like a Waterman! Picture #8 shows a 1915 Sweet; you can see that it doesn't differ much from the Waterman. I don't think that Sweet lasted beyond 1916, but in those two years there is a good possibility of mistaken identity between Sweet and Waterman.

Picture #9 is from a 1917 ad, but the same picture was used in the 1916 ads. I used the 1917 ad because the 1916 ads had artwork in the background which tended to obscure the details of the motor. The 1916 model had a built-in flywheel magneto rather than the external gear-driven magneto. The gas tank is a different shape from the three previous years and has almost twice the capacity of the 1915 tank.

In 1917 the Arrow Motor & Machine Co. of Newark, N. J. purchased the assets of the Waterman Co. and produced the Porto as well as the line of inboard motors that Waterman had made. Arrow, of course, had been making a twin cylinder opposed engine for several years. They kept the names Arrow and Waterman as two distinct lines; the Arrow the twin, and the Waterman the single cylinder Porto.

The 1918 Porto appears to be the same as the 1917 model.

In 1919 Arrow did not picture the Porto in their ads; in fact, after the first quarter they did not advertise in Rudder or Motor Boating.

In 1920 their ads appeared again and the same cut was used as in 1916-17-18: The model was identified as C16, 5 HP, 68 lbs. Whereas the 1917 and 1918 Arrow ad used a Hudson Terminal Building address and even listed a foreign sales manager, the 1920 ad listed their address as 727 Frelinghuysen Ave., Newark, N. J. Apparently Arrow was beginning to retrench.

Surprisingly enough this next picture #10 is from an April, 1921 ad. This was called Model C-21; but with that "bicycle tire" flywheel and the external magneto, it looks more like a 1915 model. The Feb. and March ads showed the model C-16.

In 1922 the only ads I can find for Arrow featured the single cylinder inboard engine.

The next ad I find is in May, 1924 Rudder magazine, and it announces "Pausin Engineering Co., successors to the Arrow Motor & Machine Co., manufacturers of Waterman and Arrow motors and spare parts, 727 Frelinghuysen Ave., Newark, N. J." This was one of the addresses that Arrow used also.

Through 1928 Waterman was listed in the May Rudder magazine which annually listed all U. S. manufacturers of marine engines. It is not clear in the listing whether it is an outboard or inboard engine. The specifications were the same except for the weight. Well, that is what I have been able to find on Waterman so far, and it doesn't seem much for the amount of research I had to do. There are still quite a few questions unanswered, and I think that some of our members may have the rest of the answers.

President Dave has started the ball rolling in this respect with a Lockwood Chief group; members who have Chiefs are beginning to exchange information on them. I think that it would be beneficial to all if we could form special interest groups who would

Light 59 Lbs.

Buy Direct
Freight Free

Don't buy an outboard motor from a dealer who has a "Waterman" outboard motor on his premises. You can't get the best outboard motor for your money unless you buy it direct from the Waterman Motor and Machine Co.

Carburetor, not "I" instead of "L" Reason 16" Propeller; Independent Tiller Line, steers freeless Under-Water; forming Valveless M. Copper Water Jacket Booth, or any other sign magnetic, or by

FEATURING IN ALL YOU BUY THE

Invariable from the factory.

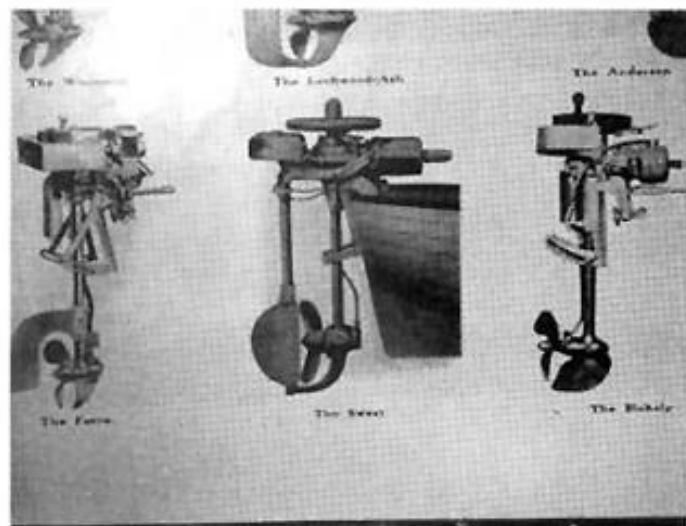


WATERMAN
PICTURES
SHEET 2

No.6 left, 1914 model. Note tiller bar and underwater exhaust.

No.8 right, A 1915 Sweet, similar to the Waterman.

No.9 below, 1916-17 Waterman with flywheel magneto.

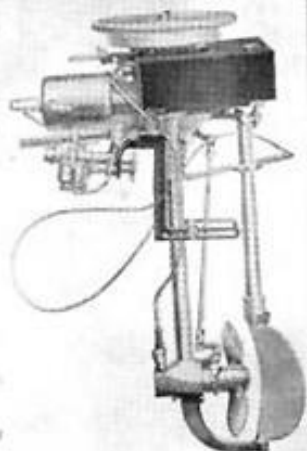


No.10 below, 1921, C-21, last known production model.

No.7 below, 1915 model with reversing propeller and gear driven magneto.

Original Porto Detachable Engine

It's the only outboard motor with a reversing propeller...



Mari...
Depends...
Impru...
ano?...

New York City

1915 October, 1915 Motor Boating

The New **Waterman PORTO**

AN ENGINE WITH A THOUSAND SPEEDS



New Reversing Propeller

Mari...
Depends...
Impru...



Waterman 40 Fast Outboard Motor...
BUCKEYER BILT WORKS, Inc.
19 Charlotte Harbor



Waterman Motors
LIGHT WEIGHT
LONG LIFE
C-21 OUTBOARD MOTOR

The Most Powerful Outboard Motor on the Market

Write for Free Catalogue
Agents Wanted Everywhere
Arrow Motor and Machine Co.
700 Park Avenue
NEWARK, N. J.

WIRE TELEPHONE for BOAT

SEABR...

"DAYTON" LIGHTING AND IGNITION SYSTEMS.
6, 12, 32 VOLTS COMPLETE



SEABR...

The boat is built with the best materials...

pool their information on specific motors. The American Aviation Historical Society has aircraft specialists who specialize in one particular model, Grumman Hellcats for instance; all information on Hellcats is channeled to this person. Perhaps this is what we should do. If the plan works, conceivably a part of each "Outboarder" could be devoted to information the engine specialists have come up with, so that everyone could share in the information. You may not have a specific motor when the information is published, but you might pick one up sometime.

To start the ball rolling I would like to have all the Waterman owners let me know what they have. A picture would be swell, but at least some information -- model and serial number if possible, carburetor brand, magneto brand, and any distinguishing features. If anyone has any information on the unresolved questions I'd appreciate some help in that area, too. I will compile whatever information is sent to me and have it in the next issue or perhaps in the Newsletter if Bob Zipps has room; then someone can take it from there. It's not that I'm ducking a job, but I do have some weeks of research ahead on Cross and Caille.

PHOTO CREDITS

- #1 Patent
- #2 Kiekhaefer Corp. Public Relations Dept.
- #3 Kiekhaefer Corp. Public Relations Dept.
- #4 Page 43, June, 1912 Rudder
- #5 Page 52, May, 1913 Rudder
- #6 Page 33, April, 1914 Rudder
- #7 Page 62, October, 1915 Motor Boating
- #8 Page 238, May, 1915 Rudder
- #9 Page 133, February, 1917 Motor Boating
- #10 Page 20, April, 1921 Motor Boating

EDITOR'S NOTE

The advertisement in question is reported to have appeared in the Feb., 1913 issue of the "Popular Mechanics Advertising Section", pp 153. It should be noted that the 1912 motor was able to operate as an outboard and as a general purpose power unit. Setting up the latter required at least a 90 degree repositioning of the carburetor and relocation of the gas lines and tank. Maybe some of these units remained for sale yet in 1913.

FOR A SLOW TROLL GET A **JIFFY**

ON and OFF in a Jiffy—TROLLING PLATE

An Aid to Better Fishing

This entirely new type trailer gives slower speed while the motor runs faster and surer. Cast the weeds spars and let your motor run. Nothing complicated—no changes to be made. Fits in your pocket. Fits all fishing motors—makes any motor troll better. If your dealer can't supply you, we will send post paid for \$1.25 (no stamps).

PETERSON SALES COMPANY
 150 N. E. Lincoln
 Minneapolis, Minn.

KEEP YOUR OUTBOARD MOTOR **FREE OF WEEDS**

"KUTWEED" DOES IT. Spins with propeller, chews weeds into shreds BEFORE they can clog propeller. Fits all outboard motors, operating either clockwise or counterclockwise. Has been double cutting edges. Very light and quickly attached. ONLY 50 CENTS. No stamps, please. If your dealer hasn't "Kutweed," order direct from:

KUTWEED SALES CO.
 Dept. SA, 2324 Harriet Ave., Minneapolis 2, Minn.

For Greater Outboard Boating Pleasure Get a **NEW Co-De STEER CONTROL**



- **FLEXIBLE** May be used from either side of boat. Steers any direction.
 - **ADJUSTABLE** Extendable telescopic control arm. Fits any boat.
 - **COMFORT** Now you can steer your boat from a comfortable forward position.
 - **ADDED SAFETY** Steering device locks in any position leaving both hands free.
 - **GREATER FREEDOM** Fingertip control holds the course you select.
- Pat. Pending
Fair Traded

If your Dealer cannot supply you **ORDER DIRECT** POSTPAID OR MONEY ORDER **\$7.95** ORDER TODAY

FITS ANY BOAT OR MOTOR . . . INSTANTLY ATTACHED OR REMOVED

Why twist and strain to operate your motor while boating or fishing? The Co-De Steer Control gives you more comfort, freedom, and pleasure . . . locks in any position. Made of rust resistant cadmium plated steel. Every water sportsman needs one. Extension rod available for use in second seat, price 75c. Immediate Delivery.

CO-DE Company 206 Baker Bldg. Minneapolis 2, Minn.

RACING

by Bud Cowdery



AOMCI Racing Editor Bud Cowdery in his racing togs



Here's Bud again close-up in his C-Service (C-1) Runabout. Bud's current racing number is D-1.

Editor's note: For this issue of the Antique Outboarder I've put together a little sketch of B.W. "Bud" Cowdery, Lt Col USAF (Ret). Bud has been our Racing Editor for some time. Lately, his personal racing accomplishments have been coming so thick and fast that I thought we should all get to know him better. All material in this article was developed from information supplied by Bud himself, or from the Danbury NEWS TIMES October 25, 1969.

I'm proud to introduce our Racing Editor Mr. Bud Cowdery. Bud is a young 53 years old and is retired from the US Air Force where he logged more than 6000 hours as a pilot during his 25 years of active duty. He now lives with his wife, Margaret, at their home 15 Crestdale Road, Danbury, Connecticut, and works at the Danbury High School where he is Department head of the Aerospace Science group.

Bud started racing in 1933 in A and B Hydros, mostly in the New England and New York area and was able to continue his racing career while still in the Service. Since 1954 he has raced A and B class Alky Hydros; A, B, C & D stock hydros and runabouts; A, B, C, C-1 (C-service) and F hydro and runabout (Alky). In 1962, Bud quit all other class competition to concentrate on C-1 hydros and runabouts. He's been successful, winning such titles as 1965 and 1967 World Champion, C-Service Runabouts and 1967 APBA National Champion, C-Service Runabouts.

Bud's Current World Speed Records

APBA - Union International Motorboating - Kilo	C-Service Runabout	10/26/63	55.103 MPH
National Outboard Association, World Record, 5mi	C-Service Runabout	10/17/65	48.622
National Outboard Association, World Record, Kilo	C-Service Runabout	10/18/65	57.325
National Outboard Association, World Record, Kilo	C-Service Hydro	10/18/65	61.224

Mr. Cowdery is a member of the Canadian Boating Federation and races in Canada during the year. According to Bud, the Evinrude Speeditwin enjoys its greatest racing popularity in C-Service competition in the Province of Quebec. He raced there in July, 1969 on the same card with 145, 266, 280, 360(cu. in.) and 7 Litre inboards; and class A, B, & C Outboard hydros. Bud says he doesn't win in Canada as frequently as he does in the US. The weather up there is much rougher and if you push your boat too hard, you'll break it up.

In August, Bud competed in the National Championships at De Pue, Illinois, finishing 2nd in one heat of C-Service runabout but sort of washing out in that class by jumping the gun in the next heat. In the hydro runs, he took a 2nd and a 3rd place and was awarded overall third place. The winner was Bob Murphy, Springfield, Ill., with 2nd place going to an old timer, 66 year old Rocky Stone of Wilamina, Oregon. Rocky was also the 1st place winner in C-Service runabout and Bob Murphy was second.

October 11th and 12th Bud ran in the finals of the World Championships at Fort Buhlow Lake, Alexandria, Louisiana, winning two World Titles, C-Service Hydro and C-Service Runabout. None of the C-Service speed records were broken this year. World title racing competitions are conducted by running two five mile heats. Point totals are awarded to the top five finishers in each heat. The competitor accumulating the highest point total after both heats is the winner. Nearly 370 drivers competed in the world championships this past year.

The C-Service engine is a 30 cubic inch, opposed firing machine. The C-1 class has been frozen for ten years with no new engine design permitted. Bud says he races the C-1 engines because they are the most economical. Other engines are constantly being improved and keeping up with all the new developments is just too expensive. Although he enjoys racing as a relaxing hobby, Bud has also had some unrelaxing experiences.

"I've never been hospitalized but I've been dumped or flipped quite a bit. In 1954, I was doing 60 miles per hour on the Madison River in Ohio when the nose of my hydro hit a wave. The nose buried itself and the boat flipped over. I came out of it with a bruised chest but the boat wasn't so lucky." The worst accident he was involved in occurred in Quebec this past summer. Bud explains that "races begin with a running start. There is a large clock supported over the starting chute. If you cross the starting line before the clock hits zero, you're disqualified. But you can be hitting 55 or 60 before you get to the clock. The idea is to time it just right and be at top speed when you cross."

"The danger is that you may come up on some guy who is doing just 30 MPH right in front of you. You aren't supposed to swerve and sometimes you can't slow down in time. Anyway, this guy in another boat saw that he was coming up on the man in front of him too fast, so he turned 90 degrees to the right- straight across the field. Somehow he missed the man next to me. I saw him out of the corner of my eye and knew I would hit him. I swerved to the left to avoid hitting his body, and the front of my hydro smashed into his engine. My boat flew 15 feet into the air and turned over. I fell out and hit the water but didn't go under because of my life jacket. The boat came down and landed on my head but luckily I had a crash helmet on."

Bud plans to continue racing not only for the sheer enjoyment the competition brings him, but also because he believes it helps him to communicate with his students. "They say to themselves, 'Look at this old guy! If he can win a World Championship at his age, maybe he'll say something meaningful to me' - at least they'll listen."



NEXT ISSUE, Bud explains what's involved with reworking a Evinrude Speeditwin for racing use.

WANTED

Literature covering 8000 Series ELTO
4-60 Racing Engines

Shop manuals	Service sheets
Owners manuals	Catalogs
Brochures	Parts Manuals

EDWARD L. HITZE
1514 N. 12 th St
Lafayette, Ind
47904

WANTED

EVINRUDE BIG FOUR ENGINES
OR PARTS FOR SAME

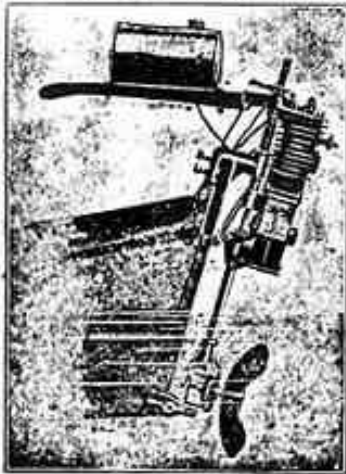
John C. Harrison
1000 N. W. 54th Street
Miami, Florida 33127

Cameron Waterman

AND HIS WATERMAN MARINE MOTOR Co

CHEAP PORTABLE BOAT MOTOR

A portable outfit weighing complete only 35 lb. can now be had for use on row boats. The outfit is so compact and light it can be carried in a trunk or by the hand and on arrival at destination requires only a few minutes to attach ready for use. After a



Row Boat Motor

person has placed the motor on a boat once or twice he can do the work in three minutes. The only tool required is a small wrench. The illustration shows the manner of fastening to the boat and the gearing connection to the propeller shaft. For duck hunters, fishermen, and families spending a few weeks at a lake, or visiting different places each year such a motor would prove a great convenience. The tank holds a supply for 50 miles which will cover ordinary requirements for one day. A speed of about 5 miles an hour can be made. The outfit is comparatively inexpensive.

POPULAR MECHANICS 1906

by W. J. Webb

The first commercially practical American made gasoline outboard motor to be put into substantial and successful production, as we understand the term today, was the Waterman Porto.

Cameron B. Waterman was testing his newly overhauled motorcycle engine clamped to the back of a chair in the Fall of 1903 when he got the idea of the outboard motor. Test fuel was illuminating gas. At the time he was a Yale Law School student. He later became the fifth Waterman in direct line to become a Yale graduate with his son and grandson later becoming sixth and seventh.

Having done much sailing and motor cruising with his parents from age 10, Mr. Waterman's experiences led him to the Captaincy of the Yale crew in 1904. His very active mind would not let the previous Fall's idea of the outboard motor rest so he converted the motorcycle engine to a marine power plant.

Graduating from Yale in 1904, Mr. Waterman married Pittsburgher Miss Lois Miller. Working at his law practice in Detroit he simultaneously developed the new outboard at their home on Burns Avenue. The test tank was a piano box, reinforced and leak-proofed with pitch.

A patent application was filed which proved disappointing to Mr. Waterman as someone had previously patented the basic idea of a removable boat engine. The decision was nevertheless made to start the outboard motor business. Preparing for production, the first experimental outboard was built up with a stock air-cooled Curtiss motorcycle engine. The propeller was chain driven.

