The NEW

1929

JOHNSON

SEA HORSES

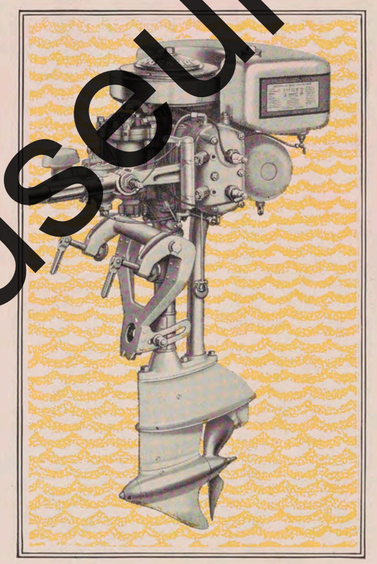
JOHNSON MOTOR COMPANY

Waukegan ~ Illinois

The Sea Horses live again! Famed in legend and myth as the flashing steeds of Neptune, god of the sea, they come to life again to typify the flashing speed and power in the new line of motors by Johnson!

Johnson Sea Horse Motors Create

New Measure of Water Motoring Enjoyment



Your first ride in a new Sea Horse powered boat will give you an *entirely new conception* of outboard motoring. You have experienced changes before—but never one like this.

As you set your controls you will smile in anticipation of starting the motor easily, because you have been told that Sea Horses require very little starting effort. But you will never be prepared for the surprise you will get on the first pull of all. Response will be immediate—and you will slide away from the pier toward open water while you are still puzzling how it was done so easily!

If you are like others who have been fascinated by this remarkable performance of the Sea Horse, you will quickly stop your motor to start it again—and again—just for the joy of starting an outboard that starts every time.

Then, and not till then, will you grasp the full significance of Johnson's wonderful invention—the Release Charger. You will realize that here at last is simplicity of starting that is comparable to the certainty and ease of automobile starting. You will know from your *own* experience that, fair weather or foul—in rain, in sleet, in heat, in cold—your Sea Horse will be readily obedient to every starting pull.

Before your elation over the delight of Sea Horse starting has subsided, you will be conscious of another and equally thrilling joy. The noise and fumes of the exhaust, that used to try your patience, *are gone!* You sweep along—incredulously listening for those old, familiar staccato reports that you will never hear again—from *your* motor at least.

Only the pleasing whir of a sweetly running engine remains. For the first time, while driving an outboard, you hear what your friends in the bow call back to you. And you—amazed—speak up far more than becomes a sailor—simply to test the reality of a thoroughly subdued exhaust.

You sniff the breeze that sweeps your stern—daring your nose to catch

a single whiff of exhaust gases. All clear! What a striking contrast to the days when a perverse breeze would fill your boat with clouds of fumes. They are buried now, together with exhaust noises, through the new Johnson Underwater Exhaust. This is an integral part of all Sea Horses with the exception of the Sea Horse Single and Sea Horse 3, and can be procured as an accessory for all previous Johnson motors, except the two smallest models.

Assuming your chief interest lies in dazzling speeds, your first Sea Horse experience will probably be with the Sea Horse 32, Johnson's new, beautiful four-cylinder motor which develops more than 32 horsepower, or with the new high-speed, Class B motor, the Sea Horse 16 which develops more than 16 horsepower.

As you trim your boat and open the throttle of either of these motors for your first, thrilling Sea Horse dash, you will get your next big surprise. You speed your motor to the point where, according to all previous outboard experience, your power curve should drop. But you have just begun. You take a firmer grip. Your power increases as you approach 4,000 r.p.m. At 4,500 it is still climbing. At 5,000 *the peak has not been reached* — and you revel in a mighty surge of power that is wholly new to outboard motoring!

Such power is the result of a radical departure in outboard motor design. Rotary Valves, which control the admission of gas from the carburetor to the crank case and maintain a flow of *undiminished charges even at maximum engine speeds*, account largely for the astounding power of the Sea Horse 32 and Sea Horse 16. In these two models, with their Rotary Valves, Detachable Aluminum Cylinder Heads, arrangement of offset cylinders that permit the use of straight connecting rods without bearing offset, Circular Disc Crank Arms, Heavy Section Lynite Pistons, Roller Crank Pin Bearings and other important developments, Johnson gives the world its *first, genuinely high-speed, outboard motors*.

Not only do these two new models develop power undreamed of a year ago, but they develop it easily—without forcing. They deliver unbelievable speed as a matter of course. And they maintain their terrific pace mile after mile, day after day with utmost dependability. They thrive upon pace like this because they are designed for *high speed*.

Such dependability is a fundamental Johnson characteristic. It distinguishes every Johnson motor built. Sea Horse models 14, 10, 3 and Single are as famous for dependability in hard use as the high-speed models are for brilliant performance. While they are simpler in design than Sea Horse 32 and 16, they, too, deliver dazzling speeds according to their sizes.

Gene Pic[kard] ... across the line to win the coveted A.C.F. C[lass] C ... championship trophy at ...on.

Hold Three Championships

In fact, it is a 1928 Johnson motor (similar to the Sea Horse 14 in simplicity of design) that holds the World's Outboard Motor Championship in Class C driven by Eugene Pickard on his famous racing hull "W-13," in the 1928 Championship Regatta at Wilmington.

Howard Ingram in "Jimmy Boy" powered by a 1928 Johnson Big Twin motor, won over a field of skilled drivers in the 408.3 mile marathon from Kansas City to St. Louis October 6-7, 1928, the world's longest marathon.

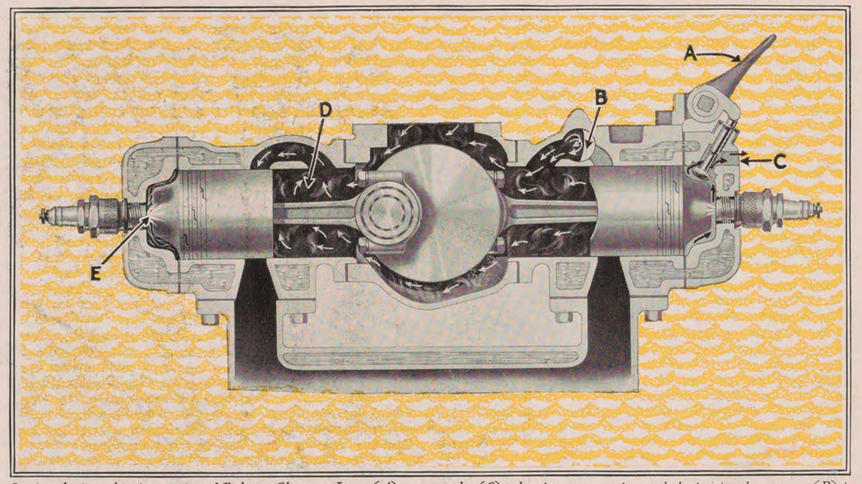
Albert Burmeister, driving another Johnson, won the International Regatta Class C Trophy at Lake Templin, Berlin, Germany, in June.

Such victories, when they are won consistently, are significant. Johnson has the distinction of winning the preponderance of officially sanctioned outboard events the country over ever since the inception of outboard racing.

These qualities of stamina upon which famous drivers depend for consistent victories, make Johnson motors favorites also on daring expeditions. For instance, Johnson motors performed so superbly for Commander Richard E. Byrd in connection with his memorable flight over the North Pole, that they were chosen to accompany the present Byrd Expedition into the Antarctic.

Whether your choice be one of the new high-speed Sea Horses (the four-cylinder 32 or the Class B 16) or whether you prefer the simple, rugged design of the Sea Horse 14, Sea Horse 10, Sea Horse 3 or Sea Horse Single—your selection of a Johnson motor will mean happy days of trouble-free performance. And you will possess a motor which, because of its radical improvements described on following pages, *obsoletes all previous outboards*.

Flashing high speed . . . gruelling runs . . . or just ordinary cruising . . . Sea Horse stamina will stand the test.



Sectional view showing action of Release Charger. Lever (A) opens valve (C) releasing compression and closing intake passage (B) in inactive cylinder. Full charge (D) is forced into combustion chamber of active cylinder while double intensity of spark (E) ignites charge.

The Johnson Release Charger

—*Outboard Motoring's Most Startling Development*

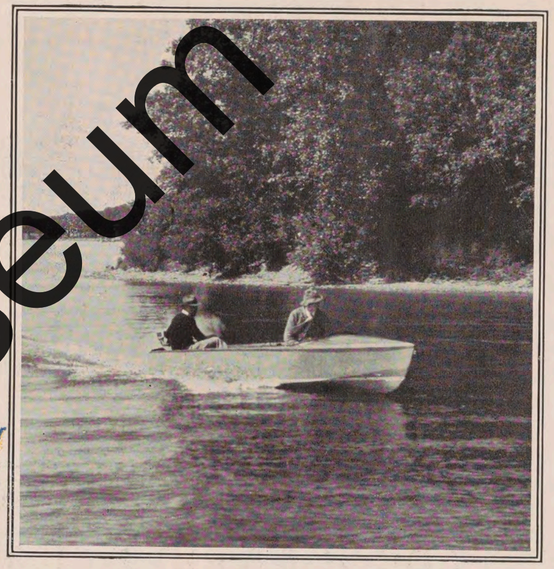
THE greatest joy that has ever been added to outboard motoring comes as a result of Johnson's wonderful new invention—the *Release Charger*. What the Self-Starter is to the automobile, the Release Charger is to the outboard. With this revolutionary system Sea Horse motors start cold, start flooded, *start always*—and with no more physical exertion than it takes to snap a whip!

Women and children who formerly drove the family outboard craft only when they felt wholly equal to the occasion, find *Sea Horse* motoring intensely alluring. They hasten out to the water at every opportunity without really knowing why they have become such outboard enthusiasts. The reason is the Johnson Release Charger which reduces starting effort so radically it can hardly be called an effort.

Beginners, who without realizing it, were forever flooding their outboard motors and thus getting themselves into starting jams, are now protected from such trouble by this fool-proof starting system. Flooding a Sea Horse is unlikely since it will invariably start on the first pull. But should it be flooded deliberately, it will start! An enormous spark of double intensity at the start-off, one of the features of the Release Charger, takes care of that!

Sportsmen who used to arise extra early to start their motors in the cold gray of dawn no longer need to reckon on possible delays. The minute their tackle or guns are stowed in a Sea Horse powered boat they are

Nature is never so entrancing as from a Johnson powered boat.

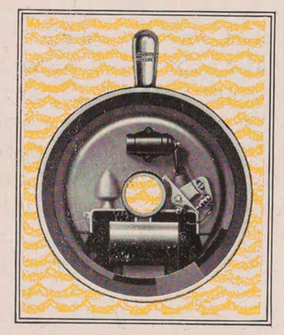


ready to start. Cold motors make no difference in the positive action of the Release Charger.

With so much to gain from a Sea Horse can you be content with any other motor?

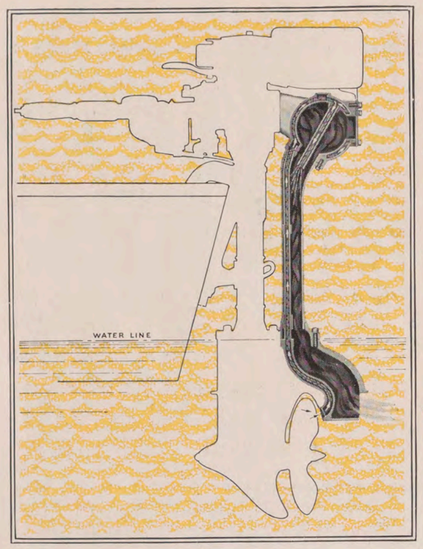
The Johnson Release Charger releases compression from one cylinder and supercharges the other. This is accomplished by moving the convenient Release Charger Lever which opens a valve in the first cylinder to release compression and closes that cylinder's intake passage at the same time to cut off admission of charges.

The charge from the crank case which is normally distributed to the two cylinders is now forced into the active one. Decreased resistance at the spark gap by releasing compression in the inactive cylinder creates a double intensity of the spark in the active cylinder. Thus by *doubling the intensity* of the spark in the active cylinder which is already supercharged, starting is a certainty—even with a cold or flooded motor. Finally, released compression in one cylinder so greatly increases the ease of accelerating the flywheel that one scarcely feels the effort of pulling the motor over compression in the active cylinder.



