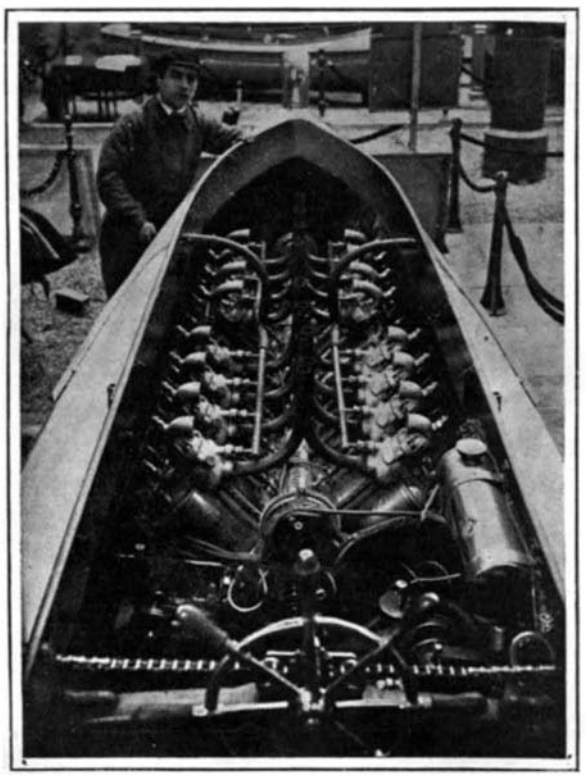
A SIXTEEN-CYLINDER MOTOR-BOAT ENGINE OF 180 HORSE-POWER.

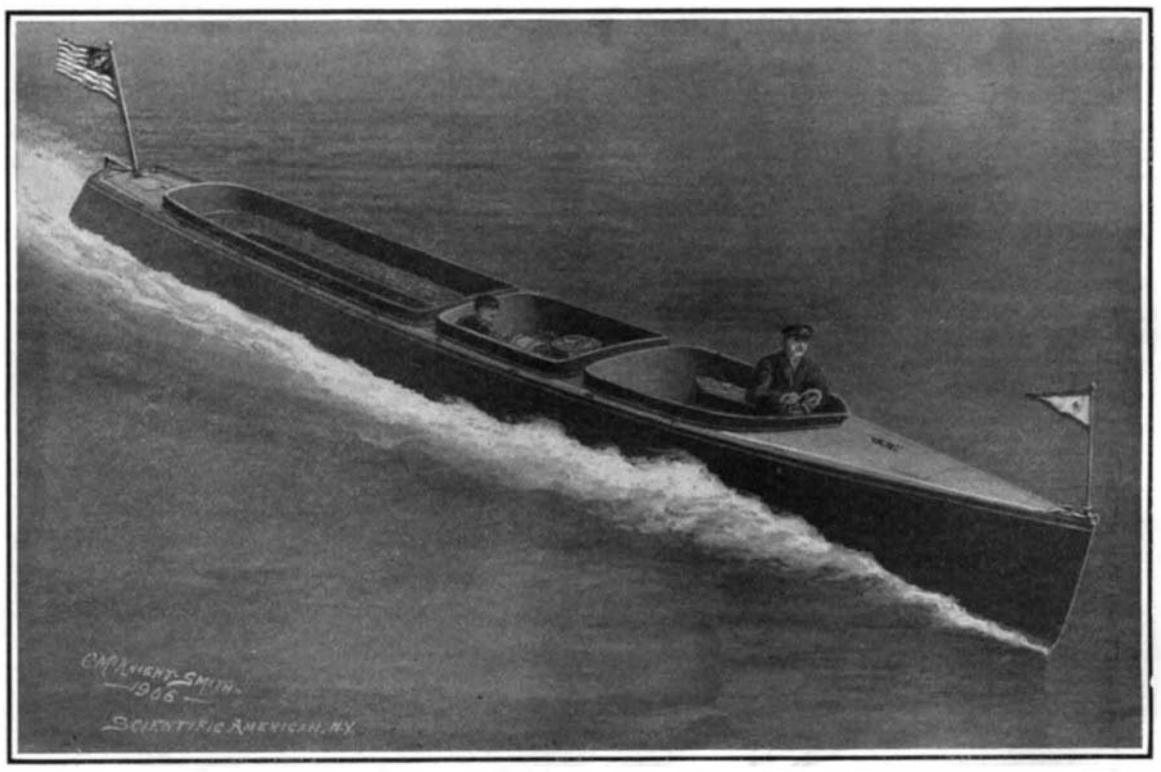
The new 8-cylinder gasoline motor which has been brought out at Paris by M. Levavasseur, has a number of novel features. Our illustration shows two 90-horse-power motors as mounted in tandem on the launch "Antoinette," one of the prize winners of the season. By the use of eight cylinders great steadiness of power is secured as an impulse is obtained every one quarter of a revolution, and hence the flywheel can be dispensed with. Another great advantage lies in the fact that the motor can be run in either direction by the placing of special cams upon the cam shaft. By pulling a small handle located at the end of the cam shaft, the cams are shifted and the motor is reversed. The constructors claim that the new motor thus has the advantages of a steam engine.