A factory was bought, and Mr. Oliver Barthel was hired to design a production oriented engine in 1906. A one cylinder water cooled engine was built. Mr. Waterman leaned toward air cooling, so Mr. Barthel then built twenty five singles with the flywheel inside the crankcase, like motorcycles. In 1907 the design was changed to permit water cooling and 3000 engines were made. In 1908 the first horizontal cylinder engine with flywheel on the top was designed and produced. 1914 saw the introduction of the Porto 3 HP, model C-14 flywheel magneto engine.

Apparently once the problem of getting his outboard motor in production and on the market was satisfactorily solved, Waterman's interest began to wane. By nature and preparation he was a patent attorney, and as the years advanced, he earned an excellent reputation and great success in that profession.

He continued to operate both his marine motor business and law practice until late in 1916. The exact selling date is not a matter of publication record, but the last Waterman Porto ad that could be found appeared late in November 1916 and the first Arrow ad announcing the purchase of Waterman appeared in the January issues. What an opportunity they missed! Here the maker of a relatively unknown outboard was buying one of the top names in the industry, and if there was any publicity about the event we missed it. The ad, while full page, made a modest statement of fact, and that was all. The same ad was repeated several times in the same magazines, again an error, in my opinion.

In April 1917 the United States entered the war, and Waterman was called to Washington and asked to design and build a service truck for the fledgling U.S. Air Force. This he did, and he was next sent to France as Chief of the Motor Transportation for the U.S. Air Service. After the war, Mr. Waterman, now a Colonel, was commissioned to collect U.S. armed force vehicles which were scattered all over Europe--stolen might be a harsh word to use on some of these--but it is interesting to note that in 1918-1919 the U.S. armed forces wanted to reclaim what was theirs. There seems to be some change from today's attitude.

This task accomplished, Mr. Waterman returned to this country and his law practice in Detroit. Meanwhile, during the early days of the war, Mr. Waterman had completed the sale of Waterman Marine Motor Company to the Arrow Motor Company, for the obvious reason that his wartime activities did not permit him to give his business the necessary attention.

Mr. and Mrs. Waterman and their children used to spend a month or more each summer cruising the Superior, Huron, and Georgian Bay waters although the most time was spent on Superior. One of their boats was large enough to require a working crew of two besides the Watermans. Waterman had his own Great Lakes pilot's license, a true reflection of his ability as a boat man. Mrs. Waterman was apparently as much interested in boating as her husband. Even before their marriage she had earned the nickname "Admiral" from Waterman's crew-mates at Yale.

Mr. Waterman was a vigorous and active man and continued his interest in boating as well as in sports of all kinds throughout his long life, which ended as the result of a stroke in April 1955.

Arrow continued the Waterman production until 1924, at which time it was discontinued. Apparently the Arrow people were never greatly interested in outboards as such. This was unfortunate, as this deprived the boating public of the first American made gasoline outboard to be put in regular production.

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Club Briefs, continued from page 2.

BY WAY OF CLARIFICATION, THE "MOTORS SEEN" COLUMN IS A READER SERVICE WHEREBY ONE member can help another by reporting those motors he has seen but did not buy. In this way, some other member can have a crack at it. Lately, with so many people all over the country making inquiries such as "what year is my motor?", "how much is it worth?", etc., we've got a lot of good leads. These too have been put in the column. It's true we don't know if they are all for sale or not, but at least someone can look into any of those which look interesting to him. The names in the ads belong to the owner, not the person who saw the motor.

WELCOME TO THE NEW KNUCKLE BUSTERS CHAPTER OF NEW JERSEY. MAN IN CHARGE IS TOM LUCE. Bill Salisbury is reported to have a California Chapter all set to go too. Contact you nearest chapter for a more rewarding hobby. Make plans to organize a new chapter in your area if none exists. Dave Reinhartsen has the details. Welcome also to the MIDWEST CHAPTER organized in November by Bill Rose, Waukegan, Illinois.

MAKE A MOTOR BOAT OF ANY BOAT IN 5 MINUTES

Ask The Man Who Owns One.....

BOAT/MOTOR TEST: WATERMAN VERTICAL SINGLE OWNER AND PILOT: MARCUS WRIGHT III

Built between 1907 and 1912, this Waterman is believed to be the only Member-owned specimen operated on a boat within modern times. Acquired in 1968 from an estate, this engine was complete but needed overhauling before successful operation.

Realizing the Waterman restoration project from acquisition to bug-free running on a boat was not going to be easy, the whole affair was treated with patience for fifteen months.

Overhauling involved cylinder honing, new piston rings, one main bearing rebushed, connecting rod wrist pin bushing replacement, machining of new drive and propeller shafts with new bushings for those. Both pairs of gears had their meshings carefully fitted.

The Waterman's motorcycle heritage is easy to recognize with the two flywheels being enclosed in the crankcase. These are joined by the crankpin. The connecting rod is malleable iron. The piston is cast iron, flat on the top except for the straight-up intake port deflector, cast integral. Three piston rings are used: Two at the top, one on the skirt bottom. Crankshaft and lower unit gears are bronze. Cooling is by a piston type pump on the lower unit front. This is operated from an exposed eccentric and connecting rod of the forward part of the propeller shaft.

Once overhauled and set up the fun of starting, if you will, began. Five hours were patiently expended on this phase of restoration. The combination of a low compression ratio and (at the time) a baffling carburetor made it most difficult to sort out the starting settings. Spark setting was most critical. Very slight overadvancement caused the starting crank to be thrown nearly ten feet which soon taught the lesson to hang on to that crank even if she kicked. Setting the spark ATC too much caused harder starting; so we soon learned to set the spark for starting at one to two degrees ATC.

Once the Waterman became broken in and the critical spark and carburetor settings were discovered, this Great-Grandfather engine became easy and reliable to start and run. Priming is done by choking, ignition off, and cranking 15 or 20 revolutions until vaporized fuel issues from the compression release, Ignition on, release closed, carburetor needle at the richer starting setting, throttle at one quarter, spark set one to three degrees ATC, the Waterman is slowly cranked through compression. She fires right off, you immediately advance the spark about 30 degrees. Now under way, the Waterman is four-cycling but soon settles down to neat two-cycle running as you gradually lean the mixture for warm running.

While the Waterman is understandably rough running on a boat, it is smoother we noted, than other contemporary horizontal cylinder singles. Wide open, the boat is as fast as with the well known Evinrude single. The Waterman turns up a few hundred RPM's more than does, for example, the Evinrude A which is explained by the propellers of both engines having nearly the same pitch with reduction drive for the Waterman and direct drive for the Evinrude. Idling is regular, even and about one-half top RPM.

The direct exhaust is loud, sharp and smokeless after fully warmed. Although instructions call for 15 drops per minute from the oil reservoir on the intake manifold using straight gasoline, we prefer to run the engine on a 1/3 pint of oil per gallon of gasoline mix. The exhaust burns clean with internal parts showing adequate lubrication.

Both the upper and lower gearsets are lubricated with Texaco #950 Outboard Gear Grease. The exposed upper gears are greased about every 15 minutes. The main bearings use bearing grease and are tightened every few minutes. Those frequent greasings are no problem as the engine is run on exhibition only, and then only for a few minutes.



Engine's running. Blurring must
due to firing at instant of photo



Mark with Evinrude trophy and win-
ning Waterman. Lake Hopatcong 9/69



Mark running Waterman...

20

Photos down by
Dave Reinhartsen

WRIGHT'S WATERMAN

Photos up by
Col. H.T. Luce

Waterman running Mark...



Mr. Waterman has received a
message



Alexandra Wright, Tom Luce & Mark
cruising with the Waterman



Carburetion is accomplished by a Detroit Motor Casting Company carburetor. This float-type unit has a throttle needle valve and two air intakes. The primary air intake is on the bottom, containing the venturi and adjustable fuel needle. The adjustable secondary air intake on the carburetor's side is used to bleed additional air into the primary circuit above half throttle for mixture leaning.

The Waterman has been run on a barrel with the Detroit carburetor. For boat propulsion, a later Tillotson carburetor is used to accommodate modern lower transom heights as the crankshaft gears sometimes throw water which the Detroit carburetor with its 3 inch lower air intake would cause the engine to suck a charge of water into the crankcase, immediately fouling both the spark plug and the writer's disposition.

Ignition is a battery powered vibrator coil. Primary contacts are on the top of the drive shaft. The moving contact is a pin in the shaft which contacts the spring-loaded ball stationary contact. This stationary contact is turned and locked with a lock screw for spark advance control.

Waterman provided a fixture to attach to the boat's keel or skeg. This had a hole into which a pivot cast into the lower unit was dropped. As this fixture isn't appropriate for modern hulls plus the transom bracket being too narrow, a KA Johnson bracket was modified so the Waterman could be easily run on any available boat.

To hear the long silent mechanical voice and have the experience of operating this three generations old engine provided the challenge to complete this project. Almost as if to reward the attention given it, the Waterman went on to win the Evinrude Oldest Running Motor Trophy at the 1969 Lake Hopatcong Meet and then later that afternoon proved her mettle taking guests for brief rides.

Members are sincerely invited to visit and see this engine running.

SPECIFICATIONS

Bore and Stroke---2 3/4" X 3"	Oil/Gas Ratio---(see text)
HP and RPM---2 @ 1400 (estimated)	Weight, as operated---66 lbs.
Gear Ratio---1.625 to 1	Best Speed, actual---4.36 MPH
Propeller---9 1/2" dia X 15" pitch (estimated)	Idling Speed, estimated---2 MPH

RESTORER'S TIPS

MAKING, REPAIRING,
AND FINDING PARTS

Mark Wright

As you build your collection from time to time you will have an opportunity to acquire an engine that is so rare you might never find another copy to use for a parts motor. One or two minor parts may be missing or very badly worn and yet you would like to make a patient long-range project of getting your prize running again.

Gears, shafts and bushings may be beyond use. A good machinist can make shafts and bushings with ease. Should the gears be beyond recall, try Boston Gear Works in Quincy, Mass. The old samples could be sent then for matching or substitution. Many very early engines have standard gears available right out of a modern gear catalogue.

A good machinist can nicely fix a crankshaft or flywheel with a bad taper. In extreme cases, new flywheel hubs can be made to be shrunk and pinned to the old flywheel. Be sure to keep the keyway exactly where it was originally. Crankshafts with rusty throws can sometimes be sufficiently polished to run again. A good plater can restore these too, but have him approved by a crankshaft rebuilder first. Continued on page 28.



TWIN CITIES

MINNESOTA

CHAPTER NEWS

JOHN KOONCE

On September 14 we had a meet and family picnic at Prior Lake, the same place it was held last year. To start the day off right, the flywheel on my 1927 K-35 Johnson came loose. There was, luckily, no damage to the motor. She purrs like a kitten at low speed, but when I get half throttle she'll spit 'n sputter like a greenhorn's first swallow of moonshine. New points, I've been told, may solve the problem. (Can anyone help me out?) How's that for slipping in a free ad?

About 20 motors were brought for running or display. Some that were brought for display ended up as runners, and others that were brought for runners ended up on display for reasons that we won't go in to.

The PO's played the roll in the general running. Putting on a fine display with these powerheads of yesteryear was Dave Jonson with his PO-15 and PO-38. Bill Slice, after staying up most of the night with Dave to put the final touches on their motors, looked as though he was trying to get airborne with his PO-38. Ron Johnson also gave us a great show with his PO-15. Bob Peterson gave me a ride that I won't forget for a long time with his 12 foot Crestliner pushed by his Johnson P-80 (21.5 HP). After we planed off, I jumped in back with him but forgot to jump up front again when we stopped. If you don't think a 12 foot boat can hold much water, try that sometime!

Nancy, my wife, did the photography for the Bang and Go Race that we set up to spice up the meet, and that it did! If any of you get around this way sometime, stop in and see the movies that Nancy took of the race. Dave won the trophy that was donated for the race. My 200 lbs. and model 4357 Elto Handy Twin was no match for Dave and his mother's 1929 A-45 Johnson. Ron Johnson ran a good race but came in 2nd with his 1930 OK-60 Johnson. This may be a good place to inform all members that just because Ron and Dave have the same last name, both run Johnson motors, had the same address, (before Ron bought a house), and both have hair on their heads, does not mean they are any relation. They are not! And neither of them are any relation to the Johnson Brothers of the Motor Company. Bob Brautigam came charging in third place with his 1932 Caille, Model 79. Bob Peterson, after sabotaging me on the far shore by taking my oars so I couldn't get away, roared across to place fourth. Dave, Ron and Bob were already finished and on the shore when this took place, so it was all in fun! Bill Slice was unable to enter the "Big Race" because the 1936 Neptune that I sold him didn't run. (I lost anyway.) Bill has it running like a top now.

Dave should have some "points" for getting the game warden called out to the meet. While Dave was out on a pleasure ride, minding his own business and not bothering anyone with his PO-38 wide open, a couple of tough looking guys with those horrible (NEW) motors came racing towards poor defenseless Dave. Then when they had just about swamped the poor kid, they hollered at him for getting too close to them. (There ought to be a Law!) Defenseless against the two brutes, Dave came back to shore where the game warden waited for him with a complaint that he had been "buzzing" other boats and displaying unsafe water habits. The warden was very reasonable when he heard Dave's story and let the complaint drop. Now, does Dave, or does he not, get points for that??

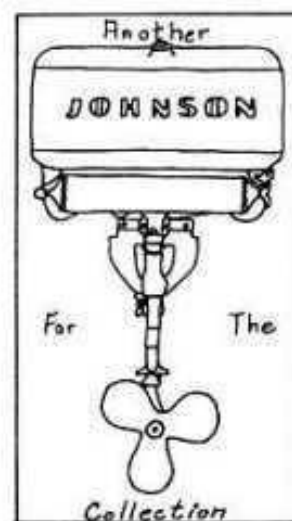
Other motors that were brought to the meet were Bob Peterson's 1923 "Big Twin" Evinrude. Bill Slice had his 6 H.P. Neptune there in great shape. Ron Johnson had a beautiful 5 H.P. Sea King (1938). Dave also had his 1926 Elto Light Twin there. My little 1½ H.P. Waterwitch wasn't much good against the winds we had. I had to set the motor and row along with it. I also brought my 1924 Model A Johnson.

All in all I thought it was really a great meet. I wish I could've run my 1928 Elto Quad, but I still need a flywheel. (Another free ad.)

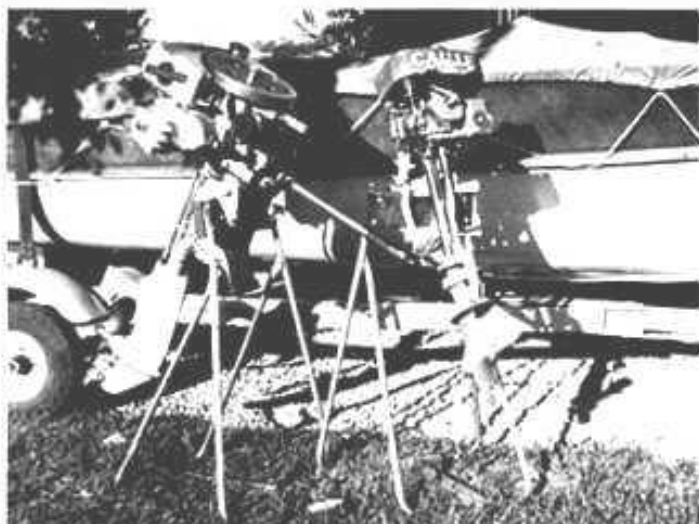
Let's all try to sit down and write a short story about our association with the Club, to give some suggestions, and to give a little information about the local chapters, even if there is only a single member. Or some of your experiences while looking for motors would be interesting, like the day Bob Brautigam went looking for motors and came home with a 1915 Pierce Arrow tow truck! Or the time Adolff Zwiefelhoper went looking for a Waterwitch and came home with a wife!! Anything that will take a little of Bob B's time will be fine. You see, Bob is doing a lot of writing for The Antique Outboarder now and he always likes to make fun of me. But if I can talk some of you into writing some articles, then he will be too busy fo make fun of anyone! So come on, PLEASE help me pick on Bob for a change.



Chapter members and their families at Prior Lake, Minn



Here's the cute birth announcement for Tanja Lynn Johnson born Oct 18



Bob Brautigam's 1929 Elto Speedster and model 79 Caille single. Both performed well.

JOHN KOONCE STILL GETS A LITTLE MAIL

Dear John- - just finished building a 6 foot plank with waterwings on the front and my 1939 Elto Cub mounted on the rear. I planned to lay down on the plank but I found it better if I just swim alongside. Does this invention have any value? Signed: U.P. Sydown

Dear Mr Sydown: YES! At the price of lumber these days, a 6 foot plank is worth \$2.80.



Dave Johnson receives the trophy from J. Koonce (L) and R. Johnson

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FEATURING

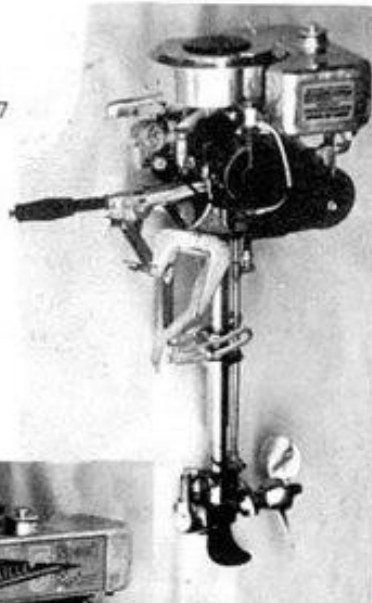
CAILLE

THE CAILLE PERFECTION MOTOR Co.
Detroit, Michigan U. S. A.