This applies to the Sea Horse line—from the new four-cylinder Sea Horse 32 (in which the Release Charger makes *two* cylinders inactive and *two* active) to the Sea Horse 3 excepting the Sea Horse Single.

Sectional view of Quick Action Magneto on Sea Horse 16 showing new type of breaker for high engine speeds.



Sectional view of underwater exhaust on Sea Horses 16 and 32 showing independent water cooling system; water entering system, cooling muffler and flowing into exhaust pipe, where it aids in contracting gases as it passes down and out of discharge port below anti-cavitation plate.

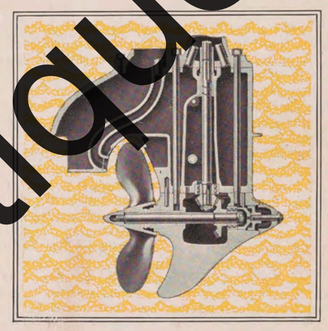
The Johnson Underwater Exhaust

Eliminates Exhaust Noise and Fumes

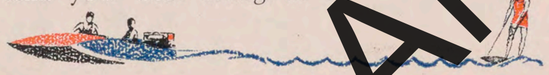
ONLY those who have actually driven one of the new Sea Horse motors can appreciate the enormous difference in outboard motoring brought about by the Johnson Underwater Exhaust. It lends an entirely different atmosphere to small craft motoring, at once joyful and refreshing. By subduing the persistent noise of the exhaust, one is free to enjoy fully the glorious sensation of winged motion over the water.

The only sound one hears is that welcome whir of the engine which is music to the ears of marine folk. You can send your boat along at a thrilling speed and carry on a conversation with your friends without lifting your voice. People along the shore are spared the annoyance of the sharp, staccato reports. In a word, the Johnson Underwater Exhaust restores peace to our waterways.

This radical departure in outboard motor design likewise provides a



Sectional view of lower unit of Sea Horses 16 and 32 showing ball bearing assemblies, cavitation plate and propeller shaft.



long desired relief from the clouds of burned gases carried into the boat by a following breeze. Anyone who has ever driven an outboard knows how unpleasant it is to have a breeze carry these fumes into the boat. This is an unpleasantness that no driver of any of the big Sea Horse models need suffer—since the Johnson Underwater Exhaust discharges exhaust gases below water.

Available on Four Models

The Underwater Exhaust is an integral part of all Sea Horse models with the exception of the Sea Horse Single and Sea Horse 3.

Yachtsmen and leading exponents of outboard motoring, together with Johnson, consider this development so valuable to outboard motorists that special facilities have been created to supply the Johnson Underwater Exhaust as an accessory for installation on *all previous Johnson models* except the Johnson Single and the Light Twin. Thus, in one great stroke, *Johnson removes any excuse for noisy outboard motors or gas-filled boats.*

Muffler Cooling System

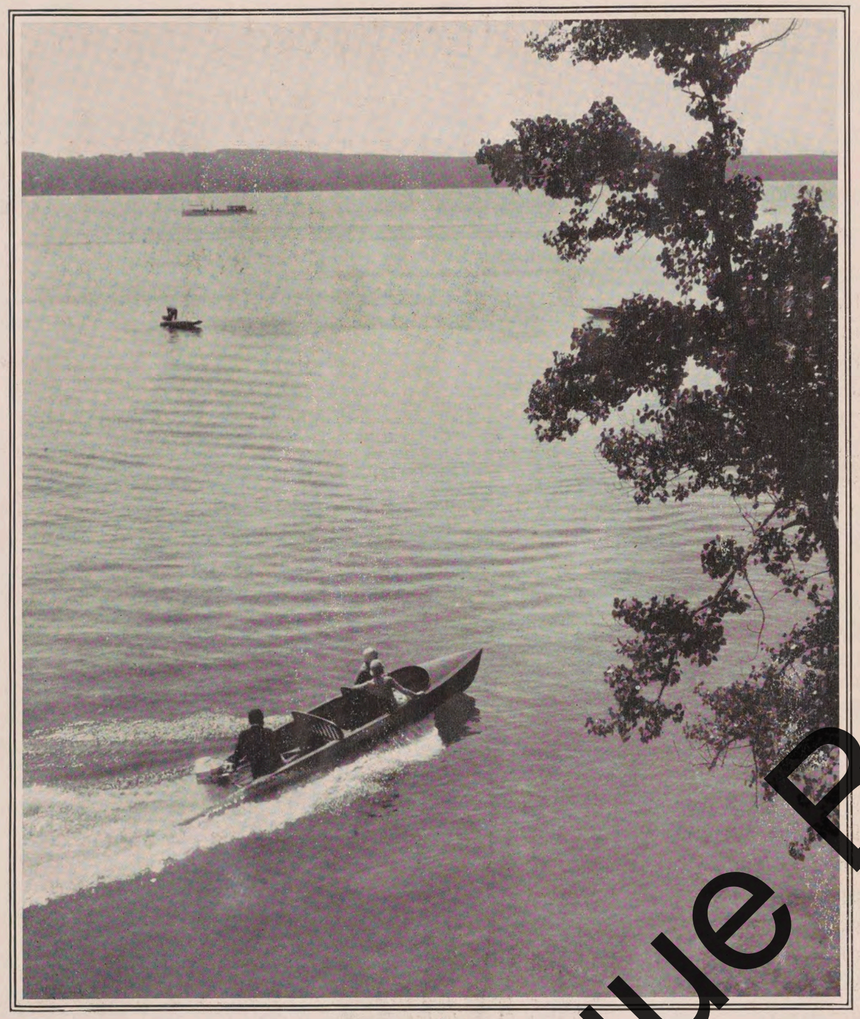
As you will see from the illustration on the opposite page, water for the muffler cooling system in the Sea Horses 16 and 32 is carried up from a point at the rear of the propeller to the muffler jacket. After circulating around the muffler, the water flows into the exhaust pipe, where it assists in silencing the exhaust by partially condensing the hot gases. The water and the exhaust gases are then discharged below the anti-cavitation plate.

An exhaust cut-out opens and closes automatically in retarding or advancing the magneto armature plate—thus releasing back pressure created by running slowly and in starting.

As for underwater resistance, you will observe that the contour of the exhaust outlet blends into streamlines of gear case. There is no additional surface here to cause added resistance.

The Underwater Exhaust is Johnson's gift to a world that has pleaded for quieter outboard motors. With it one speeds gaily along—free from all exhaust noises or fumes—conscious only of a new joy in water motoring. Unless you drive an outboard motor so equipped, you drive an obsoleted motor.

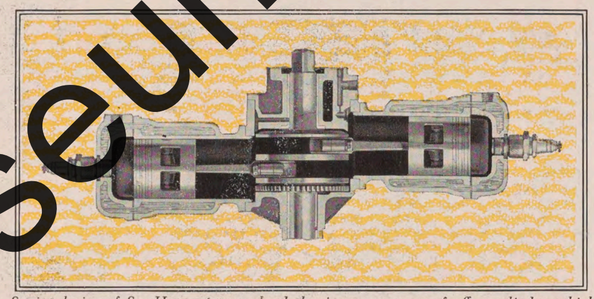
An outboard powered runabout loosens the shackles that anchor you to the front porch of your cottage.



Out across the mirrored surface of the lake . . . the cool lake breezes striking you . . . not a care in the world . . . truly the Sea Horses have brought a new luxury never known to water travel!

New Type, High Speed Motors

—*The Sea Horse 32 and Sea Horse 16*



Sectional view of Sea Horse 16 power head showing arrangement of offset cylinders which permit use of straight connecting rods without bearing offset. The same features apply to the Sea Horse 32.

JOHNSON'S determination to develop the maximum speed in outboard motors, without in the least sacrificing their justly earned reputation for dependability and stamina, has resulted in necessary radical changes which are presented to outboard motordom for the first time in the Sea Horse 32 and Sea Horse 16.

Among the many changes made which were necessary to insure extreme high speed with staying qualities was the introduction of the Rotary Valve, Circular Disc Crank Arms, Detachable Aluminum Cylinder Heads, Straight Connecting Rods with special roller bearings, Special Heat Resisting Lynite Pistons, Ball Bearings are used on the pinion and propeller shafts and the gear case is of beautiful streamline design. Dependability even with the extreme high speed and power is assured.

Straight Connecting Rods

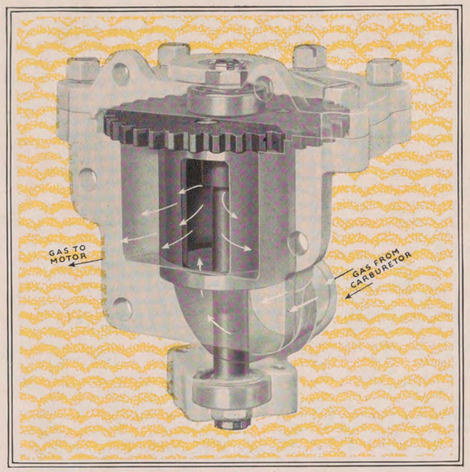
The cylinders in the Sea Horse 32 and Sea Horse 16 as shown by the illustration above are offset sufficiently to permit the use of straight connecting rods without bearing offset. These eliminate side and angular pressures and make possible for the first time the proper use of roller bearings on the crank pins.

The connecting rod floating freely in the piston without the necessity of a thrust bearing on the piston pin end, makes high speed possible without jeopardizing stamina.

Roller Bearing Crank Pins

The special rollers of the crank pin bearing, turn directly on the crank pin and use the connecting rod proper as their outer race. Here again is a feature of advanced design to reduce friction and to contribute to greater speed.

That boy of yours will get the greatest thrill of his young life with a Johnson Sea Horse.



Phantom view of Rotary valve showing 180 degree opening for admission of full gas charge to crank case.

The Rotary Valve

— *Great Advance in Outboard Motor Design*

With the introduction of a Rotary Valve the new four cylinder Sea Horse 32 and the new Class B Sea Horse 16 are even further set apart from the type of outboard motor you have known heretofore. This bold departure in outboard motor design makes possible an astounding range of power and speed in these two motors.

The Rotary Valve, which is cylindrically formed and which controls the admission of gas from the carburetor to the crank case, is driven by gears from the crank shaft at crank shaft speed. It opens the passage from the carburetor to the crank case for approximately 180 degrees. Being set for the proper interval of opening and closing, [illegible] charges are fed into the crank case, even at maximum engine speeds, thus insuring higher power peaks than has ever before been possible in an outboard motor. As a result, the Sea Horse 32 and Sea Horse 16 are given decided advantages in power and speed as are shown in the power curves on pages 29 and [illegible].

Approximately 20% more power is developed per cubic inch displacement than in 1928 motors.

In addition to creating an amazingly higher standard of power in outboard motors, the Johnson Rotary Valve contributes to quieter engine operation by feeding the charge gradually and evenly instead of permitting it to "pop" into the crank case.

High Compression Crank Case

The crank shaft arms in the Sea Horse 32 and Sea Horse 16 are circular discs, part of a one-piece, case-hardened, alloy steel crank shaft. This type of crank occupies greater space in a compact crank case, thus creating high crank case compression.

Special Lynite Pistons

The pistons of Johnson's two high speed motors are cast in metal molds and have a deflector of special form to facilitate the venting of exhaust gases.

Being cast in a heavy section of Lynite, they more readily distribute and release heat thus avoiding the overheating of the piston and rings at high speeds.

Quick Action Magneto

The Quick Action Magneto is simple in construction and control. A cam, attached to the hub of the flywheel, strikes the breaker blade, the only moving part, opening the contact point and causing a hot spark. This improved breaker has been incorporated in the magneto of the Sea Horse 16 and 32 for the higher revolutions. Here again is an item of increased protection.

Control Steering Handle

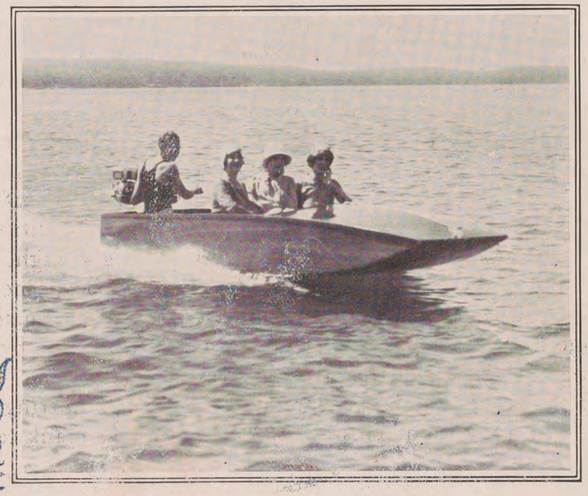
The steering handle is equipped with a sleeve grip which controls the throttle. A push button which shorts the circuit to stop the motor, is conveniently located in the end of the handle.

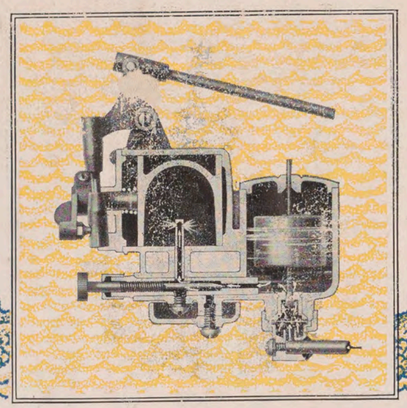
With controls so centralized on the steering handle you can speed along without any occasion to disturb the balance of your craft.

Ball bearings on the propeller and pinion shafts contribute to a fuller delivery of power.

The streamlines of the gear case, by diminishing resistance, add to the speed of all craft powered by the Sea Horse 32 and Sea Horse 16.

Women take the keenest of enjoyment in Sea Horse-driven craft.





Sectional view of carburetor showing simplicity of float-feed automobile design.

Automobile Type Carburetor

Simple of Adjustment

SEA HORSE motors are equipped with the Johnson-designed, float-feed type of carburetor, built on the proven lines of marine and automobile carburetors, with one simple needle-valve adjustment.

The sectional view of the carburetor above shows how the gasoline entering the float valve raises the float sufficiently to close the float valve. A constant level of gas is maintained in the chamber.

The gasoline is then drawn through the needle-valve and nozzle by the suction in the crank-case, the amount of gasoline being controlled by screwing the needle-valve in or out to increase or decrease the size of the opening. This simple adjustment is the only one necessary with the Johnson Carburetor. It has a particular advantage in that its simplicity effectively eliminates possibility of improper adjustments.

Air is drawn in through the bell-shaped tube, mixes with the gasoline when passing by the needle.

In Sea Horses 16 and 32 the choke valve is located that it swings into a recess containing gasoline at bottom of mixing tube, resulting in initial charge being readily drawn into the motor. Also in these two motors, the carburetor is equipped with a drip basin which carries any overflow out of boat.

Becalmed sail boats find Johnson Sea Horses ideal auxiliary power.

Sectional view of detachable aluminum cylinder head and special deflector form cylinder head.

Detachable Aluminum Cylinder Heads

DETACHABLE cylinder heads of aluminum alloy are another decided advance in outboard motor design included in the Sea Horse 32 and Sea Horse 16. Their development was part of the Johnson program to produce a strictly high speed motor that would stand up under severe use as other Johnson motors always have.

Since the aluminum alloy from which they are cast carries off heat rapidly, they insure cool spark plugs at high speeds.

As a further precaution against overheating, water from the cooling system circulates through the detachable cylinder head. This is an exclusive Johnson feature to be found on all Sea Horse models.

The detachable head being machined separately it is possible to make the inside of the head conform very closely to the shape of the top of the piston, which results in far greater compression.

Finally, being easily detached, these cylinder heads greatly facilitate cleaning out carbon and inspecting pistons.

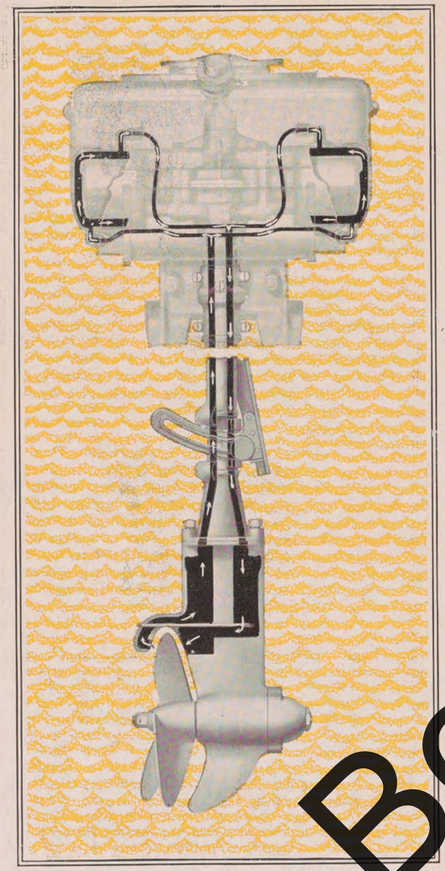
That favorite fishing spot across the lake is accessible with an outboard motor.

Efficient Operation

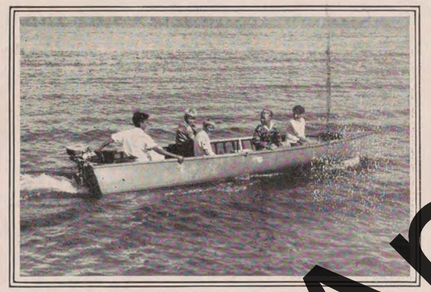
Insured by the Pressure-Vacuum Cooling System

THE Pressure-Vacuum Cooling System, incorporated in all Sea Horse models except the Sea Horse Single, makes possible a high efficiency of operation hour after hour of continuous running.

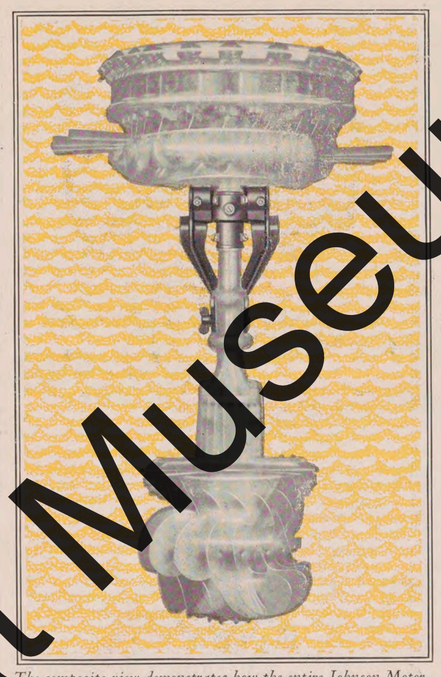
Simple in design and action this system has no moving parts to wear. The water is forced into an intake opening by the propeller, while the suction of the propeller action creates a vacuum that draws the water out of the discharge port in the gear-case. The action of the propeller creates a force that is sufficient to raise a stream of water 12 feet in a pipe. The water is carried from the intake port in the gear housing, through tubing in the drive-shaft casing and a port in the crank-case to the underside of the water-jacket. It circulates around the cylinder heads and walls and finally down through the tubing in the drive-shaft casing and through a passageway in the casing to the discharge port in front of the propeller. This complete cooling of the motor reduces carbonization of the cylinders and ports to a minimum, minimizes the possibility of over-heating the spark plugs, and maintains an even motor temperature at all times.



Phantom view of the new Pressure-Vacuum Cooling System. All moving parts that might wear have been entirely eliminated.



Simplicity of operation enables your children to operate a Sea Horse.



The composite view demonstrates how the entire Johnson Motor, with the exception of the bracket, can turn in as many directions as there are points on the compass on those motors not equipped for underwater exhaust.

Full Pivot Steering

Insures Perfect Maneuvering Ability

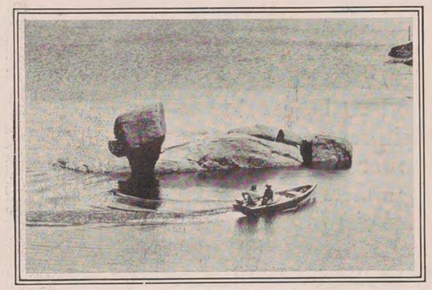
FULL Pivot Steering, an important feature of all Johnson motors except those equipped with the Underwater Exhaust, is the only outboard steering system in the world that provides *complete* maneuvering ability.

With Full-Pivot Steering you can maneuver your boat in any and every direction.

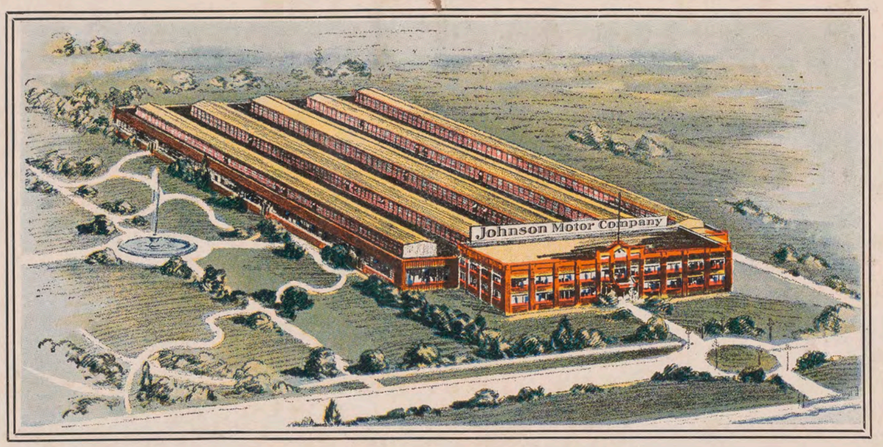
When you move the steering handle the entire motor turns and the direction of the power push is changed. You can start sidewise or forward or astern. The composite view shows how the entire Johnson Motor, with the exception of the bracket, turns completely around. Getting away from a crowded dock, or squeezing in and out of tight places is at once simple and enjoyable.

You can maneuver against a head or quartering wind. When wind conditions are such as to prevent headway you still have complete control of your boat by reason of steering with your power. You can swing the boat on its center and turn in its own length. You can reverse instantly and use such reverse as a brake. The ability to maneuver your boat in rough water is an element of safety always to be borne in mind.

The secret of Full-Pivot Steering lies in Johnson's patented reverse lock, which holds the drive-shaft in a vertical position when you reverse. In reversing your boat you can swing the motor without having the force of the propeller push the drive-shaft to the surface. The shaft is automatically locked in the stern bracket upon reversing motor.



With Full-Pivot Steering you can maneuver your boat with full power in any and every direction.



Dependability . . .

The Heritage Of Every Sea Horse Motor

THE beautiful plant of the Johnson Motor Company, on the shores of Lake Michigan at Waukegan, Illinois, embraces every modern device for the precise manufacture of high quality motors. There are 641 separate and distinct inspections before any motor is approved for shipment to the customer.

All raw material which enters into production is given a rigid inspection before it is placed in work to make sure it measures up to standard.

During the machining of each part, it is given a floor inspection after each operation. Every part is *known* to be right and to be capable of withstanding the most severe service. The cylinders are honed, and pistons are ground to a high finish and close limits, maximum variation being only .0075 of an inch.

A final inspection takes place before assembling the motors. Each part is checked for dimensions, finish, etc., eliminating any chance for defects.

The power-head, consisting of the cylinders, pistons, crank-shaft, connecting rods and crank-case, is run in oil five hours before it is finally assembled into the motor.

Following final assembly, motors are run under their own power under load in a test tank for five hours.

Each motor is then given an individual inspection. The speeds are carefully checked with a tachometer, the carburetor and magneto are adjusted to secure the most efficient results.

This elaborate program of inspection is your assurance of a perfect motor.

The ... Sea Horse motor a necessary ... summer life.

JOHNSON *Authorized Service Stations*

ALABAMA

Marine Supply Co.,
Water and St. Francis Sts.,
Mobile, Alabama

Masters Tire Co.,
422 South 20th St.,
Birmingham, Alabama

CALIFORNIA

B. H. Hebgen Co.,
326 Market St.,
San Francisco, California

Marine Sales & Service Co.,
466 West 11th St.,
San Pedro, California

CANADA

Johnson Motor Co., Ltd.,
Peterborough, Ont., Can.