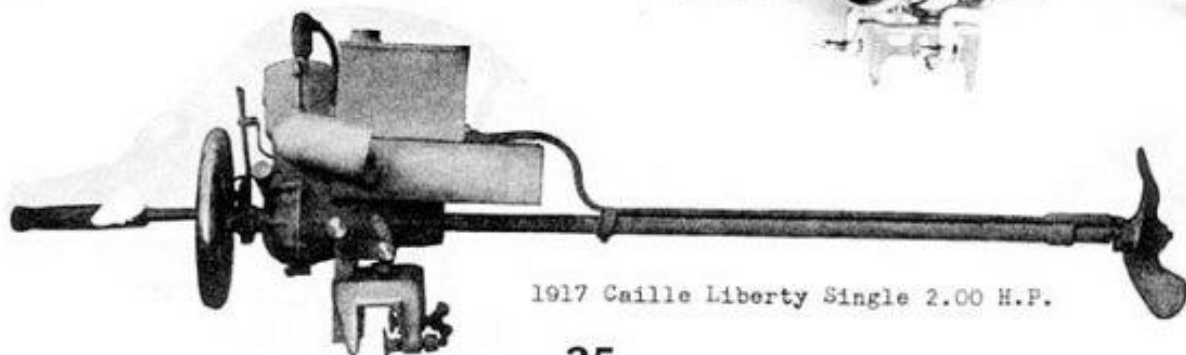
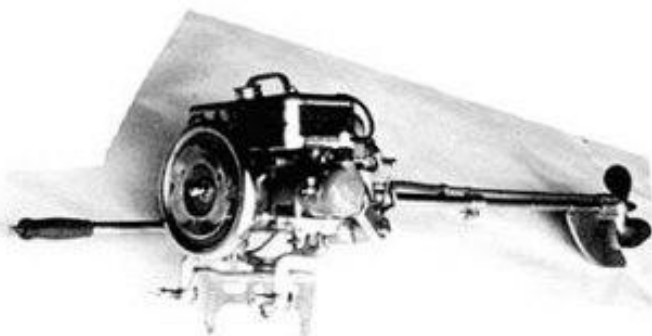
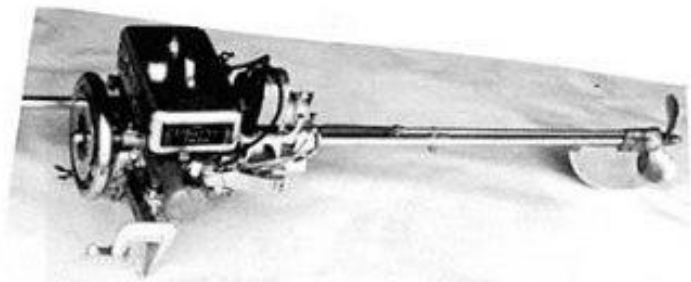


Left- 1917 Caille
2 H.P. Five-Speed
Single with rewind
starter

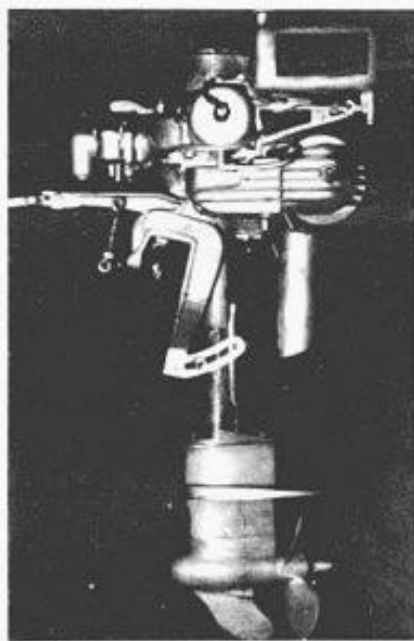
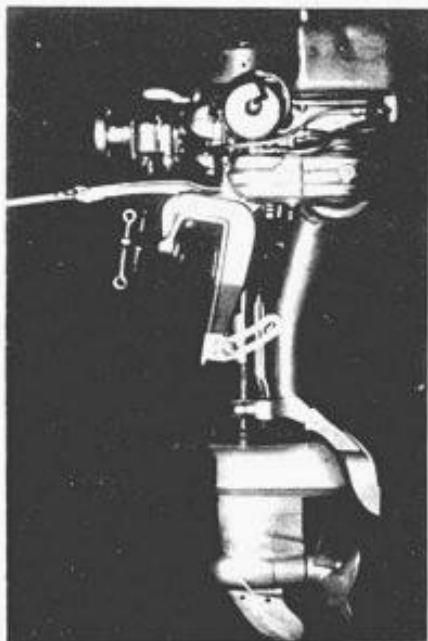
Right- Two views of a
Caille Five-Speed 1927
4.5 H.P.



Below- Two views of a
1925 Caille Liberty
Twin 2.75 H.P.



1917 Caille Liberty Single 2.00 H.P.



Above left to right- 1931 Caille Utility Model 27, 15 H.P.; 1934 Motorgo made by Caille, 21 H.P.; 1929 Caille Commodore Model 32 12 H.P.. (Photos courtesy of Clarence Sitton)



Left and Below- Two views of a 1920 Caille Liberty Single, 2.00 H.P.

Below- Two views of a Caille Model 20 Five-Speed Racer, 9.0 Horse Power



CAILLE MODEL NUMBER AND YEAR REFERENCE CHART
 CAILLE PERFECTION MOTOR CO. DETROIT, MICHIGAN 1913 - 1935

<u>YEAR</u>	<u>CLASS</u>	<u>MODEL</u>	<u>DESIGNATION</u>	<u>CYL</u>	<u>HP</u>	<u>RPM</u>	<u>WT (lb)</u>	<u>BORE X STROKE</u>	<u>PRICE</u>
1913 - 25	A	-	5 Speed	1	2	700	60	2.62/2.50	\$100
1917 - 31	A	1917-19	Liberty Single	1	2	700	70	2.62/2.50	58
		1920-23	Liberty Single	1	2	700	72	2.62/2.50	75
		1924-31	Liberty Single	1	2	700	73	2.62/2.50	85-100
1921 - 24	A	-	Neptune	1	2	700	61	-	85-95
1924 - 28	A	-	Liberty Twin	2	2.75	1200	48	2.00/2.00	145
1925 - 26	A	-	Pennant 5 Speed	2	2.75	1600	45	-	-
1927	A	-	Junior	2	2.75	2000	45	-	-
	A	-	Master 5 Speed	2	4.5	2600	52	-	-
	B	20	5 Speed Racer	2	9	4500	50	-	170
1928	A	-	Junior	2	2.75	2000	45	-	145
	B	22	Master 5 Speed	2	6	2800	65	2.50/2.00	175
	B	30	Racer (Tractor)	2	10	4800	63	-	185
1929	A	12	Junior 5 Speed	2	2.75	2000	45	2.00/2.00	-
	B	22	Master 5 Speed	2	6	2800	65	2.50/2.00	-
	B	32	Commodore	2	12	5000	65	2.50/2.00	185
	C	42	Admiral	2	18	4000	95	2.75/2.50	220
	B	34	Champion Racer	2	14	6000	65	2.50/ 2.00	-
All with tractor lower unit	B	36 *	Flash Racer	2	16.5	6000	67	2.50/2.00	-
	C	46 *	Streak Racer	2	22	5000	97	2.75/2.50	-
	C	44	Monarch Racer	2	20	4500	95	2.75/2.50	-
1930 Red Head Series	A	14	Master	2	6	4500	40	2.25/1.75	-
	A	15	Master Multiflex	2	6	4500	43	2.25/1.75	-
	A	35 *	Racer (Tractor)	2	12	6000	52	-	-
	B	25	Utility	2	15	4500	85	2.50/2.00	-
	B	26	Utility Multiflex	2	15	4500	85	2.50/2.00	(electric)
	B	40 *	Racer (Tractor)	2	17	6000	80	2.50/2.00	-
	C	45	Utility	2	21	4500	110	2.75/2.50	-
	C	47	Utility Multiflex	2	21	4500	110	2.75/2.50	(electric)
	C	50	Racer (Tractor)	2	23	6000	105	2.75/2.50	-
C	51	Utility Multiflex	2	23	4500	110	2.75/2.50	-	
1931 Red Head Series	A	16	Utility	2	8	4200	55	2.25/1.75	135
	A	35 *	Racer (Tractor)	2	12	6000	52	2.25/1.75	-
	A	15	Utility Multiflex	2	8	4500	55	2.25/1.75	-
	B	27	Utility	2	15	5000	85	2.50/2.00	-
	B	28	Utility (Electric)	2	15	5000	105	2.50/2.00	-
	B	29	Utility Multiflex	2	16	4500	85	-	-
	B	40 *	Racer (Tractor)	2	16	6000	80	2.50/2.00	-
	C	48	Utility	2	21	4500	110	2.75/2.50	-
	C	49	Utility (Electric)	2	21	4000	130	2.75/2.50	-
	C	50 *	Racer (Tractor)	2	24	6000	105	2.75/2.50	-
C	51	Utility Multiflex	2	23	4500	120	2.75/2.50	-	
1932	-	79	Caille 79	1	4	4000	34	2.25/1.75	-
	-	-	Multiflex	1	4	4000	35	2.25/1.75	-
		15	Utility	2	8	4500	55	2.25/1.75	-
	A	16	Utility Multiflex	2	8	4200	55	2.25/1.75	-
	B	27	Utility	2	15	5000	85	2.50/2.00	-

<u>YEAR</u>	<u>CLASS</u>	<u>MODEL</u>	<u>DESIGNATION</u>	<u>CYL</u>	<u>HP</u>	<u>RPM</u>	<u>WT (lb)</u>	<u>BORE X STROKE</u>	<u>PRICE</u>
1932 Continued-									
	B	28	Utility (Elec)	2	16	4500	105	2.50/2.00	-
	B	29	Util. Multiflex	2	16	4500	85	2.50/2.00	-
	B	40 *	Racer (Tractor)	2	16	6000	80	2.50/2.00	-
	C	48	Utility	2	21	4500	110	2.75/2.50	-
	C	49	Utility (Elec)	2	21	4000	130	2.75/2.50	-
	C	50 *	Racer (Tractor)	2	24	6000	105	2.75/2.50	-
	C	51	Utility Multi.	2	23	4500	120	2.75/2.50	-
1933	-	79	Caille 79	1	4	4000	34	2.25/1.75	-
to	-	109	Multiflex	1	4	4000	34	2.25/1.75	-
1935 **	A	15	Utility Multi.	2	10	4200	60	2.25/1.75	-
	A	16	Utility	2	10	4200	55	2.25/1.75	-
	B	27	Utility	2	16	4500	85	2.50/2.00	-
	B	29	Utility Multi.	2	16	4500	90	2.50/2.00	-
	C	48	Utility	2	23	4500	110	2.75/2.50	-
	C	51	Utility Multi.	2	23	4500	115	2.75/2.50	-

NOTE:

* Indicates models known to have used two carburetors.

** Model years 1933 through 1935 were essentially the same with only minor changes to shape of gas tank, size of waterpump housing, etc..

This table has been compiled from the best information available but should be considered as an unofficial guide.

Restorer's Tips Continued from page 21.

Bronze bushed bearings were usually made from standard I.D. and O.D. bushing stock still available today from industrial hardware supply stores. More often than not new bushings will restore bearings clearance properly, as the crankshafts are usually O.K. if not deeply rusted or scored. Don't forget to put oil grooves into these new bearings.

Piston rings are standard. Ask your local auto wholesale parts store to order plain cast iron compression rings for you. Give him the bore diameter and the ring width. Rarely, very old engines will be found with exceptionally wide rings. The writer's 1913 Evinrude 1/2 inch wide rings were replaced with 1/4 inch wide rings in each groove. Sealing is actually better. Be sure to lightly hone the cylinder, otherwise the new rings will never seat properly. Help yourself on initial starting by running the well oiled engine in a lathe or drill press for a while. This improves compression for initial starting.

Should new piston rings with step cut ends be unavailable use straight cut rings. Line up the ring ends so the ends won't hang up in the ports as they pass else you could damage the rings and cylinder. For insurance pin the ring so they cannot rotate. Drill the hole in each piston land about .005 inches smaller than brass welding rod you press into piston ring lands for pinning. A small round file will notch the rings for pinning. It is usually best to do the pinning at the ring end.

Make gaskets yourself using a small ball peen hammer and good gasket paper. Use the part itself for a die.

Borrowing parts for copying is another way out of some situations. Three 1915 Ferros are speaking again as a result. A Washington member loaned me his muffler. Two copies were made, one for a New Hampshire member and another for my engine. My Ferro's pump was copied and sent to the Washington member who had the original muffler.

New muffler cans can be fabricated of brass or stainless steel by sheet metal fabricators.

Most cracked or broken aluminum castings can be repaired by professional welders with Hell-Arc equipment. Remember aluminum warps somewhat due to the intense welding heat. The welder can tell you what to expect. Depending upon the use of the part, have a good machinist true-up the casting bores and faces where rotating or reciprocating action is involved.

Cultivate the acquaintance of a competent machinist. He can advise you as to the repair or fabrication of otherwise unobtainable parts. Get to know racing engine mechanics and owners of antique autos as they often know individuals with specialized talent who will take interest in your problem and be of assistance to you.

The rarer an engine is the more it deserves to be operational. The personal satisfaction of restoring and running rare engines is unique. We trust these suggestions will be helpful to you. The AOMCI Parts Sources manual is the best reference available for sources of parts. Check out your engine's brand name and contact any listed sources for the make of engine in question. For those members who have not mailed in their \$2.50 donation to defray the Parts Source publication cost, kindly send your donation to John Harrison now. Any member who has not received his copy of the listing need only make written request to Mr. Harrison or the author.

THE NEW YORK TIMES,

SUNDAY, OCTOBER 12, 1969

**JERSEY INVESTIGATES
TREMORS IN MORRIS**

JEFFERSON TOWNSHIP, N. J. Oct. 11—Officials of the State Division of Mines were sent to this Morris County community today to investigate earth tremors that shook the area twice this month.

The latest tremors were reported to have occurred between 9:45 P.M. and 10:20 P.M. yesterday in the area of Lake Hopatcong between Prospect Park and Nolans Point. The first tremors were reported a week ago.

The police said they first thought the rumblings may have been caused by an explosion or sonic boom. However, Mayor Ralph Atkinson said state geologists had confirmed the rumblings were earth tremors.

Fact is, Doc Craver, Tony Caglione, Tom Luce and Mark Wright were checking out a few antique outboards that evening on Lake Hopatcong.

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*Member Jim Altman does
a nice job on outboards
too!*

RESTORER OF FINE AUTOMOBILES
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Ed Kant of Waupun, Wisconsin salutes the U.S. Mail -- He writes, "About a year ago I saw an ad in the Antique Outboarder for a model A Evinrude about 50 miles from here. I made the trip and got the motor but some of the parts were missing. I asked the man who I purchased it from to drop me a line if he found the parts. I had given up ever hearing any more about it. To my surprise, I received a letter in the mail saying he had found the parts while cleaning his garage. He had thrown away my name and address so he just addressed the envelope as follows: Occupant, Antique Boat Motors, Waupun, Wis."



AN AUTOMOBILE MAIL-WAGON.

THE Yankee Chapter NEWS

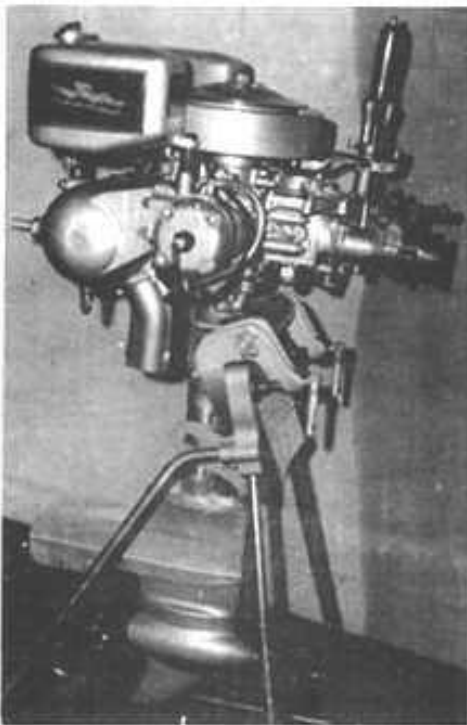
by Peter Hunn

October 4th, 1969 started out as any normal Saturday in New England usually does, but it would end up much differently because this was the day of the first Yankee Chapter meet. Around 9 o'clock that morning an old Ford Woody Wagon pulled into my driveway with lower units, props and steering handles visible through the windows. Inside the beautifully restored car was the driver and owner, Bill Lyman. Now as many of you know, Bill is a man that can really make a meet go over great - and he did just that. He not only brought his storehouse of information and stories, but eight really nice motors. Among these were an Elto, Quad, Evinrude canoe motor, Caille Liberty Drive and a real prize, an Indian Silver Arrow.

Bill and I set up his motors along with my Johnson OA-55 and Elto Speedster outside on the front lawn. I don't know if the neighbors were interested in what they saw - or if they just wondered whether or not a new addition to the junk yard was being started. Next came Bob Zipps with his Lockwood Racing Chief, a beautiful engine. I secretly wanted to switch my OA-55 for his Lockwood 92 BR but for some reason the Johnson boys never put oil cups on their cylinders, making it unlikely for the OA-55 to pass as an imposter. The Hawie's came next and Mr. Hawie has so much information stashed away in his head that if he doesn't know something, then you don't have to know it either.

Perry Stanley, a new member from the state of Connecticut also attended. He is very interested in the Club and I enjoyed talking to him very much. Frank Shimer and Vincent Loss came all the way from Long Island. We'll have to let them pass as New York Yankees. Vincent brought a Johnson A-75 which I had sold him at the Hopatcong Meet. He has it looking very nice. Sometimes I hate myself for selling motors like that.

We then went into the house to discuss motors further and to have some refreshments. Oh! by the way Chapter Members: remember the cupcakes that were served? They were made with cyclamates. I heard a lot of good motor talk and enjoyed the day very much. I thank all who attended and helped the Yankee Chapter to be born and stand on its feet. A special thanks to Bob Zipps who helped me on this. If it weren't for him, I would still be wondering where to wrap the starter rope.



Left,
Johnson SR-50
Factory Racer

From
BILL KELLY'S
Collection



Right,
Model 7031
33 HP Evinrude

Johnson LIGHT TWIN

1921-1927

by Bob Zippa

Photos by Gene Wagner

It was shortly after the dawn of outboard history when a certain motor was introduced which proved to be the first step in a practically revolutionary movement that would start the industry really thinking.

The year was 1921 and the motor was the Johnson Light Twin. Prior to this, motors were stereotyped and with the exception of the Elto, used design parameters that seemed to be cast in stone and materials that were archaic even for their time.

When Johnson entered the scene, it seemed as if their policy was to enhance creative thinking and inventiveness to such a degree that within a few short years, they expanded the boundaries of the state of the art to frontiers never even imagined. From a modest beginning in a field of proven motors such as Caille, Elto, Evinrude, Lockwood and Kohan, they were destined to become leaders in the industry and before their initial decade came to a close, they were selling more motors than all other brands combined.