Hop...
1790 Georgia St., West,
Vancouver, B. C., Canada

CONNECTICUT

Clapp & Treat, Inc.,
... St.,
Hartford, Connecticut

Shutter Radio & Marine Co.,
184 Crown St.,
New Haven, Connecticut

DISTRICT OF COLUMBIA

Davis & Child,
1312 - 14th St., N.W.,
Washington, D.C.

FLORIDA

Baird Hdwe. Co.,
Gainesville, Florida

R. L. Billingsley,
26 North Gertrude St.,
Orlando, Florida

Capital Auto S. Co., Inc.,
310½ South Monroe St.,
Tallahassee, Florida

Hopkins-Carter Hdwe. Co.,
135 South Miami Ave.,
Miami, Florida

Jacksonville Sptg. Gds. Co.,
129 West Bay St.,
Jacksonville, Florida

Runyan Mch. & Blr. Wks.,
Cor. Pine and Palafox Sts.,
Pensacola, Florida

George MacKay Co.,
Ocala, Florida

Sportsmen's Supply Co.,
616 Florida Ave.,
Tampa, Florida

GEORGIA

Stubbs Hdwe. & S. G. Co.,
119 Congress St., West,
Savannah, Georgia

ILLINOIS

Hewes Motor Co.,
Grand Ave. & Genesee St.,
Waukegan, Illinois

M... Boat Mart,
...22 Diversey Parkway,
Chicago

INDIANA

George N. Meyer,
...a, Indiana

River Park Radio Shop,
2218 Mishawaka Ave.,
River Park, South Bend, Ind.

KENTUCKY

The Sutcliffe Company,
225 Fourth St.,
Louisville, Kentucky

LOUISIANA

Arthur Duvic's Sons,
122 Chartres St.,
New Orleans, Louisiana

MAINE

Church Electric Co.,
2 Bridge St.,
Augusta, Maine

Wells Sporting Goods Co.,
52 Court St.,
Auburn, Maine

MARYLAND

A. G. Alford Sptg. Goods,
212 E. Baltimore St.,
Baltimore, Maryland

MASSACHUSETTS

Eastern Service Marine Co.,
780 Commonwealth Ave.,
Boston, Massachusetts

Walter H. Moreton Corp.,
1045 Commonwealth Ave.,
Boston, Massachusetts

Rapp-Huckins Co., Inc.,
59 Haverhill St.,
Boston, Massachusetts.

MICHIGAN

C. G. Baisch,
136 Michigan St., N.W.,
Grand Rapids, Michigan

"Bill's Boats"
(W. R. Doak, Mgr.)
Riverfront, W. of Alter Rd.,
Detroit, Michigan

MICHIGAN (*Cont'd*)

...k Bros. Service Station,
61... Michigan Ave.,
Lans..., Michigan

...ing C. Murray,
...47 E. Front St.,
Traverse City, Michigan

Robert L. Shand,
Plainwell, Michigan

MINNESOTA

Alexandria Hdw. & Lbr. Co.,
Alexandria, Minn.

Johnson Motor & Cycle Co.,
15 South Fourth St.,
Minneapolis, Minnesota

MISSOURI

Olive Cycle & Motor Co.,
1043 N. Grand Blvd.,
St. Louis, Missouri

Dug Thomas,
304 McDaniel St., West,
Springfield, Missouri

Tobener Brothers,
1517 Cherry St.,
Kansas City, Missouri

NEW YORK

Automotive Elec. Ser. Corp.,
206 Amsterdam Ave.,
New York City

Rochester Marine Co., Inc.,
111 North St.,
Rochester, New York

Syracuse Boat Corp.,
930 S. Salina St.,
Syracuse, New York

NORTH CAROLINA

Gaskins Cycle Co.,
New Bern, North Carolina

Queen City Cycle Co.,
Wilmington, North Carolina

OHIO

Anchor Canoe Livery,
(M. F. Cooper, Mgr.)
1007 Bowery St.,
Akron, Ohio

Powell & Clement,
430 Main St.,
Cincinnati, Ohio

Barnes Boat Mart,
1407 W. Ninth St.,
Cleveland, Ohio

Covert Bros.,
322 Superior St.,
Toledo, Ohio

OREGON

The Beebe Company,
1st and Washington Sts.,
Portland, Oregon

PENNSYLVANIA

Johnson & Towers,
126 Arch St.,
Philadelphia, Pennsylvania

RHODE ISLAND

H. L. Wood Co.,
118 Dorrance St.,
Providence, Rhode Island

SOUTH CAROLINA

Heinitsh's Drug Store,
Cor. Main & Calhoun Sts.,
Columbia, South Carolina

TENNESSEE

Carrigan's Sport Shop,
102 S. Main St.,
Memphis, Tennessee

TEXAS

Cullum & Boren,
1509 Elm St.,
Dallas, Texas

L. E. Miller,
1204½ Congress Ave.,
Houston, Texas

Potchernick's,
211 St. Mary's St.,
San Antonio, Texas

Rigsby Cash Hdwe. Co.,
706 Seventh St.,
Wichita Falls, Texas

VIRGINIA

Marine Equipment Co., Inc.,
7 Roanoke Dock,
Norfolk, Virginia

T. W. Tignor's Son,
1437 E. Main St.,
Richmond, Virginia

WASHINGTON

Pacific Marine Supply Co.,
1223 Western Ave.,
Seattle, Washington

WEST VIRGINIA

Mullineaux Garage Co.,
812 Seventh Ave.,
Huntington, West Virginia

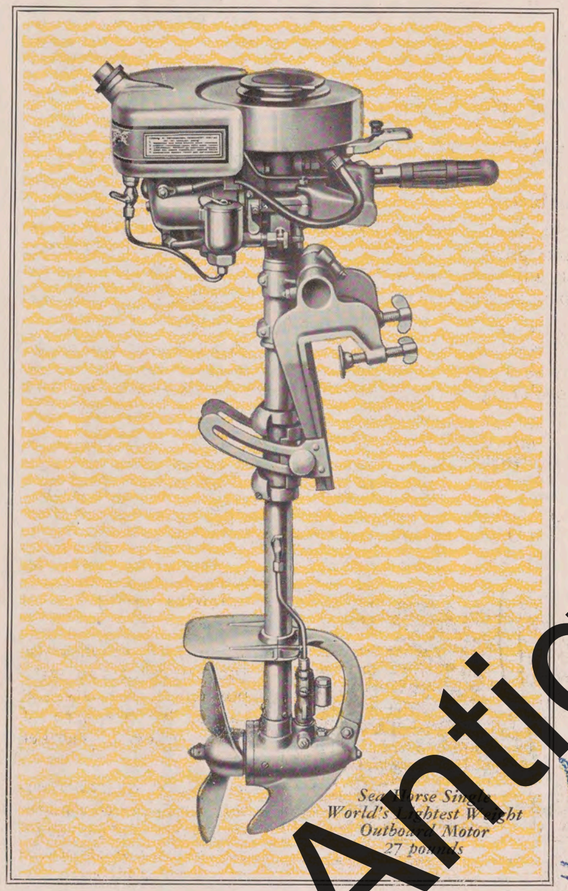
Mechanical Specifications of the

Johnson SEA HORSE Single

MINIMUM VIBRATION—Vibration, so prevalent in ordinary single-cylinder motors, has been reduced to a minimum by the high speed, the light reciprocating parts and the perfect balance of the motor.

POWER-HEAD — High-speed single-cylinder, valveless, three-port type. Bore, 2 in.; stroke, 1½ in. Cylinder accurately machined and honed to very close limits. The ports and combustion chamber of the cylinder are accurately machined to produce the greatest possible efficiency. The cylinder is cast of close-grained grey iron. The piston is made of aluminum alloy, precisely machined, and has three rings. Connecting rod of special-analysis phosphor bronze. The bearings, of hard phosphor bronze, are reamed and hand-fitted to very close limits.

The crank-shaft, drop-forged from high-grade steel, is fully machined on all surfaces to close limit dimensions. It is case hardened—a strong, one-piece unit of extra liberal size. All bearings are ample size.



Sea Horse Single, World's Lightest Weight Outboard Motor 27 pounds

The crank-case is die cast of special high-tensile strength, light-weight aluminum alloy.

HORSE-POWER — Motor is very powerful and capable of a great range of speed, depending on type of boat used. The power varies with the motor speed used and is better illustrated by the power curve and chart shown

LUBRICATION — Principally automatic, since oil is mixed with the gasoline. Oil is carried from crank-case to upper journal bearing by special designed oil ducts. Heavy oil or grease required in the gear-case only.

CARBURETOR—Special Johnson design; float feed; extremely simple; needle-valve adjustment; one-lever control; accessible screen and priming-basin with drain which is provided at bottom of the bowl. Operates successfully in a tilted position.

GASOLINE TANK—Polished aluminum; capacity: 4 pints, sufficient for one and one-half to two hours, depending on the speed of the motor; valve is provided in filler cap to prevent leakage when carrying motor.

IGNITION — High-tension Quick-Action magneto built into the flywheel; oil and moisture-proof; has only one moving part; requires no lubrication, delivers extra-hot spark for easy starting.

COOLING SYSTEM — Water-cooled with plunger pump, of hard phosphor bronze. Located on top of gear case, and well protected by special guard. Piping is concealed in drive-shaft casing and does not interfere with turning of motor.

MUFFLER — Special Johnson design of aluminum alloy castings. Silences the exhaust without undue back-pressure, rendering cut-out unnecessary.

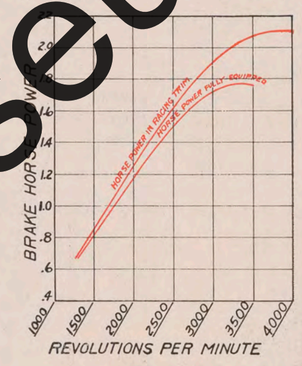
SEA HORSE SINGLE

Horsepower developed full throttle open

2600 Rev. develops . . . . . 1.56 H.P.
2800 Rev. develops . . . . . 1.65 H.P.
3000 Rev. develops . . . . . H.P.

Horsepower developed with cut-outs open and [illegible] tube closed

2600 Rev. develops . . . . . 1.7 H.P.
3000 Rev. develops . . . . . 1.9 H.P.
3500 Rev. develops . . . . . 2.06 H.P.



PROPELLER — 7⅝-inch diameter, two blades.

BEVEL GEARS—High-carbon nickel steel, hardened and heat-treated to withstand great strain and wear; mesh of gears readily adjustable by two screws and jamb-nut on outside.

FULL-PIVOT STEERING (Patented)—Entire motor turns completely around; insures reversing and steering with full efficiency in any direction; motor floats in socket; insulating vibration from boat.

REVERSE LOCK (Patented)—Prevents motor from tilting when in reverse position, thus making possible *Full-Pivot Steering*.

AUTOMATIC TILT—Motor automatically tilts upon striking obstruction; may be tilted to any height in shallow water or weeds; for cleaning weeds from propeller, or beaching.

STARTING—Rope starting; starting pulley on top of magneto; notches secure end of rope but cannot catch the clothing or strike the hand.

STEERING HANDLE (Patented)—Set at convenient angle, tilts with motor, pivots on steering rail which serves as base on which to lay motor and to carry it easily. It may be readily detached or folded back against the motor to occupy less space.

ANTI-CAVITATION PLATE (Patented)—Attached directly above the propeller, insures full propeller efficiency by preventing any loss through cavitation.

SHOCK-ABSORBER — A cone-clutch device on the drive-shaft affording protection to motor and propeller from under-water obstructions.

STERN BRACKET—Fastens motor to boat with two wing-screws, without the use of tools.

CANOE BRACKET (Patented)—Used also with double-pointed boats. This bracket attaches motor to side of rear deck. Canoe bracket is interchangeable with regular stern bracket.

MOTOR TAKEDOWN—The motor may be taken apart at a point just under the crank case, by simply removing four screws.

FINISH—Polished aluminum alloy; polished nickel and cadmium plating.

INTERCHANGEABILITY—All parts of motor are machined to close limits so that they are interchangeable; power-heads, lower units and stern brackets are also interchangeable.

WEIGHT—Total weight of motor is 27 pounds.

DIMENSIONS—Motor is compact; occupies least possible space. Standard length, 35 inches; width, 10 inches. Height of stern, 14 inches.

MODEL J-25—For use on square-stern boats and canoes.

The Sea Horse Single is the ideal motor for canoes, small boat use and on portages.

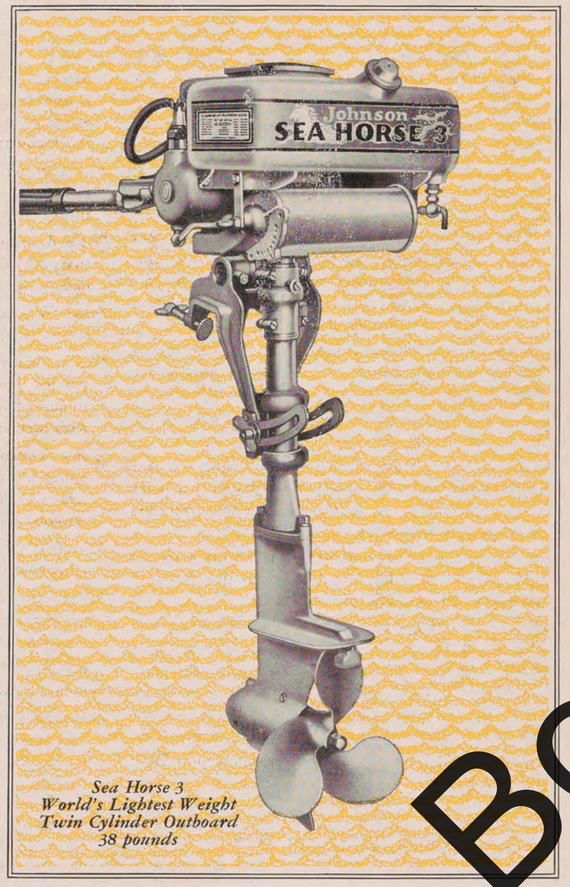
MODEL JC-25—For use on pointed-stern boats and canoes.

Note—Type J-25 may be converted for use with pointed-stern boats and canoes by purchase of canoe bracket, Number UO-114.

Note—Type JC-25 is convertible for use with square-stern boats and canoes by purchase of stern bracket, Number UJ-40.

Mechanical Specifications of the

Johnson SEA HORSE 3



Sea Horse 3
World's Lightest Weight
Twin Cylinder Outboard
38 pounds

POWER-HEAD—High-speed twin-cylinder, valveless, three-port type. Bore, 2 in.; stroke, 1½ in. Cylinders accurately machined and honed to very close limits.

The ports and combustion chambers of the cylinders are accurately machined to provide perfect distribution of the charge to the two cylinders. The cylinders are cast of close-grained grey iron. The pistons are cast-iron, precisely machined, and have three rings.

Connecting rods are of special analysis phosphor bronze. The bearings, of hard phosphor bronze, are reamed and honed fitted to very close limits.

The crank-shaft, drop-forged from selected high-grade steel after being machined all over, is case-hardened (file hard) and ground to extremely close limits. Bearings are of ample size.

The crank-case is die cast of a special, high-tensile strength, light-weight aluminum alloy.

HORSE POWER—Motor is very powerful and capable of a great range of speed, depending on type of boat used. The power varies with the motor speed used and is better illustrated by the power curve and chart shown herewith.

RELEASE CHARGER—Equipped with Release Charger for positive, easy starting. A convenient lever releases the compression from one cylinder and supercharges the other. Decreased resistance in the spark gap of inactive cylinder throws intensity of spark into active one. The spark of practically double intensity in the active cylinder together with supercharge of gas makes starting a certainty. Released compression in one cylinder so greatly increases ease of accelerating flywheel that effort of pulling motor over compression in the active cylinder is scarcely felt.

The Sea Horse 3 fully equipped for ready use on dinghies and tenders.

LUBRICATION — Principally automatic, since oil is mixed with the gasoline. Oil is carried from crank-case to upper journal bearings by specially designed oil ducts. Heavy oil or grease is required in the gear-case only.

CARBURETOR—Large, special Johnson design; float-feed; extremely simple; needle-valve adjustment; one-lever control; accessible screen and settling basin with drain which is provided at bottom of the bowl; operates successfully in a tilted position.

GASOLINE TANK—Polished aluminum; capacity, 6½ pints, sufficient for one and one-half to two hours, depending on the speed of the motor; valve is provided in filler cap to prevent leakage when carrying motor.

IGNITION—High-tension, Quick-Action magneto of fly-wheel type; oil and moisture-proof; has only one moving part; requires no lubrication; delivers extra hot spark for easy starting.

PRESSURE-VACUUM COOLING SYSTEM (Patented)—Water circulates due to force and suction of propeller. No pump or valves are used with this system. Intake and discharge openings are integral parts of gear-case. Piping is concealed in drive-shaft housing and does not interfere with turning of motor as a whole.

MUFFLER—Special Johnson design of aluminum alloy castings and tubing. Silences the exhaust without undue back-pressure, rendering cut-out unnecessary.

PROPELLER—Punch diameter, three blades of efficient design; pitch 7 in.

GEAR-CASE—Unitized, of special light alloy, highly resistant to salt water corrosion, of streamline design to a point above the water line, cast integral with anti-cavitation plate and water passages.

DRIVE-SHAFT CASING—Very rigid, cast of Lynite, a special heat-treated light alloy, highly resistant to salt water; integral water pipe and reverse lock.

BEVEL GEARS—High-carbon nickel steel; hardened and heat-treated to withstand great strain and wear; mesh of gears may be inspected through plug-hole and readily adjusted by screw and lock-nut. Gear ratio motor to propeller is 14 to 24, reducing the propeller revolutions and consequently increasing the efficiency of propeller.

FULL-PIVOT STEERING (Patented)—Entire motor turns completely around; insures reversing and steering with full efficiency in any direction; motor floats in socket, insulating vibration from boat.

REVERSE LOCK (Patented)—Prevents motor from tilting when in reverse position, thus making possible *Full-Pivot* Steering.

AUTOMATIC TILT—When going forward, motor automatically tilts upon striking any obstruction; may be tilted to any desired height in shallow water or weeds; for cleaning weeds from propeller, or beaching.

STEERING HANDLE (Patented)—Set at convenient angle; tilts with motor, affords on steering rail which serves as handle on which to lay motor and to carry it easily. It may be readily detached or folded back against the motor to occupy less space. Equipped with a rubber shock-absorber grip.

ANTI-CAVITATION PLATE—Cast integral with gear-case. Insures full propeller efficiency by preventing any loss through cavitation.

SHOCK-ABSORBER—A cone-clutch device on the propeller shaft affording protection to motor and propeller from underwater obstructions.

STERN BRACKET—Fastens motor to boat with two wing-screws, without the use of tools.

CANOE BRACKET (Patented) — Used also with double-pointed boats. This special bracket attaches motor to side of rear deck. Canoe bracket is interchangeable with regular stern bracket.

QUICK TAKEDOWN—Motor may be quickly taken down either at point under crank-case by removing four screws, or at top of gear-case by removing two screws without disturbing any piping.

FINISH—Motor is beautifully finished in highly polished aluminum alloy; polished nickel and cadmium plating.

INTERCHANGEABILITY—All parts are produced by the most modern methods to close limits, so that they are interchangeable. Power-head, drive-shaft casing and gear-case assemblies are quickly interchangeable.

WEIGHT—Total weight of motor is 38 pounds.

DIMENSIONS—Motor is compact and occupies least possible space. Standard outside length, 35¾ in., and extra length, 40¾ in., width, 12 in. Width of stern bracket, 6½ in. Height of stern for Model A, 14 in.; height of stern for long shaft motor, 19 in.

MODEL A-45—For use on square-stern boats and canoes.

MODEL AC-45—For use on pointed-stern boats and canoes.

Note—Either of the above models may be obtained with 5 in. longer drive-shaft at an additional cost.

Note—MODEL A-45 may be converted for use with pointed-stern boats and canoes by purchase of canoe bracket, Number UO-114.

MODEL AC-45 may be converted for use with square-stern boats and canoes by purchase of stern bracket, Number UO-85.

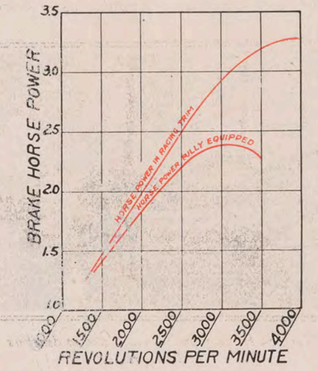
SEA HORSE 3

Horsepower developed fully equipped

2600 Rev. develops	2.3 H.P.
2800 Rev. develops	2.375 H.P.
3000 Rev. develops	2.4 H.P.

Horsepower developed with cut-outs open and hot-air tube removed

2600 Rev. develops	2.625 H.P.
3000 Rev. develops	2.995 H.P.
3500 Rev. develops	3.2 H.P.



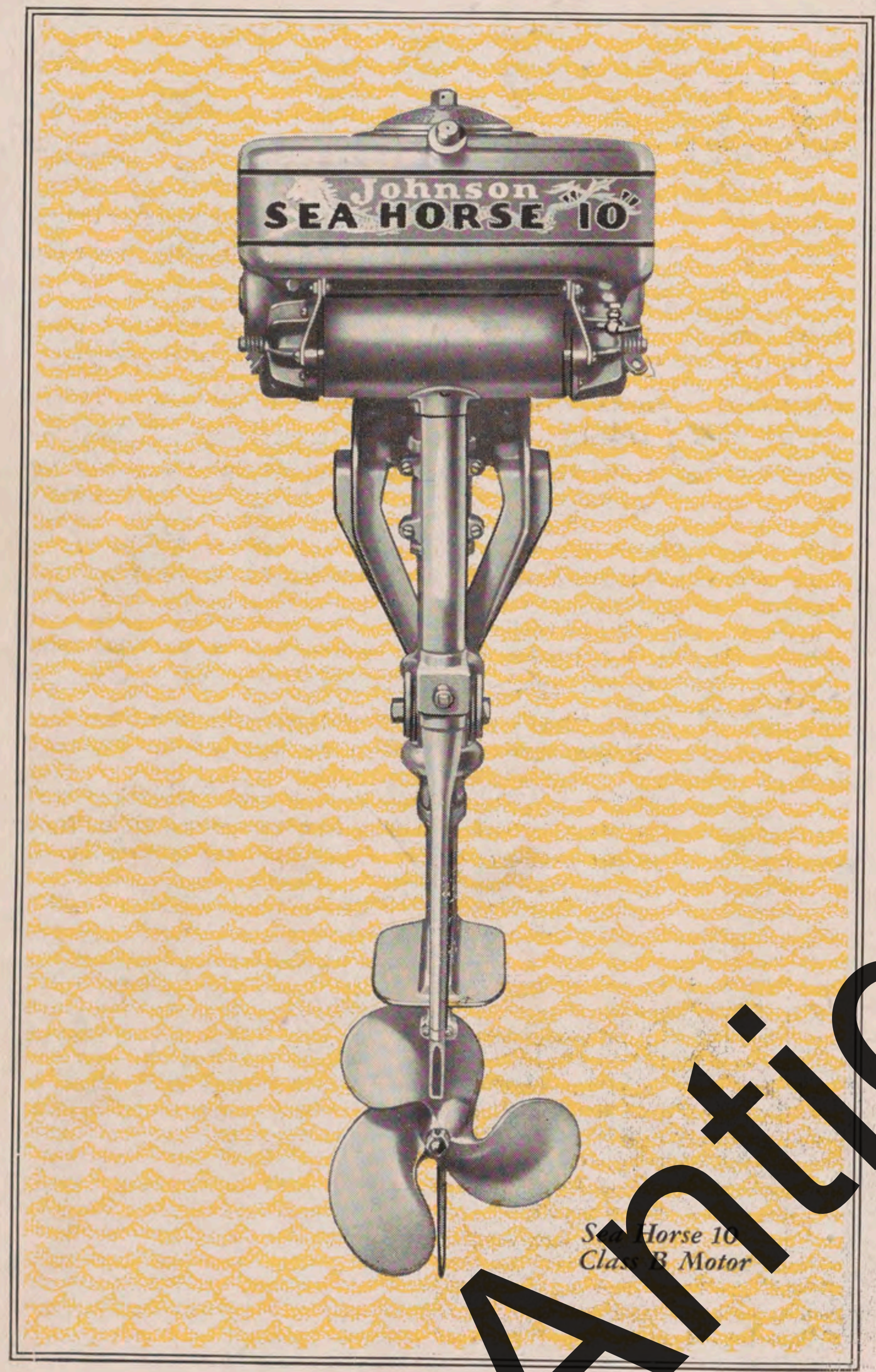
Mechanical Specifications of the

Johnson Sea Horse 10

Power-Head—High-speed twin-cylinder, valveless, four-port type. Bore, 2⅜ in.; stroke, 2¼ in. Cylinders are accurately machined and honed to very close limits. Piston displacement 19.93 cu. in.