In this article, I am going to elaborate on the Johnson Light Twin, the motor which started the company off on the right foot. I will discuss the distinguishing features and the major changes which took place on the motor from its introduction in 1921 until it was discontinued in 1927.

First of all, a little clarification must be made on the terms "Waterbug" and "Light Twin". For the first few years when Johnson was in business only one basic model was sold. Waterbug referred to this one model and this was evident in their advertising. As far as I have been able to determine, the word Waterbug was all inclusive and refers to the entire Johnson line as does the current Sea Horse designation. Therefore, when more models were introduced a further name breakdown was required and all the small opposed twins were called Light Twins. Light Twin is the name used by Johnson in their parts catalogs and is the designation used by both Hank Bowman and Jim Webb in their books. I do not know for sure when the Sea Horse designation came into effect, but a review of the decals of the Johnsons I have, finds the words first used in 1929 on my model S-45.

I have collected five different model Light Twins as shown in Figure One. They are from left to right: 1927 model AB-25; 1926 Model A-25; 1924 model BN; 1924 model B and a 1922 model A.

All of the Light Twins were made in South Bend, Indiana and this is written on the rope starter sheave. All are of the opposed twin cylinder type with three port type powerheads. They weigh approximately 35 pounds, and develop 2 HP at 2250 RPM. One distinctive



FIGURE 1

feature is that all have a brace on the front of the lower unit along with an exposed water pump.

As was common with other brands and as far as I have been able to determine, changes in Johnson Motors were incorporated when it was convenient to introduce the change into production and not necessarily as yearly changes, although it will be shown that major powerhead changes took place for the 1925 model year.

The years and the serial number range for Johnson Models are as follows:

Year	Serial Number Range
1921/ 1922	501 to 3930 (About 100 motors were made in late
1923	3931 to 7500 1921)
1924	7501 to 20,000
1925	20,001 to 30,559
1926	30,560 to 44,977
1927	44,978 to 65,524

Eight different models were manufactured from 1921 to 1924 and they are as follows:

"A", and the 5 inch longer "AL"
"BN", and the 5 inch longer "BNL"
"C", and the 5 inch longer "CL"
"DN", and the 5 inch longer "DNL"

where:

"C" is like "A" except for Part # 14-332 Canoe Attachment.
"CL" is like "AL" except for Part # 14-332 Canoe Attachment.
"DN" is like "BN" except for Part # 14-332 Canoe Attachment.
"DNL" is like "BNL" except for part # 14-332 Canoe Attachment.

and:

"A" is the Fresh Water Motor
"BN" is the Salt Water Motor
"C" is the Fresh Water Canoe Motor
"DN" is the Salt Water Canoe Motor

Eight different models were also manufactured from 1925 to 1927 (referring to Light Twins only) and they are as follows:

"A-25", and the 5 inch longer "AL-25"
"AB-25", and the 5 inch longer "ABL-25"
"AC-25", and the 5 inch longer "ACL-25"
"ABC-25" and the 5 inch longer "ABCL-25"

where as in the earlier motors "AC-25", "ACL-25", "ABC-25", & "ABCL-25" are canoe motors using canoe attachment Part # 14-332.

and:

"A-25" is the Fresh Water Motor
"AB-25" is the Salt Water Motor
"AC-25" is the Fresh Water Canoe Motor
"ABC-25" is the Salt Water Canoe Motor

The Light Twins have used three different gas tanks. The earliest models were equipped with a heavy cast aluminum tank as shown on the right in figure 2. As far as I have been able to determine the cast tank was used up to motor serial number 5582. All later models were equipped with light aluminum tanks made of thin sheet metal. The first sheet metal tank looked very much like its cast predecessor, with relatively sharp radii at corners. On the cast tank, there is a rise on the aft end of the tank running from top to bottom in the location of the tank fill hole. On the first sheet metal tank, there is no such rise as the sheet metal goes straight across the back of the tank. I suspect that the first sheet metal tank was used for a relatively short time. The third tank which is the most common, is also made of thin sheet metal but has larger radii at corners and has the distinctive feature of a rise on top of the tank at the fill hole. The rise extends forward of the fill hole and tapers down slowly until it blends in with the top of the tank. The third tank was used on "BN" and 1925 and later models. Exactly when the change from the first to the second sheet metal tank took place, I have not been able to determine. The first sheet metal tank is shown in the middle of Figure 2. The motor on the left in Figure 2 is a model "BN" with the second sheet metal tank. The big disadvantage of the sheet metal tanks are the ease in which they can be accidentally dented.



FIGURE 2

The magnetos can be divided into three distinct groups. They are: the old style used on motors below serial number 15,569 except for model "BN" motors, the regular style used on motors between serial number 15,569 to 21,163 inclusive and all model "BN" motors, and last the new style used on all motors above 21,163.

The old style magneto was used on models "A" and "B" up into 1924 and can be easily spotted by its timer lever and flywheel. This timer lever had a stop button which consists of a $7/32$ nds diameter by $5/16$ ths long pin which fits into a $1/2$ inch diameter base. This is a very distinctive feature and cannot be confused with later model magnetos. The old style magneto is shown on the right in figure 3. The flywheel used with the old style magneto has a circumferential ridge on top about $3/4$ inch in from the rim. This ridge rises $1/4$ inch. The ridge is shown on the center motor and right motor in Figure 2.

The regular and new style magnetos have the same stop buttons and they are made of a $5/8$ ths diameter fiber material

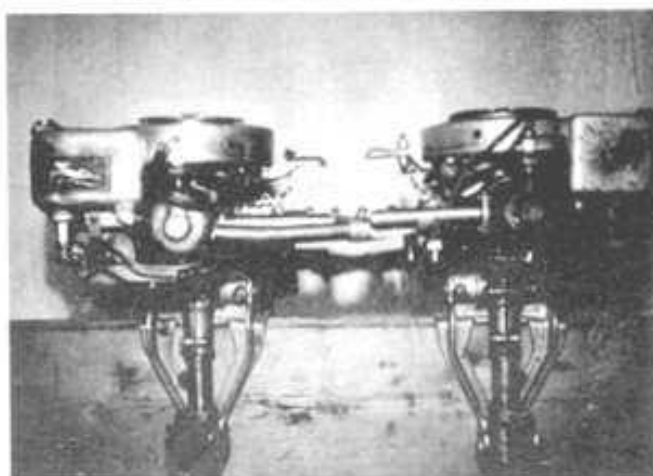


FIGURE 3

mounted on the end of a flexible piece of sheet metal. The motor on the left in Figure 3 has a regular style magneto.

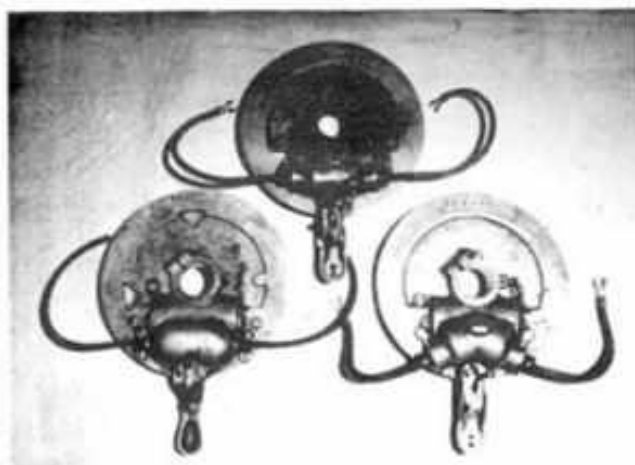


FIGURE 4

The obvious external difference between the regular style magneto and the new style magneto is that the spark plug wire leaves the magneto plate at a 90 degree angle with the timer lever in the regular style, and a 60 degree angle with the timer lever on the new style.

The bottoms of the magneto plates are shown in Figure 4. The models they are from are: model "A" left, model "BN" center, and model AB-25 right. The angle difference can be easily seen. Even though there is no angle difference between the old style plate and the regular style plate, note the plate differences where the wires enter.

Both the regular style and the new style magnetos use the same flywheel. The combination flywheel and magneto can be interchanged from model to model so be on guard. For instance the picture of the 1922 Johnson Light Twin in Jim Webb's Book does not have the old style magneto and flywheel as it should. Since it looks like the spark plug wire is leaving the magneto plate at a 90 degree angle; therefore, the plate was made around 1924-25.

Moving on next to the power head, the next feature is the cylinder. From the outside of the motor, the most distinctive feature which distinguishes early Light Twins that is, under serial number 20,000 from later engines, is the effect of the intake passage on the forward side of the cylinder.

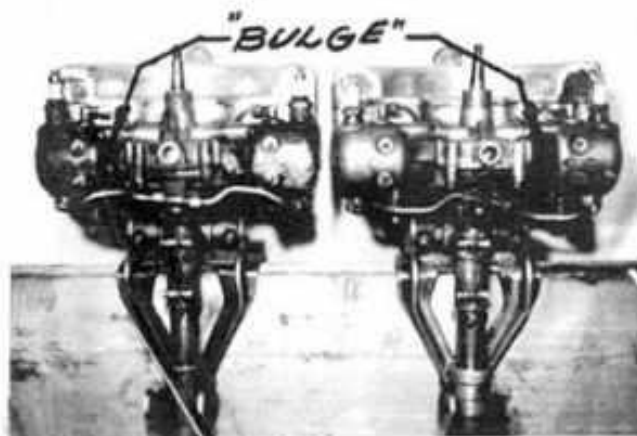


FIGURE 5

This passage delivers the fuel-air vapor from a passage in the crankcase to the intake port in the cylinder wall. The metal over this passage forms a large "bulge" in the cylinder. This "bulge" which extends from the cylinder mounting flange to just before where the water jacket starts, has a constant height for motors below 20,000. The motor on the right in Figure 5 has a constant height "bulge". The "bulge" in the cylinder of motors with serial numbers above 20,000 vary dramatically in height. The "bulge" is about the same thickness at the mounting flange as earlier cylinders but starts increasing in height immediately as it extends toward the water jacket. It reaches about 1 1/2 times the original height. The motor on the left in Figure

5 has the varying thickness "bulge" typical of the later model motors.

There are major internal differences in the powerhead. On motors below 20,000, there are two rings located on the top end of the pistons. When the piston is at the bottom of its stroke, a part of the piston skirt actually leaves the cylinder and extends into the crankcase. On motors above 20,000 the piston has a third ring which is located close to the bottom of the

piston skirt. To prevent this third ring from leaving the cylinder when the piston is at the bottom of the downward stroke, a different cylinder is used with extension lips, at the mounting flange. This is shown in Figure 6 with the cylinder on the left without the extension lips from a Model "A", and the cylinder on the right with the extension lips from a Model "A-25". Cylinders without extension lips found on motors below serial number 20,000 cannot be used with pistons having three rings which are found on motors above serial number 20,000.



FIGURE 6

The crankcase on motors above serial number 20,000 is different from those below 20,000. This is so because the holes in the crankcase where the piston connecting rod assembly passes through are larger to accept the cylinders with the lip extensions. Therefore, a cylinder from a motor above serial number 20,000 cannot be bolted (except with modification) to a crankcase of a motor below serial number 20,000.

Figure 7 shows a comparison in lower unit design. The motor on the right is a Model "A". The brace which extends from the leading edge of the gear case to the torque tube does not have an integral anti-cavitation plate. All of the early Johnsons were made this way. The requirement for an anti-cavitation plate became evident almost immediately and a plate was sold separately for use on these earlier motors. The brace of the later lower unit clamped on the torque tube a few inches lower than the older brace. At this point, the anti-cavitation plate is bolted directly to the brace.

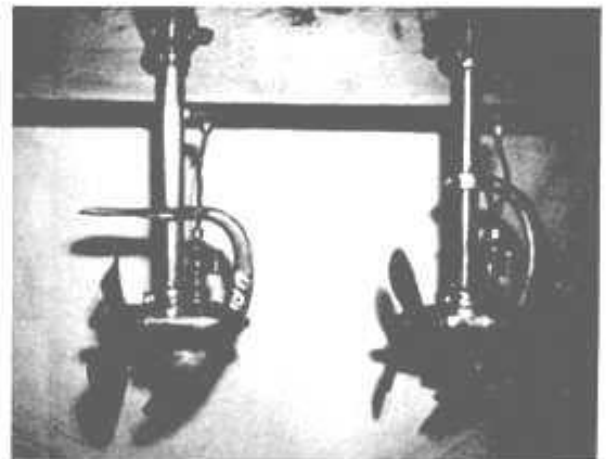


FIGURE 7

With the lower unit advancements that were introduced on the P-30 Model and were carried on by the Model P-35 and the new Model K-35, the Light Twin had to be updated and the Model A-35 was the result. Therefore, the Light Twin was not really discontinued in the true sense of the word, it simply advanced to the state of the art.

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From California -

1969 CALERO DAM MEET

AOMCI

by Bill Salisbury

The California Meet was held this year at Calero Dam in Santa Clara County on October 19. This was the first meet held in Northern California and we had a total of eight members attend along with members of their families and friends.

It was a beautiful Sunday and members started showing up shortly after eight o'clock in the morning. We set up our display at the main launching ramp and used an area convenient to the ramp and to the water.

The morning was absorbed becoming acquainted with other members, getting boats in the water and tuned up, and of course, joy riding. One of the highlights of the morning was a rescue performed by Eric Gunderson when he towed a new, fancy Donzi back to the ramp after it's owner, trying to show off, roared away from the ramp -- for about 15 feet and hit an underwater rock, wiping out his prop, shaft, and strut. Eric did it with his nicely restored 1937 Neptune 4 HP Twin. He got lots of applause from not only the Antique Outboard Club members, but other spectators as well.

The afternoon started off with the judging of the most unusual motor and motor in best condition. The judges were Frank Nunes, Bob Hackl, and Eric Gunderson. A trophy was presented to Paul Rawn for the most unusual motor and the judges came up with a tie, but since both of the motors were owned by Paul, he still walked home with the hardware. The unusuals were a Clarke Troller and a 1929 Cross Twin 4 cycle.

The Best Condition Trophy was presented to Bob Jevarian and his son Rich for their work on a superb Indian Silver Arrow (1930). The judges had to make a very difficult decision here as there were quite a number of outstanding restorations.

The Oldest Running Motor Trophy was won by Carl Castle for his 1928 Johnson A-35, also beautifully restored. This was the first time Carl had even tried to start his motor and he was obviously pleased when it started easily and ran for the five minutes prescribed by the rules without stopping. There were older motors at this meet, but not running. Chuck Stoker almost won the prize for his J-25 Johnson, but there was no serial number to be found on it and therefore we could not establish the age.

The Bang and Go Back Race was held next. Unfortunately, we had only three entries for this one. Rich Jevarian was using a Champion Single, Eric Gunderson was using his Neptune Twin, and yours truly was using the notorious '38 Johnson PO-38. Eric Gunderson took the honors here. I had the PO going so fast that I couldn't make the turn at the pole boat when the gun went off. Son David and I nearly went for a swim!

The final event of the day was a predicted log event and a surprise event at that. All watches were turned in along with estimates of the timed run. Rich Jevarian won this one with his Champion Single. He estimated his time at 7 minutes even and his actual time was 6:44! That is pretty good counting, Rich!

As you probably know, California is a big place and our members are scattered all over the place. We were all quite pleased with the success of the meet and the enthusiasm shown at the meet. We know that next year we will have a better attendance and more participation especially for the water events. So get them ready for next spring and be ready to make them perform! You'll be hearing from me.

Our thanks to Bill Seibel, who couldn't make the meet all the way from Seattle, but who sent his entry fee as a donation to help with costs. Hope you can make it next year, Bill! A special thanks to Carl Castle who expertly took the meet photographs and helped with the organizing.



Bob Jevarian (L) receiving "Best Condition" trophy from Bill Salisbury (R). Rich Jevarian looks on.



Paul Rawn receiving "Most Unusual Motor" trophy



Eric Gunderson receiving "Bang and Go Back" trophy

At Last!!

A
Really
Portable
Out-
board
Motor!



Weights under 10½
pounds. Only 21
inches over-all.

The CLARKE TROLLER

The motor without gears,
pumps or water jackets

Put it in your duffle bag or on the floor of your car. It won't leak oil or fuel in ANY position.

A motor that will be your pet, just as much as your favorite fishing rod or gun. Light, easily carried—take it wherever you go, whether to some crowded inland lake or to some far-off haunt in the distant woods.

It is the lightest, cleanest, simplest practical motor ever made available for sportsmen, campers and racers. Motor operates under water, thus cooled by direct submersion. It is always cool and always clean.

Carburetor and ignition mechanism, inclosed within metal housing, make engine water-proof, rainproof and sprayproof. Can be carried freely with tank full of gasoline.

Center of gravity well below the waterline—actually contributing to stability of boat or canoe.

Uses 6-volt "hot-shot" type battery for ignition system similar to that used in motor cars—light dry cell provides current for ignition as well as for legally required light.

Clean to handle—will not soil hands or clothing—smooth, streamlined exterior of polished aluminum is always bright and immaculate.

Easy to carry, stores in small space. Very economical. Powerful, developing 1.7 horsepower. Operates approximately 1½ hours on a quart of fuel.



APRIL, 1958

You CAN take it with you

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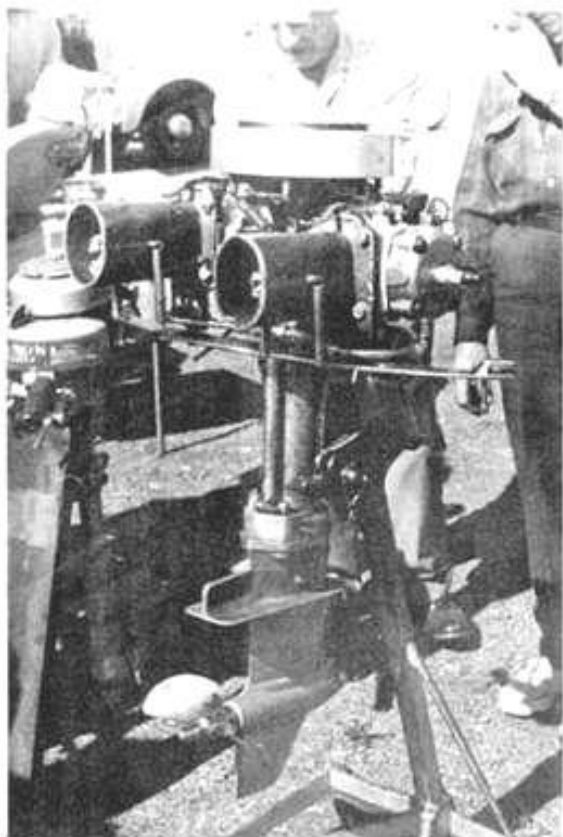
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Detroit, Mich.