The ports and combustion chambers of the cylinders are accurately machined to provide perfect distribution of the charge to the two cylinders. The cylinders are cast of close-grained grey iron. The pistons are of Lynite, a light weight aluminum alloy, precisely machined and have two rings.

Connecting rods are of special analysis phosphor bronze. The bearings, of hard phosphor bronze, are reamed and hand-fitted to very close limits.



Sea Horse 10
Class B Motor

The crank-shaft, drop-forged from selected high-grade steel, after being machined all over is case-hardened (file hard) and ground to extremely close limits. Bearings are of ample size.

The crank-case is of rigid design, cast of a special, high-tensile strength, light-weight aluminum alloy.

Horse-Power—Motor is very powerful and capable of a great range of speed, depending on type of boat used. The power varies with the motor speed used and is better illustrated by the power curve and chart shown on opposite page.

Release Charger—Equipped with Release Charger for positive, easy starting. A convenient lever releases the compression from one cylinder and supercharges the other. Decreased resistance in the spark gap of inactive cylinder throws the intensity of spark into active cylinder. The spark of practically double intensity in the active cylinder together with supercharge of gas makes starting a certainty. Released compression in one cylinder so greatly increases ease of accelerating flywheel that effort of pulling motor over compression in the active cylinder is scarcely felt.

Lubrication—Principally automatic, since oil is mixed with the gasoline. Oil is carried from crank-case to upper journal bearing by specially designed oil ducts. Heavy oil or grease is required in the gear-case only.

Carburetor—Large, special Johnson design; float-feed, extremely simple; needle-valve adjustment, one-lever control; accessible screen and settling-basin with drain which is provided at bottom of bowl; operates successfully in a tilted position.

Gasoline Tank—Polished aluminum; capacity, 1[illegible] pints, sufficient for one and one-half to two hours, depending on the speed of the motor; valve provided in filler cap to prevent leakage when carrying motor.

Ignition—High-tension, quick-action magneto of fly-wheel type; oil and moisture-proof; has only one moving part; requires no lubrication; delivers extra-hot spark for easy starting.

Pressure-Vacuum Cooling System (Patented)—Water circulates due to force and suction of propeller. No pump or valves are used with this system. Intake and discharge openings are integral parts

of gear-case. Piping is concealed in drive-shaft casing and does not interfere with turning of motor as a whole.

Underwater Exhaust—Eliminates noises and fumes. Discharge below anti-cavitation plate. Above applies to models K-45 and KL-45.

Muffler—A Johnson design, air cooled, stainless steel throughout. Silences the exhaust without undue back-pressure. Above applies to Models KF-45 and KFL-45.

Propellers are three-blade, 10 in. diameter; of several different pitches to suit boats of different speeds.

Gear Case—Lynite—a special light alloy, highly resistant to salt water corrosion, of streamline design to a point above the water line, cast integral with anti-cavitation plate and water passages.

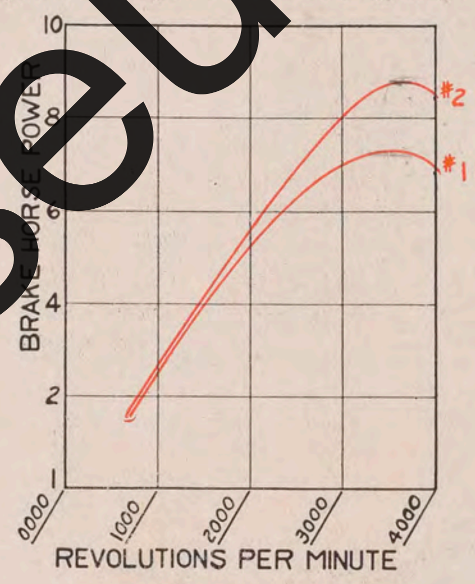
Sea Horse 10

Line No. 1. Horsepower developed fully equipped

2500 Rev. develops	6.20 H.P.
3000 Rev. develops	7.10 H.P.
3500 Rev. develops	7.15 H.P.

Line No. 2. Horsepower developed with cut-outs open and hot-air tube removed

2500 Rev. develops	7.00 H.P.
3000 Rev. develops	8.05 H.P.
3600 Rev. develops	8.95 H.P.



Steering Handle (Patented)—Set at convenient angle; tilts with motor; pivots on steering rail which serves as base on which to lay motor and carry it easily. Handle may be readily detached or folded back against the motor to occupy less space. Equipped with rubber shock-absorber grip.

Anti-Cavitation Plate—New design anti-cavitation plate insures full propeller efficiency by preventing any loss through cavitation.

Shock-Absorber Drive—A cone-clutch device on the propeller shaft, affording protection to motor and propeller from under-water obstructions.

Stern Bracket—Fastens motor to boat with two wing-screws, without the use of tools.

Quick Takedown—Motor may be quickly taken down either at point under crank-case by removing four nuts or at top of gear-case by removing two screws without disturbing any piping.

Drive-Shaft Casing—Very rigid, cast of Lynite, a special heat treated light alloy, highly resistant to salt water; integral water pipes and reverse lock.

Bevel Gears—High-carbon nickel steel, hardened and heat-treated to withstand great strain and wear; mesh of gears may be inspected through plug-hole and readily adjusted by screw and lock-nut. Gear ratio motor to propeller is 14 to 24 reducing the revolutions and consequently increasing the efficiency of propeller.

Full-Pivot Steering (Patented type)—Entire motor turns completely around; insures reversing and steering with full efficiency in any direction; motor floats in socket, insulating vibration from boat. Above applies to KF-45 and KFL-45.

Reverse Lock (Patented)—Prevents motor from tilting when in reverse position, thus making possible *Full-Pivot* Steering.

Automatic Tilt—When going forward, motor automatically tilts upon striking any obstructions; may be tilted to any desired height in shallow water or weeds; for cleaning weeds from propeller, or beaching.

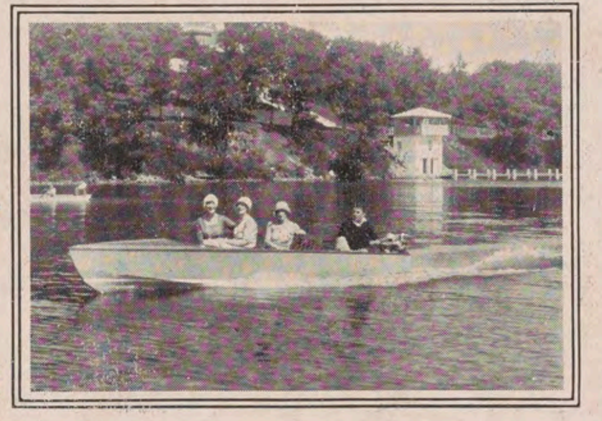
Finish—Motor is beautifully finished in highly polished aluminum alloy, polished nickel and cadmium plating.

Interchangeability—All parts are produced by most modern methods to close limits and are interchangeable. Power-head, drive-shaft casing and gear-case assemblies are interchangeable.

Weight—Model K-45, 63 lbs.—Model KF-45, 61 lbs. Model KL-45, 67 lbs.—Model KFL-45, 65 lbs.

Dimensions—Motor is compact and occupies least possible space. Standard outside length, 39⅞ in., extra length, 45⅞ in., width, 16 in. Width of stern bracket, 8 in. Height of stern for Model K-45 and KF-45, 15 in. Height of stern for Model KL-45 and KFL-45, 20 in.

Models — K-45 — Equipped with underwater exhaust. KF-45—Equipped with Full Pivot Steering; no underwater exhaust. KL-45—Equipped with underwater exhaust. KFL-45—Equipped with Full-Pivot Steering; no underwater exhaust.



An outboard runabout is the ideal means of entertaining your summer guests.

Mechanical Specifications of the

Johnson SEA HORSE 14

Power-Head—High-speed twin-cylinder, valveless, four-port type. Bore $2\frac{11}{16}$ in.; stroke, $2\frac{5}{8}$ in.; displacement, 29.78 cu. in.; cylinders are accurately machined and honed to very close limits.

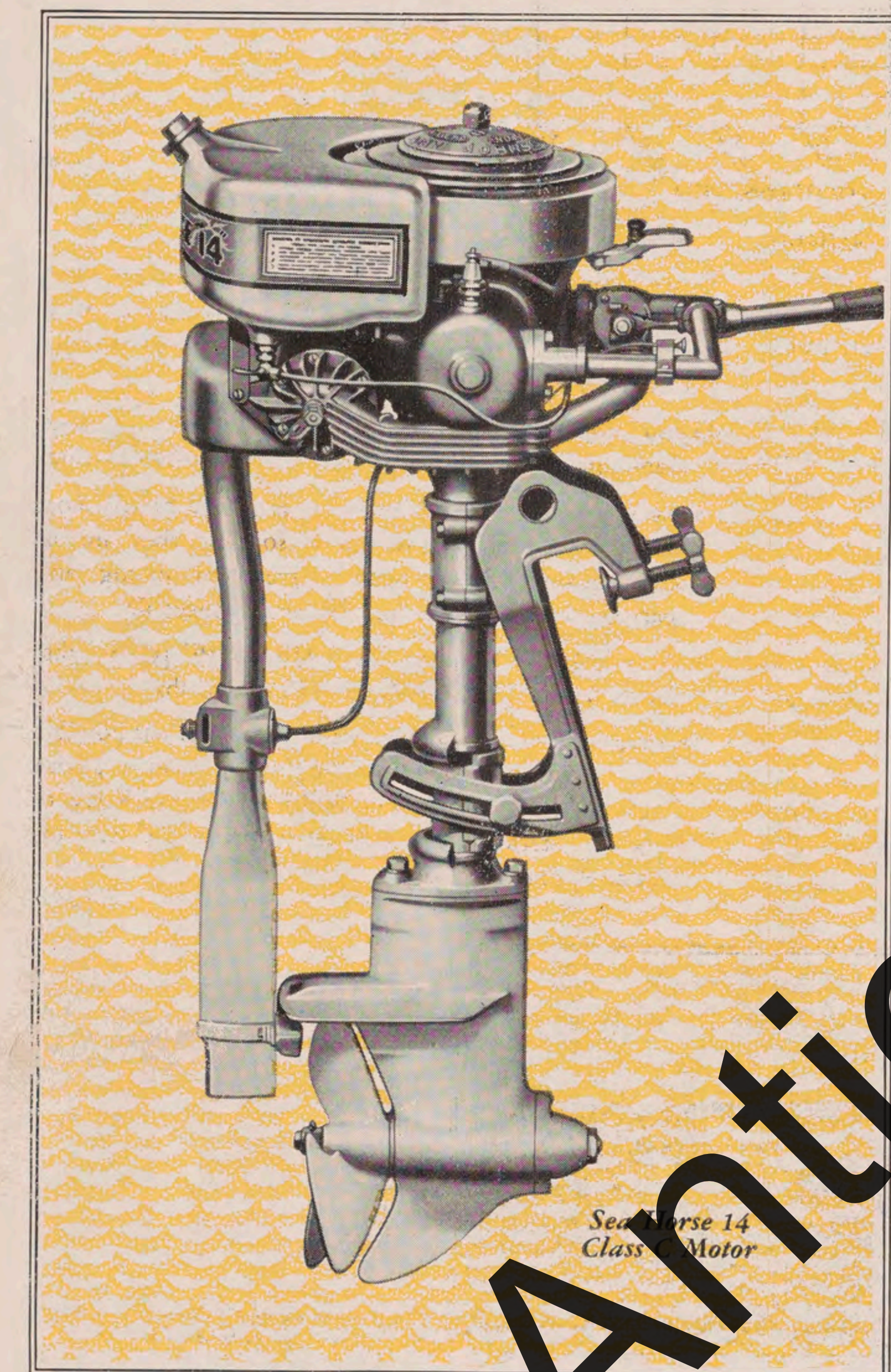
The ports and combustion chambers of the cylinders are accurately machined to provide perfect distribution of the charge to the two cylinders. The cylinders are cast of close-grained grey iron. The pistons are of Lynite, a light aluminum alloy, precisely machined, and have three rings.

Connecting rods are of high tensile heat-treated steel with removable bushings. The bearings, of special phosphor bronze, are reamed and hand-fitted to very close limits. The crank-shaft, drop-forged from selected high-grade steel, after being machined all over is case-hardened (file hard) and ground to extremely close limits.

Bearings are of ample size.

The crank-case is of rigid design, cast of special, high-tensile strength, light-weight aluminum alloy.

Horse-Power—Motor is very powerful and capable of a great range of speed, depending on type of boat used. The power varies with the motor speed used and is better illustrated by the power curve and chart shown on opposite page.


Sea Horse 14 Class C Motor

Release Charger—Equipped with Release Charger for positive, easy starting. A convenient lever releases the compression from one cylinder and supercharges the other. Decreased resistance in the spark gap of inactive cylinder throws the intensity of spark into active one. The spark of practically double intensity in the active cylinder together with supercharge of gas makes starting a certainty. Released compression in one cylinder so greatly increases ease of accelerating flywheel that effort of pulling motor over compression in the active cylinder is scarcely felt.

Lubrication—Principally automatic, since oil is mixed with the gasoline. Oil is carried from crank-case to upper journal bearing by specially designed oil ducts. Heavy oil or grease is required in the gear-case only.

Carburetor—Large, special Johnson design; float-feed, extremely simple; needle valve adjustment; one-lever control; accessible screen and settling-basin with drain which is provided at bottom of bowl; operates successfully in a tilted position.

Gasoline Tank—Polished aluminum; capacity, two and one-half gallons, sufficient for one and one-half to two hours, depending on the speed of motor; valve provided in filler cap to prevent leakage when carrying motor.

Ignition — High-tension, Quick-Action magneto of the flywheel type; oil and moisture-proof; has only one moving part, requires no lubrication; delivers extra hot spark for easy starting.

Pressure-Vacuum Cooling System (Patented)—Water circulates due to the force and suction of propeller. No pump or valves are used with this system. Intake and discharge openings are integral parts of gear-case. Piping is concealed in drive shaft casing and does not interfere with turning of motor as a whole.

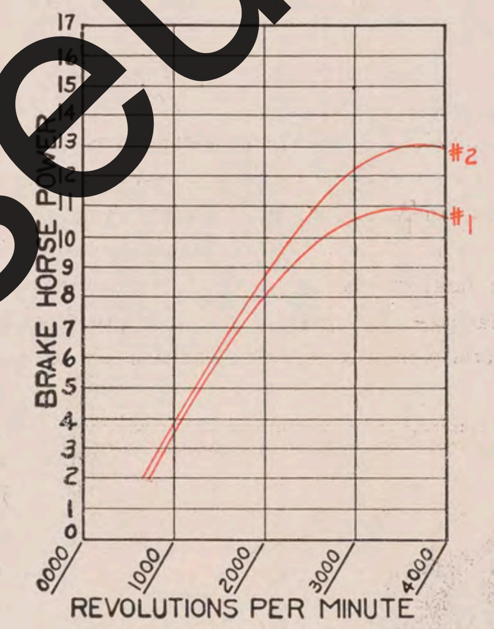
Sea Horse 14

Line No. 1. Horsepower developed fully equipped

2500 Rev. develops . . . . 9.95 H.P.
3000 Rev. develops . . . . 10.80 H.P.
3500 Rev. develops . . . . 11.00 H.P.

Line No. 2. Horsepower developed with cut-outs open and hot-air tube removed

2500 Rev. develops . . . . 11.00 H.P.
3000 Rev. develops . . . . 12.40 H.P.
3700 Rev. develops . . . . 13.15 H.P.



Underwater Exhaust—Eliminates noises and fumes of exhaust. Discharge below anti-cavitation plate. Above applies to Models P-45 and PL-45.

Muffler—A Johnson design, air-cooled, stainless steel throughout. Silences the exhaust without undue back-pressure. Above applies to Models PF-45 and PFL-45.

Propellers are three-blade; 10 in. diameter; of several different pitches to suit boats of different speeds.

Gear-Case—Lynite—a special light alloy, highly resistant to salt water corrosion. Streamline design to point above water line; cast integral with anti-cavitation plate and water passages.

Drive-Shaft Casing—Very rigid, cast of Lynite, a special heat-treated light alloy, highly resistant to salt water; integral water pipes and reverse lock.

Bevel Gears—High carbon nickel steel; hardened and heat-treated to withstand great strain and wear; mesh of gears may be inspected through plug-hole and readily adjusted by screw and locknut. Gear ratio motor to propeller is 14 to 20, reducing the revolutions and consequently increasing the efficiency of propeller.

Full-Pivot Steering (Patented type)—Entire motor turns completely around; insures reversing and steering with full efficiency in any direction; motor floats in socket, insulating vibration from boat. Above applies to PF-45 and PFL-45.

Reverse Lock (Patented)—Prevents motor from tilting when in reverse position, thus making possible *Full-Pivot* Steering. Above applies to PF-45 and PFL-45.

Automatic Tilt—When going forward, motor automatically tilts upon striking any obstruction, may be tilted to any desired height in shallow water or weeds; for cleaning weeds from propeller, or beaching.

Steering Handle (Patented)—Set at convenient angle; tilts with motor, pivots on steering rail which serves as base on which to lay motor and carry easily. Handle may be readily detached or folded back against the motor to occupy less space. Equipped with a rubber shock-absorber grip.

Anti-Cavitation Plate—Cast integral with gear-case. Insures full propeller efficiency by preventing any loss through cavitation.

Stern Bracket—Fastens motor to boat with two wing screws without the use of tools. Small spurs on bracket penetrate stern-board of boat, making attachment secure.

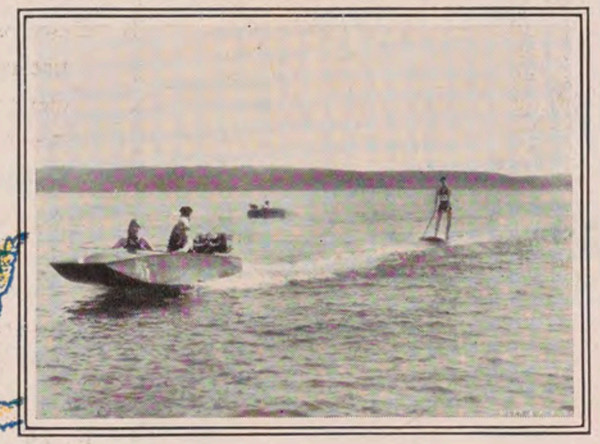
Quick Takedown—Motor may be quickly taken down either at point under crank-case by removing four nuts, or at top of gear-case by removing two screws without disturbing any piping.

Finish—Motor is beautifully finished in highly polished aluminum alloy; polished nickel and cadmium plating.

Interchangeability—All parts are produced by the most modern methods to close limits so that they are interchangeable. Power-head, drive-shaft casing and gear-case assemblies are quickly interchangeable.

Weight—Model P-45, 87 lbs.—Model PF-45, 85 lbs. Model PL-45, 92 lbs.—Model PFL-45, 90 lbs.

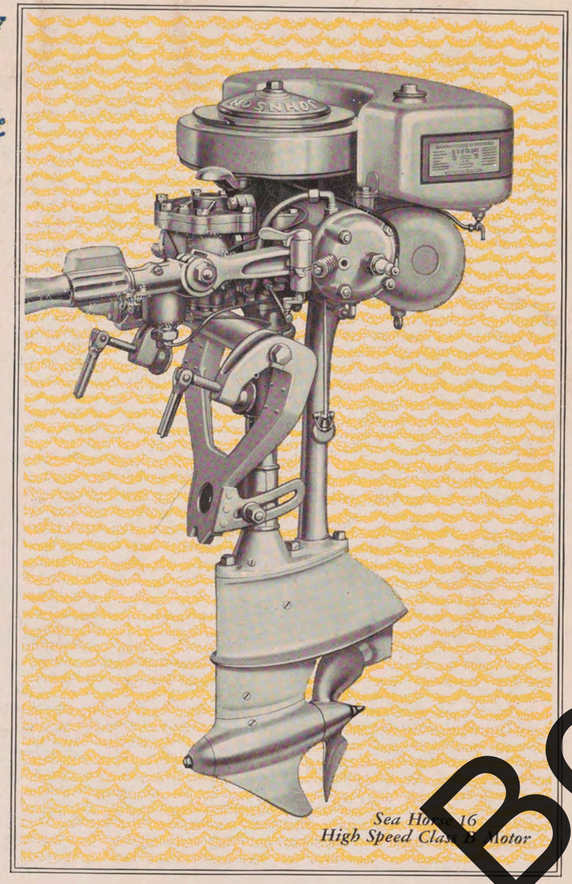
Dimensions—Motor is compact and occupies least possible space. Standard outside length tip to tip, $43\frac{3}{8}$ in.; extra length, $49\frac{3}{8}$ in.; width, 18 in. Width of stern bracket, 9 in. Height of stern for Model P, 16 in. Height of stern for Model PL, 22 in.



Aquaplaning offers one of the greatest thrills of outboard motoring.

Mechanical Specifications of the

Johnson SEA HORSE 16



Sea Horse 16
High Speed Class B Motor

POWER-HEAD—High-speed twin cylinder, rotary valve, combination two and four port type with cylinders offset. Bore, 2⅜ in.; stroke, 2¼ in.; cylinders are accurately machined and honed to very close limits. Piston displacement 19.93 cu. in.

The ports of the cylinders and the combustion chambers of the cylinder heads are accurately machined to provide perfect distribution of the charge to the two cylinders. The cylinders are cast of close-grained grey iron. The pistons are of Lynite, a light weight aluminum alloy, precisely machined and have three rings. A special form deflector in the piston head facilitates cooling and scavenging of exhaust gases.

Detachable aluminum cylinder heads contribute to higher compression, cooler spark plugs, and permit easy carbon removal and piston inspection.

Straight rods are of special high-tensile strength, heat-treated steel with roller bearings at crank pin end. The journal bearings, of hard phosphor bronze, are reamed and hand-fitted to very close limits.

The crank-shaft, drop forged from selected high-grade steel, after being machined all over is case-hardened (file hard) and ground to extremely close limits.

Circular disc crank-arms are utilized to secure higher crank-case compression.

The crank-case is of rigid design, cast of a special high-tensile strength, light-weight aluminum alloy.

HORSE-POWER—Motor is very powerful and capable of great range of speed, depending on type of boat used. The power varies with the motor speed used and is better illustrated by the power curve and chart shown herewith.

Johnson Sea Horses are consistent winners at regattas the country over.

RELEASE CHARGER—Equipped with Release Charger for positive, easy starting. A convenient lever releases the compression from one cylinder and supercharges the other. Decreased resistance in the spark gap of inactive cylinder throws intensity of spark into active one. The spark of practically double intensity in the active cylinder together with supercharge of gas makes starting a certainty. Released compression in one cylinder so greatly increases ease of accelerating flywheel that effort of pulling motor over compression in the active cylinder is scarcely felt.

LUBRICATION—Principally automatic, since oil is mixed with the gasoline. Oil is carried from crank-case to upper journal bearing by specially designed oil ducts. Heavy oil or grease is required in the gear-case only.

CARBURETOR—New, large, special Johnson design; float-feed, extremely simple; needle-valve adjustment; two-way control; accessible screen and settling basin with drain which is provided at bottom of bowl; also drip pan to allow waste gas to run out of boat into water; operates successfully in a tilted position.

ROTARY VALVE—Cylindrical in shape; controls admission of gas from carburetor to crank case; driven by gears from main crank-shaft at crank shaft speed; opens passage from carburetor to crank case for approximately 180 degrees. Being set for proper intervals of opening and closing *full* charges are fed into crank-case even at maximum speeds.