D. R. CLARKE ENGINE CO.

825 Richmond St. W.

Toronto, Canada



This is the side of Frank Nune's 1938 Speeditwin seen by the losers



This Silver Arrow of Bob Jevarian's speaks for itself.



Paul Raun's 4 cycle Cross Twin. Notice 2 caps in tank- one's for oil.

A list of motors at the California Meet:

Bob Jevarian

1938 Neptune Model 1438
Evinrude Model B
Champion Model 12
Neptune Twin Model 15B4
1930 Indian Silver Arrow
Model D01004
Penta Twin Model U-21

Chuck Stoker

Johnson J-25
1939 Johnson KA-39
Johnson KA - NY Pumper
1941 Waterwitch

Frank Nunes

1938 Evinrude Racing Speeditwin
1938 Johnson LS-38
Caille Twin - unknown vintage

Paul Rawn

Caille Twin 5 Speed
Bendix Single Model SM
Clarke Troller Model TP
1929 Cross Twin 4 Cycle
Shoda Twin 4 Cycle - WWII Jap
barge motor

Carl Castle

1928 Johnson A-35

Bill Salisbury

1938 Johnson PO-38
1939 Johnson KA-39
1933 Johnson A-65
1931 Caille-Motorgo
15 HP 20 cu. in.
1930 Johnson K-50

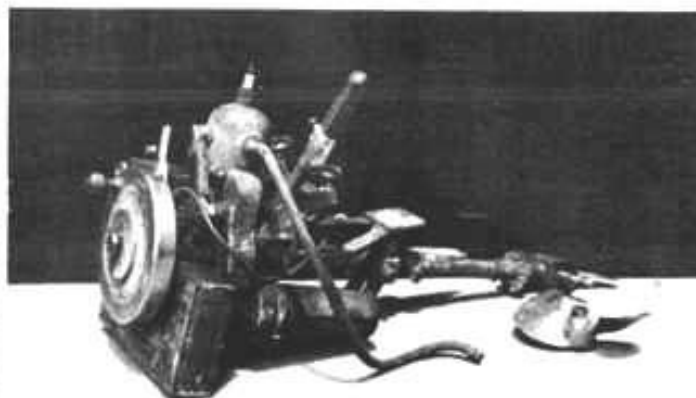
Eric Gunderson

1937 Neptune Twin OB35A

EDITORIAL STAFF

SERVICE CLINIC

So you're not a outboard mechanic. Here are easy to follow tips good for reconditioning any antique outboard motor....



"DO NOT TURN THY BACK ON FADED GRANDEUR....
APPROACH WITH STRONG HEART AND VICTORY WILL
FOLLOW" Anon.

PART 1 - Cleaning And Disassembly

Many freshly acquired Antique Outboards with flywheel and propeller turning freely are in sound enough condition as received to run well providing the engine is intelligently serviced before an attempt is made to "Start 'er Up". This article is directed to engines in that general state rather than those with stuck pistons and bearings, missing parts or in scrapyard condition.

Engines with greasy and oily exteriors can have a fine appearance when cleaned as the finish underneath has been protected. Service beyond this however, is necessary as the engine could be ruined by starting it right away. An outboard motor usually is a simple machine that lends itself to fast take-down and reassembly. For this reason one cannot really afford not to at least inspect the innards and perform some simple service tasks. Failure to do so might result in ruining bearings, pistons or precious cylinders. I'm amazed by the number of engines with missing wrist pin locks - either clips or cotters. You would not knowingly run an engine without them, so why not remove the cylinders and check out this detail so you don't risk grooving a good set of cylinders? Why gamble?

A few words on the cooling system. Inspect the water pump for a plugged intake and stuck check valves. Engines using the propeller to furnish coolant have water intakes and outlets for checking too. Shove a garden hose into the water inlet or outlet to check for unobstructed water flow into and out of the engine. Often, free flow through the pump equipped engine may be checked by putting water pressure through the hot water outlet. No doubt there are rust flakes in the water jacket. Flush those jackets out with a garden hose. Best procedure is to remove the expansion plugs so you can scrape and poke with a screwdriver, loosening up more scale that would later shake loose when you start the engine. New expansion plugs are available from any wholesale auto parts house.

Lower units are usually OK, but it's a good idea to inspect the interior for a chipped gear, rough ball bearings (these are available from wholesale auto supply or industrial bearing stores - see the Yellow Pages), proper gear meshing and worn bushings. Most of the time no work beyond removing the old grease is necessary. Get yourself an inexpensive grease gun, load it with Lubriplate 105 or the heavier Texaco 950 Outboard Gear Grease and you can keep this and your other Antique lower units properly lubricated. Tape a spare shear pin to the steering handle.

About all that's left to do is to be certain you have cooling water when she is first started. Now keep your eye peeled for another outboarder needing a tow. Be sure to tell him the year your Antique was built at the completion of the towing job. However, if we've put you in the water too fast and you have questions on details, read on!

There's no need to pass up a good buy on an old motor that doesn't run or to hesitate tackling a restoration or repair job because you lack confidence or experience. Provided you have a complete engine, making it run is not too tough and can give you a lot of satisfaction. However, your chances of repairing a motor must be judged before you start.. There's nothing but frustration in getting stalled-out half way through a restoration job because of some broken part or problem not previously seen and evaluated.

Before proceeding with any attempted repair or before buying an older motor, make sure that the motor turns over properly and that there is reasonable compression in both the cylinder(s) and crank case. An engine that is "frozen", that is the pistons are stuck fast in the cylinders because of rust, is normally not a good risk. Unless a frozen engine can be freed up easily by forcibly turning the crankshaft, the internal damage is usually permanent. This is not to say that a completely frozen engine cannot be freed up-it can. After soaking in penetrating oil for a week or so and with proper pressure or hammer blows, almost anything will come loose. However, the piston rod(s) will usually get bent, and the cylinder walls heavily scored. Use your own judgement, the motor may be unique enough to warrant the extra attention. A major hidden defect to watch for is a cracked or damaged crankshaft where the flywheel attaches. Some pitting of the tapered surface is normal. However, a chipped out or cracked keyway slot is repairable only by a professional. The lower unit housing from the engine block down should also be inspected for cracks and bends due to severe blows. The condition of the gears is important, but if operable at all, must be judged with respect to the kind of use you intend to put the engine to. A small motor used two hours a year doesn't need the quality of gears in a 22 or 33 HP engine used for lots of high speed running.

The most common cause of failure in old motors is a clogged fuel system including the carburetor. When left to stand for a year or so, outboard fuel can deteriorate to gum, hasten the formation of rust, and react chemically with the metals in the fuel system to cause extreme corrosion. The resultant white powders, green sludge, thick tars and rust have no trouble completely clogging the small fuel passages.

The next most usual cause of trouble is a defective electrical system. This can be caused simply by a damp coil, broken or loose wires, cracked insulation or what ever. A magneto that has remained in a damp basement for years may not produce a visible spark and yet, allowed to dry out, will function perfectly. A simple test for spark can be made by removing the spark plugs, reattach the high tension cables, place the outer case of the plugs against the engine and pull the starter rope. A lively white spark should occur at the electrode of the plug. A weak blue spark indicates either a bad plug, a bad cable, or bad connections.

If you're satisfied that the motor is sound and you have access to a supply of any required extra parts, the decision to proceed should be made. Keep in mind that continuous inspection should be made during cleaning and disassembly.

CLEANING - Surface dirt and grease should be removed using gasoline or a commercial solvent followed by a soap and water scrubbing. Care should be taken to keep water from entering the carburetor air inlet or otherwise getting into the crankcase and not to soak the coil of the magneto. Ordinary laundry detergents are suitable for this cleaning. Stay away from commercial car wash or industrial detergents since these can cause severe dulling of an aluminum surface.

CAUTION - Use of gasoline, turpentine or any flammable solvent including paint removers should be confined to out-of-doors or in a well ventilated area away from fire or any potential explosive cause. In addition, these chemicals all contain elements that can be injurious to your health. Prolonged breathing of these vapors should be avoided.

DISMANTLING - In general, removing parts from an engine is a straight forward operation. On occasion, a drop of penetrating oil and a sharp, light tap with a hammer will break loose a stuck screw or fitting. If you are not sure of where a part belongs, put a small tag on it marking the part's location. Make diagrams of tricky assemblies or of electrical wiring as necessary to insure proper reassembly.

On some motors, the flywheel will come loose by backing off the retaining nut. The action of a special shoulder on the nut against the underside of the rope start plate will lift the flywheel. Other engines require a stronger treatment. Loosen the flywheel nut a couple of turns and then while putting a lifting pressure on the flywheel, rap the flywheel nut a sharp blow or two with a mallet. An iron hammer will do if a hardwood block is used as a cushion. By all means do not damage the threads on the crankshaft end, or strike the nut so hard that the crankshaft breaks. In stubborn cases obtain the use of a regular flywheel puller. Here too, a little penetrating oil may help. Remember, every sharp blow struck against an older magneto type flywheel can decrease slightly the strength of the magnets inside so hammer as little as possible. If the flywheel is to remain off for a couple of weeks or more, it's wise to place an iron bolt or bar between the magnet poles.

Before arbitrarily dismantling the crankcase perform a brief inspection. You may not have to take it apart. With a light oil coating on the cylinder walls, combustion chamber compression should be good and firm to the feel. Do not overlook the importance of compression in the crankcase. Without this compression, the fuel charge is not forced properly in the combustion chamber. Check for crankcase compression by removing the spark-plugs and turning the motor over. You should be able to feel a slight compression in the crankcase and hear a definite "popping" sound. Bad gaskets or shaft bearings can often completely destroy crankcase compression.

Checking for excessive play in wristpin or connecting rod bearings can also be done at this time. Turn the motor over slowly using a back and forth motion. There should be no clicking or sense of shaft rotation without corresponding piston movement. If everything seems reasonably snug, inspect the crankshaft bearings. A little crankshaft end play (1/16" or so) won't hurt but if visible side to side movement is possible in either the top or lower bearing, repair may not be practical without machine work. If you're satisfied the power head itself needs no further take-down, make sure all bolts and nuts are tight.

If you determine that disassembly of the crankcase is necessary, be sure to mark, using a center punch or scratch awl, the mating parts of the connecting rod since the rod, the rod cap, the wristpin and the piston have to go back in the engine, exactly as they came out. See Figure 1.



Fig. 1- Marking mating parts



Fig. 2- Carbon scraping



Fig. 3- Cork & metal (up) float carburetors

PARTS CLEAN-UP - Using a jackknife, putty knife or scraper, remove all crusted carbon, dried gasket shellac, loose paint, solid grease accumulation, etc. Individual parts cleaning can be done using water soluble paint remover to get off stubborn paint or carbon, followed by scrubbing with soap and water. A Brillo soap pad or steel wool will help get

off baked on carbon deposits on exhaust manifolds. Commercial automotive solvents often do a good job. Do not use paint remover or strong solvents on decals you wish to save since they will be destroyed. A mild alcohol cleaner works well.

Unless the crankcase is to be completely disassembled, do not use soap and water to clean. Plug all exhaust and intake ports with adhesive tape or wood covers and use paint remover followed by a gasoline rinse to bring the assembly up bright and shiny.

When dry, each part should be checked for knicks, scratches or rough spots. These can be cleaned up with a file or fine (400 grit) carborundum paper. At this time, decide which pieces are to be painted and which are to be polished or buffed. A buffing wheel will put a beautiful finish on brass or aluminum but surface preparation using fine carborundum paper or crocus cloth is extremely important. Use black compound for the tough jobs and white compound for the more finished touch. After buffing, excess compound can be removed with gasoline or turpentine.

Surfaces to be painted should be wiped clean once again just before painting to remove any remaining oil or grease stains. Kieckhafer Mercury, Evinrude and Martin Seynour Co. each make a fine aluminum paint that resists dissolving from spilled gasoline. Rust resisting paints, implement finishes and ordinary four-hour enamels can be used where color is desired.

Gas lines, fuel filters and the entire carburetor should be completely disassembled with every part cleaned and every hole, orifice, port, screen or whatever opened up and all traces of gasoline sludge and other residue removed. The gas tank itself may be crusty, gummy and dirty inside. In ordinary cases, the paint remover/soap and water treatment is adequate. In extreme cases, a variety of chemicals may have to be employed. The simplest concoction is a 50-50 mixture of paint remover and gasoline. A cupful or two of gravel or a piece of chain added to the mixture in the tank followed by vigorous shaking will dislodge the critical pieces anyway. There are commercial preparations available at your automotive supply store that may do the job in easier fashion. Try lacquer thinner if all else fails.

CARBON SCRAPING - One of the most important cleaning activities is removal of the carbon from the exhaust system. See Figure 2. Scrape carbon deposits from the exhaust ports and reach as far into the exhaust manifold as you can. You may find a commercial carbon cleaner acceptable but shy away from oven cleaners which could deface the aluminum.

CARBURETOR - Sometimes the shellac coating on a cork float deteriorates to the point where tiny cork particles clog the gasoline passages. In addition, the float becomes waterlogged and doesn't properly control the gas flow. Simply allow the cork float to dry completely, sand lightly and apply two thin coats of shellac. See Figure 3. If your carburetor has a metal float, make sure the arm is securely mounted and that there are no leaks. Otherwise a complete carburetor failure is just around the corner. Before patching a leak, make a tiny hole opposite the leak and blow out all liquid and fumes. Then solder both the leak and the hole shut using as little solder as possible to avoid overweighting the float.

TO BE CONCLUDED NEXT ISSUE

Dick Jones, Florida, offers this quickie for the mechanics in the group. Make a simple ring compressor out of pipe hanger strap and a stove bolt. It'll save lots of cussing and cut finger tips.

THE FRANCHISE FOR SWEATSHIRTS EMBLAZONED WITH THE CLUB INSIGNIA IS UP FOR GRABS! Here's a chance to help the club make a little money - maybe you to- by handling a mail order sweatshirt business. Write Dave Reinhartsen for details.

BILL KELLY HAS SOME SUPER ACTION PLANS FOR A 20 X 30 FOOT ANTIQUE OUTBOARD BOOTH AT the Seattle Boat Show to be held in late January, 1970. Bill plans to exhibit an old Motorgo, Ferro, Koban, Evinrude, Gierholt, Clarke, Elto, Johnson and a host of others.

LAKE HOPATCONG

SEPT 13, 1969

by Bob Zipps

It was still pitch dark that Saturday morning when the alarm clock rang. The time, 4:30 AM. It was just a few hours before when the alarm clock was set, as last minute details and loading of the family car had kept my wife, Trish, and I up to the wee hour of midnight. But we had been looking forward to this meet ever since Tom Luce and Dr. Craver first announced it.

We were a half hour into our trip before the sun came up and after about three and a half hours, we reached Lake Hopatcong. Leaving early has its advantages as the New Jersey traffic has not had a chance to build up. The location of the meet was at Len E's Pagoda, which is a restaurant right at the water's edge. A feature of the Pagoda was the rental boat fleet which was put to the disposal of club members for the day at no charge. In addition, there is a large parking lot adjacent to the Pagoda and a large section of it was roped off to set up the antique static display. Or to sum it up, the facilities are excellent.

Members started pouring into the area shortly after I arrived and the detail in which some of the members painstakingly restored their motors was remarkable. Sam Vance arrived with two really beautiful Elto Quads. One was a '28 and the other was a '29. Later Sam put one of his Quads on his 12 foot Aluma Craft and the motor ran like a charm. Phil Kranz had a complete display of motors highlighted by a nicely restored Caille Liberty Single. Dick Michel had his Lockwood Racing Chief in spotless condition. Bill Lyman came with a completely restored circa 1900 Knox Three Wheel automobile. Bob Hampton came with a nice Elto Speedster. Tony Caglione's Racine reflected the loving care he gave it during its restoration. John Jensen arrived with a really great Johnson K-45. Milt Moos came with an unusual Caille as it had a tractor lower unit. Tom Luce brought a '22 Johnson Light Twin with him, that he had just bought a few days earlier. Marcus Wright had a 1929 High Speed Elto Speedster which was tuned to the hilt. I had four motors crammed into my car and they were a 1918 Model A Evinrude, a 1924 Johnson Light Twin, a 1929 Elto High Speed Speedster which took up to the last minute to restore and a 1930 dual carb Johnson VR-50.

Before lunch, members started taking their motors for trial spins in preparation for the competitive events. Vince Loss fired up his Elto Lightweight but the boat wouldn't move. Vince had forgotten to unfold the motor. Tom Luce started his motor next to the wall while I steadied the boat. After a few pulls, the motor started but the boat wouldn't move. Tom hit the spark and carb levers and the motor was screaming but the boat just sat there. The motor was quickly turned off and tilted, and there it was, the prop had sucked up weeds which had entangled it so bad that no forward thrust was produced. I didn't get away scot-free either. My 1924 Light Twin Johnson started on the first pull but water wasn't circulating. I turned the motor off, pulled it in the boat and dismantled the water pump right there as the three minute gun had fired for the first event. After fixing it, I quickly put it back on the transom and started. The problem was in the rush I had neglected to fully tighten the thumb screws. Well, you guessed it, the first turn I came to - the motor came off. Tom Luce said I looked like I was dribbling a basketball on the transom. Luckily, I had a good hold on the motor and shut it off without incident.

The first event was the predicted log race. This is where a member estimates the time it will take to complete a set course running at the speed of his choosing. All time-pieces must be left on shore. Well, without a doubt, the men from Long Island ran away with this one, capturing first and second places. First place winner was Vincent Loss using a 1929 Elto Lightweight (unfolded). The trophy for this event was contributed by Johnson Motors. Coming in second was Frank Shimer with a 1938, 8HP Sea King.

The Bang And Go Back event was next on the slate and the first place trophy was donated by Kiekaefer Mercury. I came in first place with my 1924 Johnson Light Twin. Jean Luce took second place honors with a 1937, 5HP Sea King.