GASOLINE TANK—Polished aluminum; capacity, 2½ gal., sufficient for one and one-half to two hours, depending on the speed of the motor; valve provided in filler cap to prevent leakage when carrying motor.

IGNITION—High tension, Quick-Action magneto of flywheel type; oil and moisture-proof; has only one moving part; requires no lubrication; delivers extra-hot spark for easy starting.

PRESSURE-VACUUM COOLING SYSTEM (Patented)—Water circulates due to force and suction of propeller. No pump or valves are used with this system. Intake and discharge openings are integral parts of gear-case. Piping is concealed in drive-shaft casing and does not interfere with turning of motor as a whole.

UNDERWATER EXHAUST—Eliminates noise and fumes of exhaust; muffler is water cooled by system independent of regular cooling system, water flowing into exhaust pipe partially condenses hot gases. Exhaust discharged below anti-cavitation plate; an exhaust plate is attached to rear of muffler by four screws which may be removed for racing.

PROPELLERS are two blade; 10 in. diameter; of several different pitches to suit boats of different speeds.

GEAR CASE—Lynite—a special light alloy, highly resistant to salt water corrosion, of beautiful streamline design to a point above the water line, gear case is cast separately from section carrying anti-cavitation plate, the two being held together by two internal bolts not exposed to water.

DRIVE SHAFT CASING—Very rigid, cast of Lynite, a special heat-treated light alloy, highly resistant to salt water; integral water pipes.

BEVEL GEARS—High-carbon nickel steel, hardened and heat-treated to withstand great strain and wear; mesh of gears may be inspected through plug-hole and readily adjusted after removing cap. Gear ratio motor to propeller is 12 to 21 reducing the revolutions and consequently increasing the efficiency of propeller.

AUTOMATIC TILT—When going forward, motor automatically tilts upon striking any obstructions; may be tilted to any desired height in shallow water or weeds; for cleaning weeds from propeller, or beaching.

STEERING HANDLE CONTROL—Gives full control of carburetor and cut-off switch for stopping. Set at convenient angle; tilts with motor.

ANTI-CAVITATION PLATE—New design cast integral with the water cutting section interposed between the drive shaft casing and gear case. Insures full propeller efficiency by preventing any loss through cavitation.

STERN BRACKET—Fastens motor to boat with two lever-screws, without the use of tools.

QUICK TAKEDOWN—Motor may be quickly taken down either at point under crank-case and muffler by removing four nuts from crank-case and three from muffler, or at top of gear-case by removing three nuts without disturbing any piping.

FINISH—Motor is beautifully finished in highly polished aluminum alloy, polished nickel and cadmium plating.

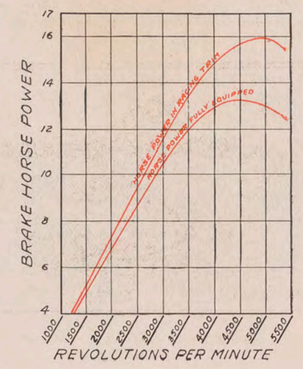
SEA HORSE 16

Horsepower developed fully equipped

3500 Rev. develops	11.90 H.P.
4000 Rev. develops	12.90 H.P.
4500 Rev. develops	13.20 H.P.

Horsepower developed in racing trim

4000 Rev. develops	14.50 H.P.
4500 Rev. develops	15.50 H.P.
5000 Rev. develops	16.00 H.P.



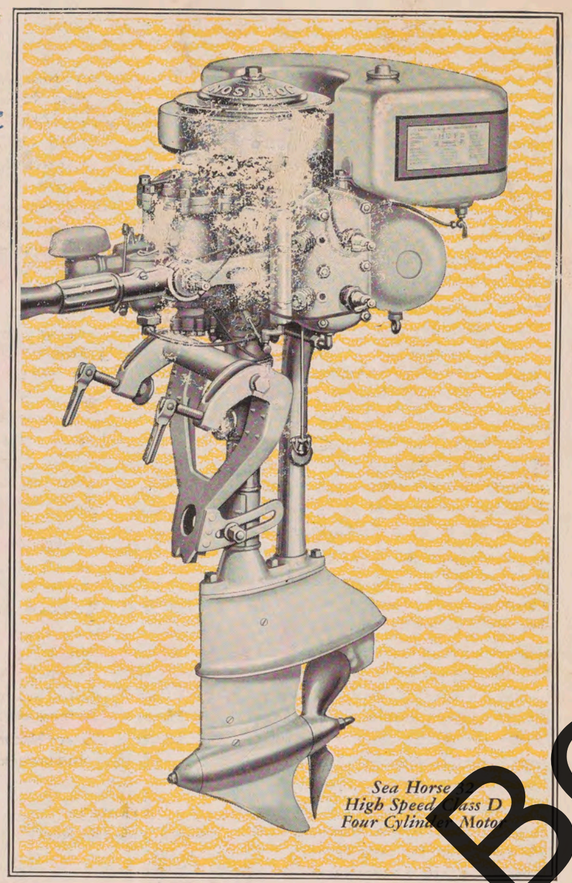
INTERCHANGEABILITY—All parts are produced by most modern methods to close limits and are interchangeable. Power-head, drive-shaft casing and gear-case assemblies are interchangeable.

WEIGHT—Standard length model—MODEL S-45, 89 lbs. Extra length model—MODEL SL-45, 92 lbs.

DIMENSIONS—Motor is compact and occupies least possible space. Standard outside length, 43⅜ in.; extra length, 49⅜ in.; width, 16⅛ in. Width of stern bracket, 9⅝ in. Height of stern for MODEL S, 16 in. Height of stern for MODEL SL, 22 in.

Mechanical Specifications of the

Johnson SEA HORSE 32



Sea Horse 32
High Speed Class D
Four Cylinder Motor

POWER-HEAD—High-speed four-cylinder, rotary valve, combination two and four port type with cylinders offset. Bore, 2⅜ in.; stroke, 2¼ in.; displacement, 39.86 cu. in. Cylinders are accurately machined and honed to very close limits.

The ports of the cylinders and the combustion chambers of the cylinder heads are accurately machined to provide perfect distribution of the charge to the four cylinders. The cylinders are cast in pairs of close-grained grey iron. The pistons are of Lynite, a light-weight aluminum alloy, precisely machined, and have three rings. Special form deflector in the piston head facilitates cooling and scavenging of exhaust gases.

Detachable aluminum cylinder heads contribute to higher compression, cooler spark plugs and permit easy carbon removal and piston inspection.

Straight rods are of special high tensile strength, heat-treated steel with roller bearings at crank pin end. The journal bearings, of special phosphor bronze, are reamed and hand-fitted to very close limits.

The crank-shaft, drop-forged from selected high-grade steel, after being machined all over is case-hardened (file hard) and ground to extremely close limits.

Circular disc crank-arms are utilized to secure higher crank case compression. Special roller bearings are used on the crank pin arms.

The crank-case of rigid design, cast of special, high-tensile strength, light-weight aluminum alloy.

HORSE-POWER — Motor is very powerful and capable of a great range of speed, depending on type of boat used. The power varies with the motor speed used and is illustrated by power curve and chart shown herewith.

RELEASE CHARGER—Equipped with Release Charger for positive, easy starting. A convenient lever releases the compression from one cylinder and supercharges the other. Decreased resistance in the spark gap of inactive cylinder throws intensity of spark into active one. The spark of practically double intensity in the active cylinder together with supercharge of gas makes starting a certainty. Released compression in one cylinder so greatly increases ease of accelerating flywheel that effort of pulling motor over is scarcely felt.

Neat, long-powered Sea Horses make possible cruisers of inexpensive design.

LUBRICATION—Principally automatic, since oil is mixed with the gasoline. Oil is carried from crank-case to upper and outer journal bearing by specially designed oil ducts. Heavy oil or grease is required in the gear-case only.

CARBURETOR—Large, new special [illegible] design, fuel feed extremely simple; needle-valve adjustment, two-lever control; accessible screen and settling basin which is provided at bottom of bowl; drain to allow waste gasoline to run out of boat in water when operated successfully in a tilted position.

ROTARY VALVE—Cylindrical in shape; controls admission of gas from carburetor to crank-case; driven by gears from main crank-shaft at crank-shaft speed; opens and closes passage from carburetor to crank-case for approximately 180 degrees. Being set for proper intervals of opening and closing *full* charges are fed into crank-case even at maximum speeds.

GASOLINE TANK—Polished aluminum; capacity, 4¼ gal., sufficient for one and one-half to two hours' running, depending on the speed of the motor; valve provided in filler [illegible] to prevent leakage when carrying motor.

IGNITION—High-tension, Quick-Action magneto of the flywheel type; oil and moisture-proof; has only two moving parts; requires no lubrication; delivers extra-hot spark for easy starting.

[illegible]RE-VACUUM COOLING SYSTEM (Patented)—Water circulation due to force and suction of propeller. No pump or valves are used with this system. Intake and discharge openings are integral parts of gear-case. Piping is concealed in drive-shaft casing and does not interfere with turning of motor.

UNDERWATER EXHAUST—Eliminates noise and fumes of exhaust; muffler is water cooled, system independent of regular cooling system, water flowing into exhaust pipe partially condenses hot gases. Exhaust discharged below anti-cavitation plate; an exhaust plate is attached to rear of muffler by four screws which may be removed for racing.

PROPELLERS are two blade; 12 in. diameter; of several different pitches to suit boats of different speeds.

GEAR-CASE—Lynite—a special light alloy, highly resistant to salt water corrosion. Beautiful streamline design to point above water line; gear case is cast separately from section carrying anti-cavitation plate, the two being held together by two internal bolts not exposed to water.

DRIVE-SHAFT CASING—Very rigid, cast of Lynite, a special heat-treated light alloy, highly resistant to salt water; integral water pipes.

BEVEL GEARS—High-carbon nickel steel; hardened and heat-treated to withstand great strain and wear; mesh of gears may be inspected through plug-hole and are readily adjustable after removing cap. The gear ratio motor to propeller is 12 to 21.

AUTOMATIC TILT—When going forward, motor automatically tilts upon striking any obstruction; may be tilted to any desired height in shallow water or weeds; for cleaning weeds from propeller, or beaching.

STEERING HANDLE CONTROL—Gives full control of carburetor and cut-off switch for stopping. Set at convenient angle; tilts with motor.

ANTI-CAVITATION PLATE—New design anti-cavitation plate cast integral with the water-cutting section interposed between the drive shaft casing and gear case. Insures full propeller efficiency by preventing any loss through cavitation.

STERN BRACKET—Fastens motor to boat with two lever-screws without the use of tools. Small spurs on bracket penetrate stern-board of boat, making attachment secure.

QUICK TAKEDOWN—Motor may be quickly taken down either at point under crank-case and muffler by removing four nuts from crank-case and three from muffler, or at top of gear-case by removing three nuts without disturbing any piping.

FINISH—Motor is beautifully finished in highly polished aluminum alloy, polished nickel and cadmium plating.

INTERCHANGEABILITY—All parts are produced by the most modern methods to close limits so that they are interchangeable. Power-head, drive-shaft casing and gear-case assemblies are interchangeable.

WEIGHT—Standard length model—MODEL V-45, 110 lbs., extra length model—MODEL VL-45, 113 lbs.

DIMENSIONS—Motor is compact and occupies least possible space. Standard outside length, tip to tip, 48¾ in.; extra length, 54¾ in.; width, 16⅛ in. Width of stern bracket, 9⅝ in. Height of stern for MODEL V, 16 in. Height of stern for MODEL VL, 22 in.

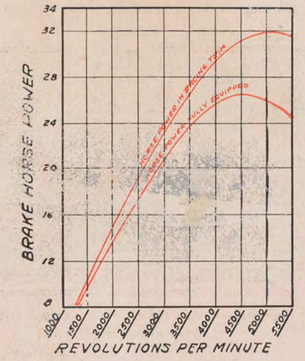
SEA HORSE 32

Horsepower developed fully equipped

3500 Rev. develops	23.15 H.P.
4000 Rev. develops	25.75 H.P.
4500 Rev. develops	26.80 H.P.

Horsepower developed in racing trim

4000 Rev. develops	29.10 H.P.
4500 Rev. develops	31.00 H.P.
5250 Rev. develops	32.10 H.P.



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