Len E's Pagoda



Sam Vance's Elto Quads



Committee Boat with Len E's Pagoda in background.



Tony Caglione (right) and yours truly talking motors.



View of the spectators from one of the boats.



Phil Kranz's motors on display.



Some of the Outboards on display



"Now hear this". Doc Craver holds drivers meeting.



Frank Shimer heads out at the tiller of his Sea King. That's Vincent Loss relaxing in the Bow.



Mark Wright and his daughter Heather scooting along with the Waterman.



Sam Vance with his 1928 Elto Quad. His sons Chris & Matt look on.



Prize Winners(L to R):Mark Wright,Vince Loss, Dick Michel; Bob Zipps; Tony Caglione, Milt Moos, John Jensen, Frank Shimer, Sam Vance, and Jean Luce

The third event that afternoon was the oldest running motor contest with the first place trophy contributed by Evinrude Motors. Mark Wright pulled a 1907 Waterman out of his bag of tricks and "ran away" with first place. Tony Caglione easily took the second place ribbon as his 1913-1918 Racine never missed a beat. There was no third prize, but my 1918 Evinrude came in third.

The Mint Condition event was a real tough one as there were many fine motors on display. But first place went to Dick Michel with his 1929 Lockwood Racing Chief. Second place went to John Jensen with a fine Johnson K-45.

The fourth event was the Most Unusual Motor contest. First place went to Milt Moos with an exotic Caille with a tractor lower unit. Sam Vance took second place with a restored 1929 Elto Quad.

Dr Craver had a prize for the member who traveled the farthest to come to the meet. Milt Moos from Westerville, Ohio won, and his prize was a bottle of Champagne. I'll bet that helped him relax after the long drive back.

ORGANIZATION AND CREDIT:

Organizers: Tom Luce and Dr. Lloyd C. Craver

Special Assistants: Ray Sabia, Alf Eriksen and John L. King

Registrar: Jean Luce (who did a fine job)

Official Photographers: Mrs Lloyd C. Craver and Tom Luce

N.J. Marine Police Sanction and Patrol: Chief William Fennecken and Officer Cliff Lundin

Contributors: Special thanks to Len Eisenstein, Len E's Pagoda, who again this year donated the use of his facilities including his rental fleet; To Johnson Motors, Kiekhaefer Mercury and Evinrude Motors for the donations of the trophies; To the Solar Oil Company for the case of outboard motor oil; and to Ken Hampton for bringing New Jersey Bell Telephone Company first aid kits (I heard he used most of them himself).

In all, twenty three members came and I'm sure that everyone of the twenty three had just as good a time as I did, and I had a ball. The entire day passed in an instant. Of course this is the direct result of those who worked so hard before and during the meet, especially Tom Luce and Dr. Craver.

NEW CHAPTER!!!

KNUCKLE BUSTERS NEWS

by Knuckle Head

A chapter organization meeting was held at Tom Luce's apartment on December 6, 1969. Attending, besides Tom and Jean Luce, were Sam Vance and his son Matt, Bob Zipps, Mark Wright, Stan DuBois and Tony Caglione.

After seeing how over forty-five outboards could be squeezed into an apartment, the fellows settled down for a short business meeting. Tom Luce suggested "Yorjerspadel" (New York, New Jersey, Pennsylvania, and Delaware) as a name for the chapter. He was nearly thrown out of his own home. The name finally picked was inspired by Tony Caglione's tale of how he broke his finger during his attempts to start his first antique outboard.

We decided to meet informally at different locations every other month during the late fall, winter, and early spring. The purpose of these off-season meetings will be to become better acquainted; to see each other's collections; and to trade motors, parts, information and know-how.

During the late spring, summer, and early fall we plan to get together monthly for informal meets at Lake Hopatcong and other location to run engines.

At this, the first meeting, Mark Wright gave an excellent talk and demonstration covering the Elto timer, including what troubles might be encountered in getting it to function properly. In addition, he discussed what instruments to use to get accurate measurements.



Mark Wright demonstrates the Elto timer with some of Tom Luce's motors showing on a mighty sturdy looking rack.



Movie time for the group. Seated L. to R., Stanley DuBois and Mark Wright; in the rear, Matt Vance, Tom Luce, Tony Caglione, Hob Zipps and Sam Vance.

Also crammed into the busy afternoon were the exchange of several motors, much advice to Sam Vance concerning his Caille Tractor-drive Racer, slides and movies of previous Regattas, and the showing of the Evinrude movie about Ole and Bess Evinrude. We highly recommend the Evinrude movie to other Antique Outboard Motor Club chapters.

The people that were at this meeting all had a delightful time and they encourage more Club members to participate at future sessions.

The next meeting will be on February 28, 1970, 12:30 P.M. at Tony Caglione's home, 140 Elm, Dover, N.J. (Telephone 201-366-1399). Drop him a card or telephone him about your plans to attend. Members are encouraged to bring their problem outboards to this meeting for group therapy.

.....
PARTS FOR SALE: JOHNSON- (Motors listed as parts are being pieced-out)... S-45-- Parts including crank and rods; PO-15 parts including crank and rods, cylinders; P-50/75 crankshaft (rebuilt) with oversize rollers- \$30.00; J-70 parts including crank and rods; "200" parts including crank and rods; Most any gasket for P and S series motors; P-50 timing gear-new; K-35/45 new coil- \$10.00; V-45 coils, good, used- \$15.00 pr; 200/210 coil, new, \$7.00; lower units: S-45, \$15..P-50, \$20..KA-37, new, \$20; PO case new \$10, used \$5; P-35/P-40 gas tank \$15 good; "A" piston rings, set of 7 (in case you break one) \$1.00; Many small parts i.e. bolts, nuts, etc.-give number. **MERCURY-** KE/KG-7 parts, all sorts incl. *.015 pistons; Perfect Mark 20H cowls, \$10/set; new Mark 15 cowls, \$20/set. **EVINRUDE/ELTO-** Choice Evinrude Speeditwin/Elto Super C cranks \$15..keyed, \$20; rare "R" Fastwin basic powerhead, tank, magneto and leg; 1930-35 Speeditwin/"C" crank and case, setup- \$25; new Sportfour Michigan prop \$10; 4201/3 parts; Speeditwin and Speedifour magneto plates; two good Speeditwin gas tanks; some gaskets, Sportwin thru 4-60. **MISCELLANEOUS-** "Duplex" antique outboard oil \$1 per quart in original good cans- no dents or rust; New sparkplugs various obsolete makes in misc. heat ranges \$2 to \$5 each depending on age and rarity.... try me...these are not Champions or AC's. **MOTORS WANTED:** 1929 Quad Elto, Elto Hi-Speed Speedster, Sr Speedster or quad for parts, Van Blerck Ensign. **WILL TRADE MOTORS** 1928 Quad for 1929 Quad; 1932 Quad for 1929 Quad. **BOATS FOR SALE-** Neal 3-point Hydro- \$100.00 plus freight, complete with hardware - run your PR - boat is clean and not patched (selling for another party); My 1926 plans Step Runabout- see in "Seattle Meet" AOMCI magazine article Oct '68. Boat is new, 14 feet long, cedar construction, canvas deck. \$200plus freight (I've spent that on material, fellas!) or Trade For: Waterman, Koban 1 piece, electric starting?? or any good, scarce old motor.

WILL CONSIDER TRADE ON MOST OF ABOVE- Bill Kelly 10201- 114th Pl N.E.
 Kirkland, Washington, 98033

AOMCI SPECIAL *Feature*

Although most Antiquers have caught the "virus of collecting" in the last three or four years, Jim Smith has tapered off his collecting and is now restoring and running. Jim, a Toronto, Ontario, dentist, says that prior to ten years ago finding his old clunkers was easier because they were more plentiful and cheaper to come by.

Jim's first experience at running an outboard was in 1935 with a borrowed 3 HP Viking, a brand name of Eaton's of Canada, made by Elto. While serving in the Canadian Dental Corps for three years during WWII, he was stationed in Nova Scotia and found by chance an old marine shop which had a V-45 Johnson in running order and also a 1918 single cylinder Caille Perfection, not running. These sparked his interest in the old ones and he gradually built a collection of over 100 motors. These motors are not all in running condition, but as time permits he restores them to useable engines.



AOMCI Special Features Editor
James L. Smith

Ninety-five miles north of Toronto, on Couchiching Lake, Jim has a summer cottage. While he and his family of wife, daughter 15, and son 12 are visiting there, Jim amazes the neighbors by chugging along with one of his old timers. "One of my favourites," says Jim, "is a '35 Johnson Model OK-75. It has surprising speed for its age."

Jim's second hobby is speedier than antique outboarding, because he takes to the skies. He secured a start with the Private Flying License about 8 years ago and has gone on with the various endorsements and courses until he now has an Instructor's Rating. He's beginning study on an Instrument Rating, but at present he does not own an aircraft.

ED.

THE THOR OPPOSED TWIN

Jim Smith

This twin cylinder outboard motor makes marvelous use of metal stampings in positions one would usually expect to find castings. These stampings are secured either by weld or by means of nuts and bolts. Typical of this construction is the gear case. Two opposing and symmetrical stampings come together with ten one-quarter inch hex machine bolts and nuts much in the same fashion as two halves of a peach. Appropriate allowances are made in their form for internal gears and shafts. Outwardly this gives a flattish appearance at the edges and is not particularly pretty because of the presence of the bolts and sharp edges of the metal plates. The plates are each one-eighth inch thick resulting in a frontal edge of one-quarter inch. Streamline is poor but the method is efficient and there are substantially less production costs. Also surprising strength is achieved as a result of the lamination.

Continued use is made of formed metal plates for the mounting bracket. Pieces of flat metal are cleverly welded together and one large piece is bent to form the main support

from driveshaft housing to bracket and is the member on which the motor is tilted. Four bolts secure this section to another stamping to make the complete pivot about the driveshaft housing.

Probably the most ingenious use of metal stampings is seen in the crankcase. The two stampings are mated as accurately as the sides of a clam shell and secured with nine sets of nuts and bolts. Again appropriate allowance is made in form for the crankshaft and its bearings and the plates continue down to bolt against the driveshaft housing. Two set screws ensure proper position of the power head to the driveshaft housing. At the same area two of the nine bolts secure the tiller bar, again made of stamped metal.

Prior to entering the outboard field Thorwald Hansen was Vice President for Manufacturing for A.O. Smith Corporation, the world's largest manufacturer of automobile frames. He established his firm at Cedarburg, Wisconsin in 1934 under the name of Cedarburg Manufacturing Company. From this we realize our sample motor dates to the mid-thirties. Contrary to popular belief, he had no relationship to the maker of Thor washers. We are indebted to our historian, W.J. Webb, for the following very interesting observations:

"The Cedarburg Manufacturing Company had made the Thor outboard motor from the time of its founding in 1934. It was always a source of regret to me that the Thor did not meet the success that I felt was warranted by the soundness of the Thor idea. Thor Hansen, who in my opinion knew as much about steel stampings as anyone in this country, conceived and executed an outboard motor using steel stampings in just about every spot a stamping could be employed. However, he used a mild steel which had many production advantages, but also rusted quickly in fresh water and corroded rapidly in salt water. This raised serious visual obstacles in the mind of the user and the prospective buyers. There were other problems also, but had Thorwald possessed sufficient financial backing all would have been overcome. In 1938 Thor introduced the Thor Pyramid Three- the world's first three cylinder in-line outboard- a good performer.

Small stamped parts of all sorts of materials are widely and successfully used by outboard makers today. However, I still hope to see the day when an outboard will be engineered for stampings from the start. I can be wrong, but I think that while the first stamped motor might cost several millions, they would come out at a very low cost after that. It must go without saying that such a stamped motor would necessarily employ rust and corrosion resisting materials."

MAGNETO AND SPARK PLUGS- The magneto plate is marked United American Bosch Corp., Springfield, Mass. It has a single coil, condenser and breaker point system with breaker arm operating from an eccentric on the hub of the flywheel. Magneto plate hub has the usual split-sectional with friction adjustment bolt for advance and retard. The spark plugs are Champion 6M, 18 MM.

FUEL SYSTEM- The cylindrical carburetor is of the check-valve type and is unusual in its large size, measuring 2.75 inches across and 2.88 inches deep. It is also heavy, being of cast aluminum one-eighth thick and thicker in some areas. The carburetor bolts to a short tube which serves as an intake manifold. This in turn is welded to the port crankcase stamping, delivering the fuel directly from carburetor to engine crankcase.

At each compression stroke, a partial vacuum is created in the crankcase. Since this vacuum also exists in the intake tube and in the upper half of the carburetor, atmospheric pressure overcomes the tension of a coil spring holding the check valve down. Air then rushes in through an opening at the base of the carburetor, proceeds past the finely bevelled edge of the check valve and into the top of the carburetor. In doing so, it picks up a spume of gasoline coming from a fine hole in the carburetor body, normally covered by the bevelled edge of the check valve. The fuel from the gas tank is piped directly to this fine hole and there is no fuel turn-off tap. However, at this point, a needle valve is provided to adjust the volume of gasoline which can pass through the hole. As soon as the power stroke commences, the spring seats the check valve and covers up the hole once more. This sequence is repeated for every revolution of the flywheel. There is no throttle, speed being selected entirely by advancing or retarding the spark.

The gas tank is made from two halves of pressed aluminum sheeting, welded together. Its support to the exhaust manifolds is rather frail as only two pieces of sheet aluminum



Good view of the lower unit stampings and water pump.



Note stamped pieces of pivot mechanism and transom clamp.



Look at the size of the carburetor! Note crankcase.

are used, these being welded to the tank and bolted on the other hand to the manifolds. The capacity of the tank is two Imperial quarts.

CYLINDERS AND CRANKSHAFT- The crankshaft has two bronze bearings, top and bottom. Over the top one, a felt ring topped with a copper washer acts as an oiler. The bronze connecting rods are straight. Aluminum pistons have two rings each. Cylinders bolt to one-half inch thick machined iron plates which are welded to the crankcase halves. The cylinders have three sets of ports each and are of solid cast iron. They have a bore of 2.125 inches and a stroke of 1.625 inches. The yield is about three horsepower at 2700 RPM. Total engine weight is 46 pounds. The spark plugs face straight forward.

Exhaust manifolds are cast aluminum. They serve a dual function of supporting the cylindrical sheet iron muffler and delivering the exhaust to it. The exhaust is in turn discharged under water through a copper exhaust pipe. Rearward extensions of the manifolds act as motor lay-down studs.

COOLING- A round aluminum casting is mounted to the rear of the lower unit gearcase. The propeller shaft passes through a portion of this casting which also has a hole to allow water inside, and contains a simple plunger pump activated by an eccentric on the propeller shaft. Water is pumped up a tube within the exhaust pipe. This tube emerges below the muffler, divides by means of a tee and passes to the base of each cylinder. From the top of the cylinders, water is discharged through the manifold castings. The heavy bronze two-bladed propeller is seven and one-half inches in diameter and was made by Michigan. Its hub is shaped to form the opposing half of the round casting containing the water pump.

By 1939 The Cedarburg Manufacturing Company was in financial difficulties and Thorwald Hansen sold his factory to E. Carl Kiekhaefer for \$25,000. Mr Kiekhaefer had actually intended to set up his own electrical engineering business on the premises. Among the assets of the factory were 500 Thor motors which he improved and rebuilt to complete a contract with Montgomery Ward & Co. These were so successful that he decided to stay in the outboard business. In 1939 he marketed single, alternate twin and three cylinder models under the Thor name. By 1940 he had developed and was building entirely new and more advanced models under the name Mercury.

J.L. Smith

MIDWEST CHAPTER NEWS

by Lynn Sallee

On November 8, 1969, a new chapter of the AOMCI was formed. The group of both long-standing and novice motor enthusiasts met in the beautiful new auditorium of the Waukegan (Illinois) Public Library. We voted to name the club the Midwest Chapter of the AOMC, Inc. It was felt that the name had a wider scope than the one we had been using temporarily (The Tri-State Association) and would encourage new members from the entire section of the country as well as the initial group from Illinois and Wisconsin..

The first meeting was devoted primarily to organization. Officers elected to serve the group for the 1969-70 year were: William Rose (Waukegan, Illinois), President; Ray Machen (Brookfield, Illinois), Vice President-Historian; and Mrs. Lynn Sallee (Winneconne, Wisconsin), Secretary-Treasurer.

Several committees were set up to handle organizational duties. Miss Lucille Rose (Waukegan, Illinois) will plan publicity for the chapter. Warner Turner (West Bend, Wisconsin) and Jere Sairs (Milwaukee, Wisconsin) are responsible for drawing up the by-laws and President Rose will define the purposes and aims of the chapter. The Spring meeting scheduled for late April will be planned by Tom Hagloch (Aledo, Illinois) and John Herberg (Moline, Illinois).

The chapter discussed the need for increasing the membership. At the suggestion of Edward Kant (Waupun, Wisconsin), the group decided that the Spring meeting would feature a "Bring A New Member" theme. If there are any readers in the Midwest area who would be interested in joining our new chapter, they can contact the secretary (Mrs. Lynn Sallee, Hiawatha Drive, Winneconne, Wisconsin, 54986). We are eager to enlarge our chapter and would welcome any AOMCI members from the area. Several of our enthusiastic charter members traveled 200 or 300 miles to attend the first meeting so distance should be no excuse to keep YOU from attending our second meeting.

Following the business meeting, refreshments were provided by William Rose and served by his daughter Lucille. Conversation flowed as freely as the coffee as members showed off unusual items, bragged about their latest purchases, and discussed problems of



Here are a few of the new members who were handy when the picture was taken



Chapter Officers: Vice President Ray Machen, Secretary-Treasurer Lynn Sallee and President William Rose

finding parts and restoring old motors. Stanley Herberg (Moline, Illinois), displayed a tiny toy motor, in running condition, which has been in the Herberg family for more than 30 years and probably dates back even further. Edward Kant brought a brass nameplate from an old Evinrude boat and a picture of the boat, hoping someone in the group

would know the history of Evinrude boats. No one in the group seemed to know much about them but perhaps some of the readers would have information they could pass on to Ed. Jere Sairs, proud as a new father, passed around photographs of the Elto Quad he had restored to like-new condition.

The meeting broke up at 5:00, three hours after it had been called to order, and the members left with high spirits and real enthusiasm to return to their motor hunting. We hope YOU can be with us at our next meeting.

Salt Water Running

by Marcus Wright

Many Antiquers live close to salt water and have very little choice but to run their engines in it. Offered here are suggestions for those who must use salt water and to those from fresh water areas who might like to run in salt water once in a while but hesitate because they lack first-hand experience of what to expect or how to cope with what they do find.

Those service antiques used often and not polished to museum condition can be run in salt water regularly without problems with proper maintenance. After use, wash off the entire engine for a minute or two in fresh water. Better still, run the engine in a test tank after boating. At least, flush the cooling system for a few minutes with a garden hose. Make up a simple adaptor so the hose readily fits your engine.

The writer's most often-run motors have had the cylinder jacket and water cooled mufflers cleaned, filled with Rust-O-Leum Damp Proof Red Primer paint, drained, then allowed to air dry for a week. This is good for two seasons. Every engine is religiously washed down and flushed out after each use. We even test a 1907 Waterman in salt water!

Don't overlook coating cooling jacket interiors with epoxy type paint for additional permanence. Refer to the August '69 issue of the Newsletter for details.

Antiques refinished and polished to mint condition or museum condition should be varnished or greased thoroughly on the exterior otherwise the finish will dull.

Some collectors living in fresh water areas are under the impression their cooling water jackets will not corrode. Should they have infrequently or never used engines it should be borne in mind a good idea is to fill those jackets with oil.

Modern lower unit gear greases such as Texaco #950 or Lubriplate #105 mix well with salt and fresh water and lubricate the gears and bearings very well. The former is the heavier of the two and of a consistency of greases used when your antique was built. The latter lubricant is lighter, allowing for a few more RPM's.

No knowledgeable person would ever argue the point that fresh water is better than salt water for running your antiques. With proper maintenance, however, engines can run in salt water if the suggestions based on years of actual experience are utilized.

A place to visit: Years ago before 1910 the family of famous aviator Charles A. Lindberg lived in Little Falls, Minnesota. The family moved away to Detroit before young Charles was out of school. In recent years, the old Lindberg home in Little Falls has been restored and much of the furnishings from the Detroit home have been moved back and the property turned into a museum. Standing quietly in a corner of the basement is an old Koban of 1917 vintage, identified as Lindberg's first motor.

TONY CAGLIONE'S

UNIQUE

Racine

STORY

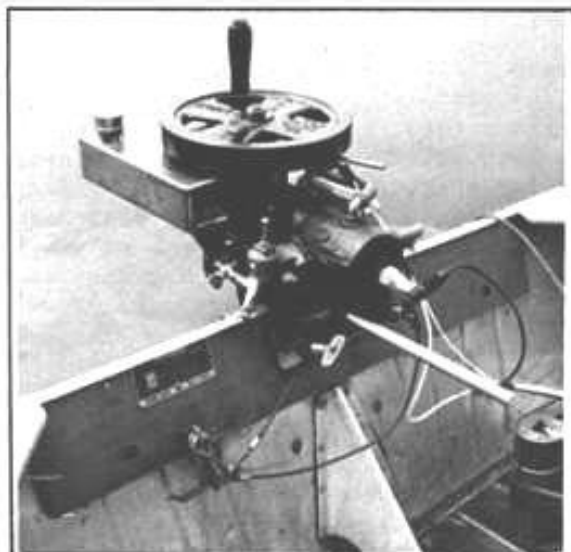
On May 18, 1969 I stopped at an old gas station, just a quarter of a mile from my home, to inquire if I might purchase a brass spark plug terminal. While talking to an elderly gentleman there I was informed that he had an old outboard motor in a barn across the street. He took me to see it and it was truly in sad shape. Covered with thick rust and half buried in a dirt floor, it had lain there neglected and silent for the past thirty years. I purchased it for \$12.00, placed it in my Bronco and headed for home. I called my wife to come and see this curiosity I had unearthed. At the sight of it my wife, who is a very understanding person, could not control her myrth. Then came the neighbors, one by one, to look and say, "Tony-- Ah!, what is it?"

We wrote to the Racine Motor Car Co. of Racine, Wisc. to inquire if they might have any information concerning our project, which didn't even have a serial # on it. We stated clearly that it was an old outboard motor, but somehow we received an answer, which informed us that they had never heard of the Racine Motor Car Co. and although they knew cars were built there they could not help us.

Some club members, however, did help. Dick Hawie found a picture of it in a Rudder magazine of May, 1915 on page 238 and the same picture in a Motor Boating magazine, March issue, 1914, page 28. We have still not been able to pin point the exact year it was made.

Upon taking it very carefully apart I found to my utmost joy that beneath those many layers of grime much of the metal on the lower unit, crankcase, prop and many other parts on this old gem are solid bronze sand casting and beautiful indeed. The points and gas tank however, were not so well preserved, in fact they were beyond repair and had to be replaced. The new tank is .032 copper. It is made to the exact dimensions of the old tank with the same fittings it originally had.

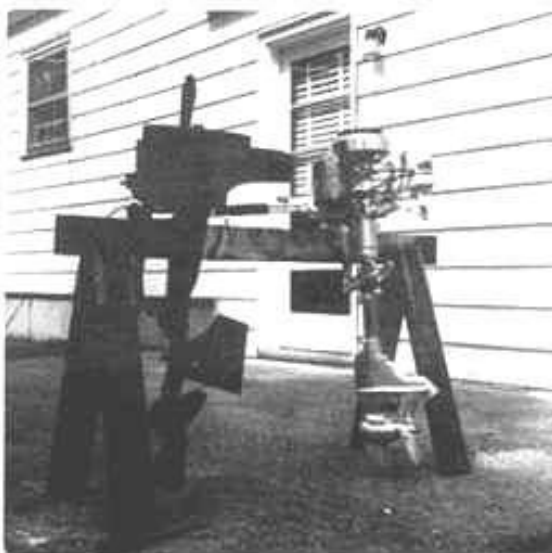
(continued)



Tony's "arm buster" ready for business. Note the fine casting detail on block and flywheel.



Here's Tony attaching the tiller handle. Photo shows the new gas tank and rudder.



Left: Racine before restoration

The Racine is a sixty pound, 2 cycle motor, 2 HP at 800 RPM, 2.62 bore and 3.12 stroke. It takes a Champion A 25 plug.

The rather long unbelievable starting handle on the Racine is not called a knuckle buster, but would you believe an arm buster? This is exactly the way it was when I bought it.

It had a crude rudder made of an old piece of tin and we knew at a glance this could never have been part of the original make-up. It also did not match the photo sent by Dick, so we copied from the picture.

It took approximately a month of hard work to restore it; fortunately my place of business was on strike and I had lots of time to work on it. Much to our delight we started it at a friend's gas station with a hot shot battery and Model T coil.

Tony Caglione

P.S. Tony would appreciate receiving any information you have about the Racine.

Flambeau
OUTBOARD MOTORS

TECH NOTE

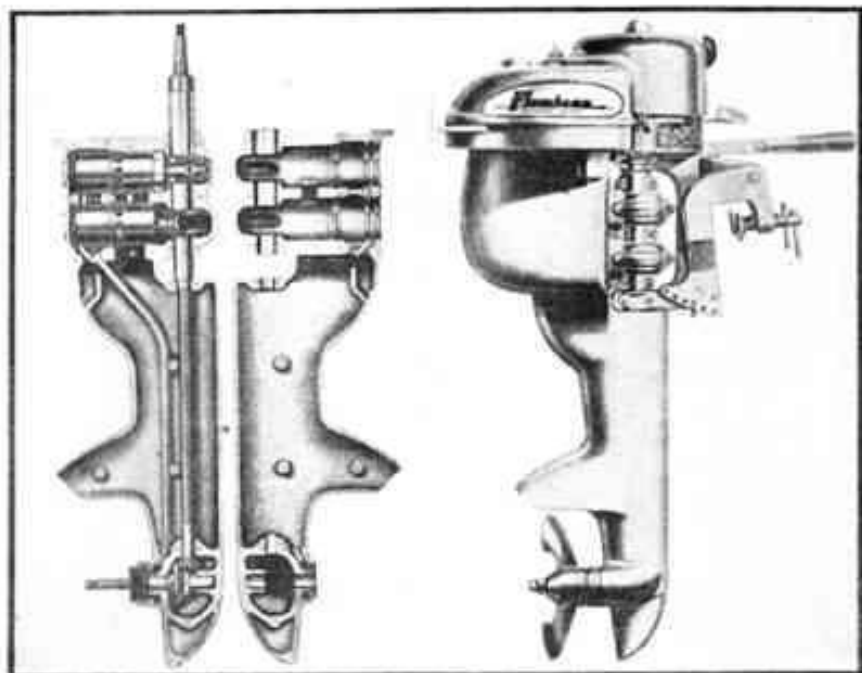
by Bill Kelly

The Flambeau outboard motor would have to qualify along with such things as the Clarke Troller and the Cross as an oddity of engineering. This motor is unusual, as it has two main halves in which all of the working parts are supported. These shells are die-cast to close tolerances, mated together and then the bores for the crankshaft, drive and propeller shaft bearings are finish machined to size. Each bore, from the top main to the gearcase pinion gear bearing is a bit smaller than the last. The top main bearing is contained in an assembly which also has the tiller handle attached, clamps into the case halves, supports the magneto plate and is the upper attach point for the swivel bracket! The bottom main bearing also protrudes through the case and being bronze, provides an excellent bottom swivel bracket attach point.

The Flambeaus were made as both single and alternate firing twin models, both of similar "sandwich" construction. These motors are also "low profile" so as to clear the rear of the boat for fishing, a popular design in today's motors. I believe Flambeau was the first to use this concept. Models were available both with and without rewind starters. The early models were painted silver while later models had a maroon finish on the gas tank. Mechanically, the Flambeau was a three port engine with an auto-type dual jet carburetor. Priming was accomplished by pressing down the priming pin which ran through the shut off valve in the top of the fuel tank.

The marketing of the Flambeau was based on user convenience. The machine was extremely lightweight (26 pounds for the single), offered long, service free operation and boasted Uni-Lever control. The latter was one of the earliest attempts to put all engine controls on just one lever.

The Flambeau also contained some unusual engineering features. For example there was no shear pin. Instead, there was a multiple-disc clutch on the propeller. Five discs were splined to the propeller shaft and interspaced with six discs splined to the propeller hub. While the propeller turned, its thrust held the two sets of discs together and kept the clutch engaged. When the propeller hit some object, the discs just slipped until the propeller became free. The carburetor was a Metal Product's design, mounted at the rear of the motor with the fuel tank, carburetor and motor in direct vertical line, thereby eliminating gas lines. The water pump was reached by removing the propeller and unscrewing the pump clockwise (left-hand thread).



SANDWICH CONSTRUCTION: Left, two casing halves enclose all working parts. Note diminishing size bearing bores.

To assemble your Flambeau, first make certain that all parts are meticulously clean and have a tube of Gas-Oila sealer (the red stuff you see on threaded fittings- it comes in a small tube) handy. Assemble the rods and pistons to the crank and slip the sleeves over the pistons. Install the top main, bottom main and driveshaft, casing and pinion gearcase bearing. Apply a liberal coat of Gas-Oila to mating surface of the case half with sleeve aligning pins (exhaust side). Install the previously built-up crank assy, along with the center main bearing which is split at 90 degrees to the case halves.

Watch the oil holes in the center and bottom mains to insure that they align with the holes in the case half. Apply a liberal coat of sealer to the other case half and screw fasten the whole works together. Don't forget to seal each end of the water tube. Use Gas-Oila sealer only on this assembly. Any other sealer won't work.

Install water pump plate, impeller and pin; and screw pump housing onto the gear case. Be certain to install a line of Gas-Oila around each end of the fuel inlet tube--a gasket between the carburetor low speed, and all four attach screws through the fuel tank.

PARTIAL SPECIFICATIONS

YEAR	H.P.	RPM	CYL	BORE/STROKE	DISPL	WT	MODEL
1946	2.6	4000	1	1.94 X 1.56	4.62in ³	26	-
	5.1	4000	2	" X "	9.24	32	-
	10.0	4000	2	-	-	48	-
1947	2.5	4000	1	1.94 X 1.56	4.62	26	-
	5.0	4000	2	" X "	9.24	32	-
1951	2.5	4000	1	" X "	4.62	29	174520
	5.0	4000	2	" X "	9.24	35	174050

Early models used J-8 plug. 1951 models used J-7J. Gap setting-.025. Point setting .019. Fuel mix, 2/3 pt/gal.

**Power-Speed
Quick Starting
Easy Control**



1926

**2 3/4
HP**

Every advantage you could ask--every feature known that contributes to your convenience and pleasure with an outboard motor is embodied in the

**CAILLE 5 Speed
Twin**

It's the only motor with a reversible propeller, and gives you two speeds forward and two reverse. When set at neutral the boat stands still with motor running--like a car at the curb. And it's the only motor with

Dual Ignition

With both batteries and magneto you always have an auxiliary ignition system. Start on the hot spark of the battery--then, by simply withdrawing a plug, switch over to the snappy, economical magneto spark, or vice versa, without stopping motor.

"Pay as You Play"

Buy on time if desired. Only \$37.00 down puts a Caille Five Speed Twin on your boat. Take care of the balance in monthly payments. Send now for 1926 catalog and name of nearest dealer.

THE CAILLE PERFECTION
MOTOR CO.
6211 2nd Boulevard Detroit, Mich.

**CAILLE
5 SPEED TWIN**

by
R H ZIPPS

TRADER'S COVE

GENERAL REQUIREMENTS APPLICABLE TO CLASSIFIED ADVERTISING

1. a) Members- Complete AOMCI Form 101 or include: Make, Year, Model, Serial Number, Number of cylinders, runs or not, condition of compression and spark, list parts missing, overall condition, features, price, state if member.
b) Non-members must complete AOMCI Form 101. Obtain forms from writer.
2. Advertising rates: Members- Free; Non-members- \$1.00 per motor.
3. Closing Dates; All ads must be received not later than the 1st of the month preceeding the date of issue.
4. Transactions based on good faith: Deliberate misrepresentation, or violation of the code of business ethics and good sportsmanship, will constitute grounds for refusal of advertising, and may result in disarment from this club.
5. Warning to purchasers: The AOMCI will accept no responsibility for any unsatisfactory transaction involving articles which either have or have not been described in accordance with the provisions of paragraph one.

MOTORS SEEN

CAILLE: Single cyl; Al Ferris; 23711 Roundup; Apple Valley, Calif.
CAILLE: Single cyl; W. Vacek; 27 Oak Ave; Highland Falls, N.Y.
CAILLE: Liberty Drive; B. Bourne; 298 Albany; Winnipeg 12, Manitoba
BENDIX: Mod TMD; S.W. McGuire; Box 1398; Sitka, Alaska 99835
JOHNSON: Mod S-45; Joe Mueller; 1957 Minnesota; Oshkosh, Wisconsin
FACEOL: no other info; Linden Hardware; 2500 Cleveland; Columbus, Ohio
MARTIN: Ser C-54372; D. Moe; 86 Dunn Drive; Ft. Rucker, Alabama 36360
NEPTUNE: Mod 2A39; Jim Daigle; 1017 Lamar St.; Lafayette, Louisiana
NEPTUNE: Mod OB12 A; S. Gerrish; West Peru, Maine
NEPTUNE: Mod 1bA6; H. Meusch; Bucyrus, Missouri 65444
NEPTUNE: Mod OB1; Cal Heineman; 1021 34th Ave North; Minneapolis, Minn
CAILLE: Mod 30 & a Five Speed; Rex E. Nichols; Kampsville, Illinois
CAILLE: Single; Five Speed; R. Kyser; 110 N. 1st; Olean, N.Y.
CLARKE: Troller; L.A. Bernier; 1539 Aline; Grosse Pointe, Mich.
MERCURY: Mod KD-4; Joe Mueller; 1957 Minnesota; Oshkosh, Wisconsin
CHAMPION: single cyl; F. Suver; 2912 S. Bonfield; Chicago, Illinois
LOCKWOOD: Mod 72T; G. Mielkei; Rt 2 Box 335; Mayville, Wisc. 53050
MOTOR GO: Row Boat Motor D. Trumble; Rt. One; Lake City, Michigan
NEPTUNE: Mod 65B38; E. Young; 118 3/4 Lincoln; Tart, California 93268
NEPTUNE: Mod CB12A; E.E. Berttula; 5723 Garfield; Minneapolis, Minn.
NEPTUNE: Mod OB35A; Don Mason; Council Groves, Kansas 66846
Neptune; Mod OB12A; T. Davis; Dexter, Maine
CAILLE: no other info; Walter Hipes Sr.; 1516 Madison St.; Ottawa, Illinois
CAILLE: Mod 15; 5 Speed; E. Gunnufson; Twin Valley, Minnesota
BENDIX: Mod SMD; F.J. Nordmann; 2066 Zula Lane; Mobile, Alabama
BENDIX: Mod 5M; Joe Mueller; 1957 Minnesota; Oshkosh, Wisconsin
CHAMPION: Mod S4G3059; W. CHAMPION: Mod S4G3059; W. Lockwood; Chier; Marvin Meyer; Box 135; Ossian, Iowa 52161
NEPTUNE: Mod B2D; Gene Finnstad; RFD University Rd; Malta, Illinois 60150
NEPTUNE: Mod 1CA2; G. Hutchins, Box 231; Tonawanda, New York 14150
NEPTUNE: Mod 10A1; Charles Hillebrand; 2045 Ramblewood; Baltimore, Maryland 21214
NEPTUNE: no other info; C.C. Hamilton; Bumpus Mills, Tenn. 37028
NEPTUNE: Mod 15E4; Roger Partridge; 8231 Webster Rd.; Clig, Michigan 48420

NEPTUNE: Mod 10A4; Ed Hopper; RR2 Box 272 Oak Dale Acres; Kankakee, Ill
NEPTUNE: No other info; G. Reed; 211 W. Grant; Hartford City, Ind.
NEPTUNE: Mod OB35A; L. Patch; Bernaraston, Massachusetts
NEPTUNE: Master Twin; A. Finn; 189 Lehigh St.; Wilkes-Barre, Pa. 18702
SEA KING: no other info; R. Lembough; 6034 W. Pierson; Flushing, Mich.
WATERMAN: Powerhead only; G.F. Weber; Ritzville, Washington

NEPTUNE: Mod 15B2; W.T. Senger; Box 151; Grafton, North Dakota
NEPTUNE: two cylinder; R. Stroot; Box 728; Rockport, Texas
NEPTUNE: Mod OB15; Dave LaMark; 1429 Oregon; Racine, Wisconsin
NEPTUNE: Mod 9A2; J.J. Naperville, Illinois
SEA KING: #14EA-8822A; J. Wilkinson; 503 North Waterview; Richardson, Tex.
In the miscellaneous motors folder, I have a few Waterwitch Motors which may be very good bargains. In years to come, they will be in the same class as Moto Go, which are highly prized now.

NEPTUNE: Mod 4A38; Jerry Hughes; 5833 Mayville; Dayton, Ohio
NEPTUNE: Mod 5A39; Wesley Freestone; 914 Greenwich Rd; Lafayette, Indiana 47904
NEPTUNE: no other info; H. Bauer; RR3; Tipton, Indiana
OMG: Mod 4148; Ray Kelley; 225 Moss Farms; Cheshire, Connecticut 06410
SWEET: no other info; G. F. Weber; Ritzville, Washington 99169

WATERWITCH: no other info; W.H. Smith Jr.; Box 134; Douglas City, Calif.
WATERWITCH: no other info; W. Tinsley; Deer Park, Washington 99006
WATERWITCH: no other info; W. Speight; 2921 Wall-craft; Tampa, Florida
Now for the really die-hard antique outboarders, I have a few ads which come into the miscellaneous category. Either they have a few motors or they have on and did not submit the brand name. Who knows what you may turn up.

WATERWITCH: no other info; F. Carri; 2037 LeDroit; So. Pasadena, Calif.
WATERWITCH: no other info; C. Simkins; 5 Highland; Hillsboro, Ohio 45133
WATERWITCH: no other info; G. Bellis; 325 58th Pl; Des Moines, Iowa 50312
WATERWITCH: no other info; R. Peters; Route One; Dresden, Ohio 43821
WATERWITCH: no other info; K. Burdette; 774 Hollibough; Akron, Ohio 44310
WATERWITCH: no other info; A. Geist; 623 Allegheny; Oakmont, Pennsylvania

MISC: 13 motors incl Chief & Waterman; D. Callar; 1705 Fern; Alexandria, Va.
MISC: No other info; Don Warner; 104 Wheeler; Toronto 259, Ontario
MISC: Has several motors; Jon Hayes; 1175 W Wasning-ton; Marquette, Michigan
Well that takes care of the miscellaneous motors section of my files. There are plenty of good motors in there, but I have plenty more Elto, Evinrudes, and Johnsons to be listed. Good hunting!

MISC: 17 motors incl Evelyn; Clio, Michigan
MISC: No other info; W. Miller; 1647 Park St.; Livermore, Calif. 94550
MISC: Has 10 motors; F. Trudell; 7815 Crescent Beach Rd.; Pigeon, Mich.
CEDARBURG; Wisconsin

ELTO: Rudder model; H. Schuler; Box 226; Corduroy Rd; Autice, Ohio 43412
ELTO: Mod J; W. Hanna; 222 Dover; West Memphis, Arkansas 72301
ELTO: no other info; J. Hoopfer; Box 153; Granish B.C., Canada
ELTO: Mod A; D.C. Willey; One Rodger Drive; Latham, New York
ELTO: Mod 4091; Nelson Leedy; 34 Barb Avenue; Heath Village, Ohio

ELTO: Mod A; Thomas Meyer; 6000 North Stoney; Monroe, Mich. 48161
ELTO: Rudder Model; R. Jonsen; 567 Bradley; Nanaimo, B.C., Canada
ELTO: Mod G; R. Sell; 1604 West Oklahoma; Milwaukee, Wisconsin
ELTO: Mod C; Richard Hendrickson; Box 16; Waubay, South Dakota
ELTO: "Pal"; Patrick Kunitz; 1153 River Dr.; Watertown, Wisconsin

ELTO: Mod G; John Atkins; RR #1; Magamanie, Wisconsin 53560
ELTO: Mod 309; J. VanWeelden; Box 122; McFarland, Wisconsin 53558
ELTO: Mod J; F.H. Dahl; 818 Pine Street; Marquette, Michigan
ELTO: Rudder Model; Harry Peterson; 2221 Carmen Ave.; Chicago, Illinois 60625
ELTO: Mod A; Billy Spangler; 125 West Fillmore Avenue; Orlando, Florida 32809

ELFO: Mod C; D. Joyce; 2545 Sunshine Lane; Beloit, Wisconsin
 EVINRUDE: Mod A; W. Vacek; 27 Oak Avenue; Highland Falls, New York
 EVINRUDE: Mod 7031; C. Wilson; 715 Eastern Ave; Connersville, Indiana
 EVINRUDE: Mod U; LaVerne Scott; Arbor Glade Rd; Apalachin, New York
 EVINRUDE: no other info; W. Brown Jr.; Box 388; Clarendon, Arkansas
 EVINRUDE: 4 cylinder; R. Campbell; 5916 Doxmere; Parma Heights, Ohio
 EVINRUDE: Mod 4091; F. Meyers; 557 James; Batesville, Arkansas
 EVINRUDE: Row Boat Motor; R. Grier; Group Box 68; Austi Sub; Prince George BC
 EVINRUDE: Mod 4371; Ed. Kent; 15242 Charmeran; San Jose, Calif.
 EVINRUDE: Row Boat Motor; C. Hinds; 203 13th Ave; Norway, Michigan
 EVINRUDE: Mod 4266; W.A. Wing; 225 Ross; Alamosa, Colorado 81101
 EVINRUDE: Mod 6039; Fred Van Meter; 118 Pine St; Fairview, Pennsylv. 16415
 EVINRUDE: Mod 4265; Jeff Patrick; 263 Sunset Dr; Longview, Washington
 EVINRUDE: 4 cylinder; S. Whitmore; Gen. Del.; Sanas Springs, Okla 74063
 EVINRUDE: Mod A; B. Logeman; 301 Coventry; Peoria, Illinois
 EVINRUDE: Mod 4146; W. Shults; 1020 18th Street; New Castle, Indiana
 EVINRUDE: D. Williamson; 1204 Evergreen; Lakeland, Florida
 EVINRUDE: Mod 4266; Glen Neugent; 201 Locust St; Rolfe, Iowa 50581
 EVINRUDE: 1939 Ranger; C. West; Box 123; Spring Dale, Arkansas
 EVINRUDE: Large Twin; W. Evans; 3343 Ridden; Camarillo, Calif. 93010
 ELTO: Mod C; Mrs. M. Thompson; Box 266; Mercer, Wisconsin 54547
 EVINRUDE: Row Boat Motor; H. Kitchin; 1303 Claremont; Richmond, Virginia
 EVINRUDE: Mod 4407; John Giles; 501 15th Ave SW; Minot, North Dakota
 EVINRUDE: no other info; J. Fish; 2912 LaCresta; Bakersfield, Calif.
 EVINRUDE: Mod 7031; Fred D. Hill; Cawkee City, Kansas
 EVINRUDE: Mod 4252; H. McDermith; 6234 22nd Rd N; Arlington, Virginia
 EVINRUDE: 1938 Sportwin; R. Pettit; 4970 Riggins Mill Rd; Macon, Georgia
 EVINRUDE: Mod 6039; Jim Vogt; 3324 N Santa Monica Milwaukee, Wisc. 53217
 EVINRUDE: Mod H; Frank Fischer; 1512 S Lowe; Appleton, Wisconsin
 EVINRUDE: Mod 703; Fred Sturges; Box 72; Kouts, Indiana 46347
 EVINRUDE: no other info; D. Rosenberg; 626 Wood; Rockford, Illinois
 EVINRUDE: Row Boat Motor; Toivo Rautio; Route 3; Floodwood, Minn. 55736
 EVINRUDE: 1938 Ranger; Mrs. A. Schneider; 110 Sunset; Modesto, Calif.
 EVINRUDE: Row Boat Motor; 321 Palmetto Drive; Port Charlotte, Florida
 EVINRUDE: no other info; D. Feneis; 1929 St. Germain; St. Cloud, Minn.
 EVINRUDE: Row Boat Motor; H. Dale; Box 592; Cortez, Colorado
 EVINRUDE: Mod 4152; M.T. Hill; Rt. 1 Box 123; Friensly, West Virginia
 EVINRUDE: Mod A; Mike Troyer; 2706 S 6th; Elkhart, Indiana
 EVINRUDE: 4 cylinder; A. Sanford; 33565 Roca Dr; Fremont, Calif. 94536
 EVINRUDE: Row Boat Motor; L. Wescott; 5644 116th Ave SE; Bellevue, Wash.
 ALTO: Speedster; Charles Wheeler; 6409 Portal Ave SE; Washington, D.C. 20031
 EVINRUDE: no other info; L. Finley; 908 Constance; Pittsburg, Pennsylvania
 EVINRUDE: no other info; Dan Dickhausen; 4210 Friedrich; Lake Elmo, Minnesota 55042
 EVINRUDE: Mod 4093; Patience Lykle; 1105 Austin Street; Park Ridge, Illinois 60068
 EVINRUDE: 1941; Ace; James Beuman; Box 264; Lake Dallas, Texas
 EVINRUDE: 4 cylinder; James Ehlen; 302 East Lindy Lane; Okauchee, Wisconsin
 EVINRUDE: Mod R ??; Mrs. C. Luce; 1136 Roosevelt Ave; Salt Lake City, Utah
 EVINRUDE: Mod 4346; Earl Troclair; 3144 11th Street Fort Arthur, Texas
 EVINRUDE: Mod 9026; Earnest Edwards; 2209 Farmsite Rd; Violet, Louisiana
 EVINRUDE: Row Boat Motor; Mrs. C. Grace; Rural Route; Miller, South Dakota 57362
 EVINRUDE: Mod N; Mrs. Phyllis Beatman; River Road; Middletown, Connecticut
 EVINRUDE: Row Boat Motor; Ivan Neilson; Route 5; Stevens Point, Wisconsin 54481
 EVINRUDE: Mod N; William Converse; 1512 Milan Ave; South Pasadena, Calif.
 EVINRUDE: Mod 4351; James Hougerud; 1630 N 5th Street; Montevideo, Minn. 56265
 EVINRUDE: Mod A; W. Strong; 930 West 1st N; Salt Lake City, Utah
 EVINRUDE: no other info; W.H. Lowe; Hendrix Lake; British Columbia; Canada
 EVINRUDE: Row Boat Motor; K. Kaub; Hamilton, Kansas
 EVINRUDE: Large 4 cylinder; R. Follwar; Rt 11 Box 202; Houston, Texas 77016
 EVINRUDE: Mod 4371; R.W. Kalao; 4705 Lynda Drive; Holiday, Florida 33589
 EVINRUDE: Mod A; D.H. Losby; Manitowish Waters, Wisconsin, 54545

JOHNSON: no other info; W. Hipes; 1516 Madison; Ottawa, Illinois
 JOHNSON: Mod A-45; D.F. Raines; 6706 SE Steele; Portland, Oregon 97206
 JOHNSON: Mod KSL; R.S. Bradley; N 2628 Atlantic; Spokane, Wash. 99205
 JOHNSON: Mod K-35; A. Watkins; Primrose Lane Box 184A; Riverton, Ill.
 JOHNSON: Mod PO-15; T. Chamberlain; RR #1; Cooksville, Ontario, Can.
 JOHNSON: Mod J; D.L. Grimm; Box 199; Alden, Iowa
 JOHNSON: Mod AA-37; E.A. Rust; 4540 Elrin Avenue; Jackson, Miss. 39209
 JOHNSON: Mod A-35; C. Thompson; 1204 Ritson Rd Oshawa, Ontario, Can.
 JOHNSON: Mod J; Jerry Cooley; Box 2490; Amarillo, Texas
 JOHNSON: Mod AB-25; Lynn Williams; Box 161 Bird River Grove; White Marsh, Md.
 JOHNSON: Mod A-35?; D. Wynn; Box 768; Russellville, Arkansas
 JOHNSON: Mod B; Arthur King; 506 N View Terrace; Alexandria, Virginia
 JOHNSON: no other info; L. Hann; RD #1; Emmitsburg, Md 21727
 JOHNSON: no other info; J. Jordan; 6721 E Ridge; Shreveport, Louisiana
 JOHNSON: Mod A-35; R.A. Kimball; 103 John D Crv; Sturgis, Michigan 49091
 Well that's it for this issue. I hope that there is something in these columns that you can use. See you next month in the Newsletter.- Bob Zipp

JOHNSON: Mod OK-55; A. Powell; 67 Weston St.; London, Ontario, Canada
 JOHNSON: Mod OB-70; Don Ward; 9 Greenwood; Dundas, Ontario, Canada
 JOHNSON: no other info; P. Misanoimuk; Box 208; Sandy Lake, Manitoba, Can.
 JOHNSON: Mod KA-10; F. Caselton; 315 S Main; Carrollton, Illinois
 JOHNSON: no other info; Orphey Lien; Poplar, Montana
 JOHNSON: Mod A-35; Oaty Hart; 4459 Crump; Germantown, Tenn 38038
 JOHNSON: Mod HA-15; G. Boerner; 626 Park Ave; Story City, Iowa 50248
 JOHNSON: no other info; C. Nickel; 90 Oak Hill; Midland Park, New Jersey
 JOHNSON: Mod J-75; Mrs. L. McDaniel; #46 Tanglewood Apts; Little Rock, Ark.
 JOHNSON: Mod J; Fred Bigley; 210 W Ridgewood; San Antonio, Texas
 JOHNSON: Mod A-25; H. Williamson; 172 Chick-amauga; Hampton, Virginia
 JOHNSON: Mod PO-15; John Sites; 709 Bottler Rd; Marysville, Calif. 95901
 JOHNSON: Mod P-40; John Brennan; 77 W 54th St.; Bayonne, New Jersey
 JOHNSON: Mod MS-38; W.C. Rau; 104 Vernon Ave.; Ft. Mitchell, Kentucky
 JOHNSON: no other info; E. Ferguson; 231 Arlington Edwards; Hoyt Lakes, Minn.
 JOHNSON: Mod OA-65; W.L. Owen; 5206 Lancaster St.; Shreveport, Louisiana
 JOHNSON: Mod OK; Barrell Duensing; Burwash Landing Mile 10 1/2; Yukon Ty. Janson
 JOHNSON: no other info; F. Puchana; 16 Hepbourne; Toronto, Ontario, Canada
 JOHNSON: no other info; I. Lines; 1111 Genevieve Rd; Redding, Calif. 96001
 JOHNSON: Mod P-40; Frank Guddenaorr; 850 N Wood St; Aurora, Illinois 60505
 JOHNSON: no other info; G. Wallace; 14 South Street; Ticonderoga, New York
 JOHNSON: 4 Motors; 2 Mod ATs D. Heiser; 1603 Scott St.; Clearwater, Florida 33515
 JOHNSON: no other info; Rev. T. Daley; Box 195; Dillingham, Alaska 99576
 JOHNSON: Mod K-40; Gerard Bohler; RD 2 Box 330A; Pine Grove, Penn. 17960
 JOHNSON: Mod 200; Denney Wright; RD 2; Webster Rd; Fredonia, New York 14063
 JOHNSON: Mod A-25; H.M. Trott; Lowes Trailer Anx.; Box 100 Sp 22; Bend, Oregon
 JOHNSON: Mod K-50?; J.D. Nay 121 Hunt Club Dr; Oakridge Park; London, Ontario, Canada
 JOHNSON: Mod S-70; John Jones; 602 College Heights; Anderson, South Carolina
 JOHNSON: Mod A-25; A.F. Ashbacher; Supply Dept; Naval Aux Air Sta; Fallon, Nevada
 JOHNSON: no other info; Roge Gillett; Arkansas

THE BELOW LITERATURE IS ON FILE AT THE AOMCI HEADQUARTERS, 1107 PUEBLO, DALLAS, TEXAS

Johnson Repair Parts Manuals: For models P-75 P-80 PO-37 PO-38 PO-39 PO-10 PO-15 TN-27 OK-55 OK-60 OK-75 OK-10 OK-15 SD-20 HD-12 RD-13 200 P-50 P-70 PR-50 to PR-65 incl. K-50 to K-70 incl. Light Twin to 1927 J-70 J-75 J-80 300 K-35 K-40 K-45 KR-40 B, 1925 SD-10 A-75 A-80 J-25 JC-25 J-65 JC-65 K-75 K-80 KA 37 100 A-50 A-65 A-70 MS-38 MS-39 MS-10 MD-38 MD-39 MD-10 A-35 to A-45 LS-37 and 38 DS-37 and 38 LT, DT and AT-39 LT, DT and AT-10 P-75 and PL-75 Instruction Book Edition J for 1930 (all except electric start). Evinrude Parts List for Ranger models 4406 and 07; Operating Instructions for Evinrude Lightfour models 4375, 4376 and 4377; Evinrude 1931 Catalog. Neptune 1939 Catalog. Elto J and K Service Manual. Waterman Porto Instruction Manual. Northwestern Catalog. Lockwood: Chief Service Manual 1930; Parts List 928 Chief 1929; Manuals for models T, TL, TS and TLS 1927; Ace Service Manual, 1930; Instructions and Parts List for Ace, Chief and T models, 1928.

YOUR FELLOW AOMCI MEMBER.....

WAYBURN NIEMEYER

RR # 1 Box 126
Marthasville, Mo.
63357



AOMCI Member Wayburn Niemeyer & his newly aquired 15 HP Caille.



Wayburn, Mrs. Niemeyer and Son. Some of Wayburn's "engine room" showing on the right.

Mr Niemeyer farms several hundred acres on the bank of the Missouri River. He has his own launching ramp and three or four boats scattered around. He's had at least one old outboard on hand ever since he was a boy. Started out with a small Caille and worked his way up to a PR-65 Johnson which he traded in on a Mercury Mark 58. wayburn's collection includes a Speeditwin, two Speedifours, a Big Four, Caille, Johnson PO, P-50 and V-45 and a Mercury 1000. (I'll have to check the record on that last one - doesn't sound familiar at all). Wayburn is an expert mechanic and all his motors are in running condition.

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