The carburetion is produced by a small gasoline pump worked from the motor. It draws gasoline from the tank and sends it to eight small distributors placed at the top of each motor on the inlet. These regulate the supply of liquid, causing the spray action which is needed. The output of the pump is variable at will, but its automatic action is preserved, as it is run from the motor. Good carburetion is always secured in this way, and the method has an advantage in suppressing a large amount of piping.

The new "Antoinette" motor consists of eight cylinders mounted four on each side and at an angle of 45 degrees upon a crank case, as will be noticed. The eight cranks work on a single shaft. A cam shaft works the eight exhaust valves. What is to be remarked about the new motor is its great lightness in proportion to the power it will give. The 90 to 100 horse-power motor, having a 5.2-inch bore and stroke, weighs but 330 pounds, not including the reversing mechanism and ignition devices. With the latter, the weight is 370 pounds. It measures only 32 inches long and somewhat less in height. The great advantage of the motor when applied to a launch lies in the fact that it can be used to operate the propeller directly without needing a friction clutch or a reversing mechanism. It also starts up as soon as the ignition is set working, seeing that two of the cylinders are always in action. The new motor is claimed to be the lightest per horse-power that has yet been produced, this figure being 3.3 pounds per horse-power, and it is thus specially adapted for use upon airships. The smallest motor which has been constructed is a 40-horse-power size, while the largest size gives 400 horse-power. With the two 90-100 horse-power motors the launch "Antoinette III." made a remarkable performance lately at the Monaco races, where it took one of the prizes.



TWO 90-HORSE-POWER, 8-CYLINDER MOTORS CONNECTED IN TANDEM IN THE RACER "ANTOINETTE III."

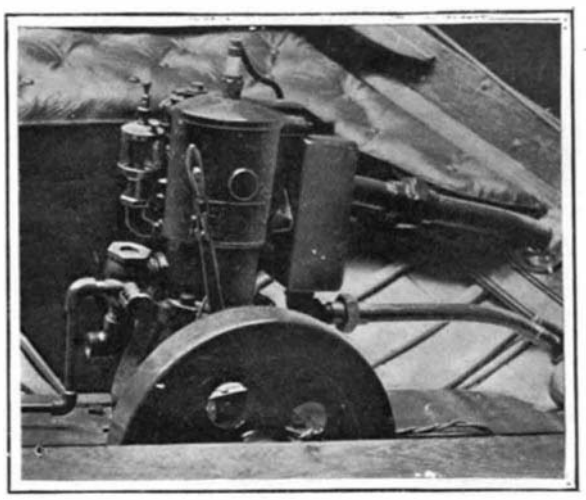


A NEW TWIN-SCREW SERVICE BOAT FITTED WITH TWO SEPARATE POWER PLANTS OF 30 HORSE-POWER EACH. THIS BOAT IS INTENDED FOR USE ON LAKES AND RIVERS

A SERVICEABLE TWIN-SCREW MOTOR BOAT.

BY THOMAS J. FAY, E.E.

Twin-screw motor boats, if not altogether new, are quite rare, to say the least. This is not because the principle of twin-screw propulsion is in any way in question, but because motor-boat work did not grow up to the level of twin-screw products until very recently.



A SIMPLE 1½-HORSE-POWER, 2-CYCLE LAUNCH MOTOR.

Before dipping into the precise details of the boat to be described, it may not be amiss to state that the question of the use of a duplicate plant in its entirety is one now receiving much attention from designers and users alike, and the trend of motor-boat construction is toward more power, greater safety, and immunity from any serious inconvenience in the event of a mishap to any of the equipment.

At first it was thought the best way to obtain more power was to put two motors in "tandem." A few attempts at this arrangement put an end to it entirely, except in cases, like the "Dixie" and the "Challenger," involving the design and construction of eight-cylinder motors with integral bases and especially designed crankshafts, as well as an arrangement of accessories to match.

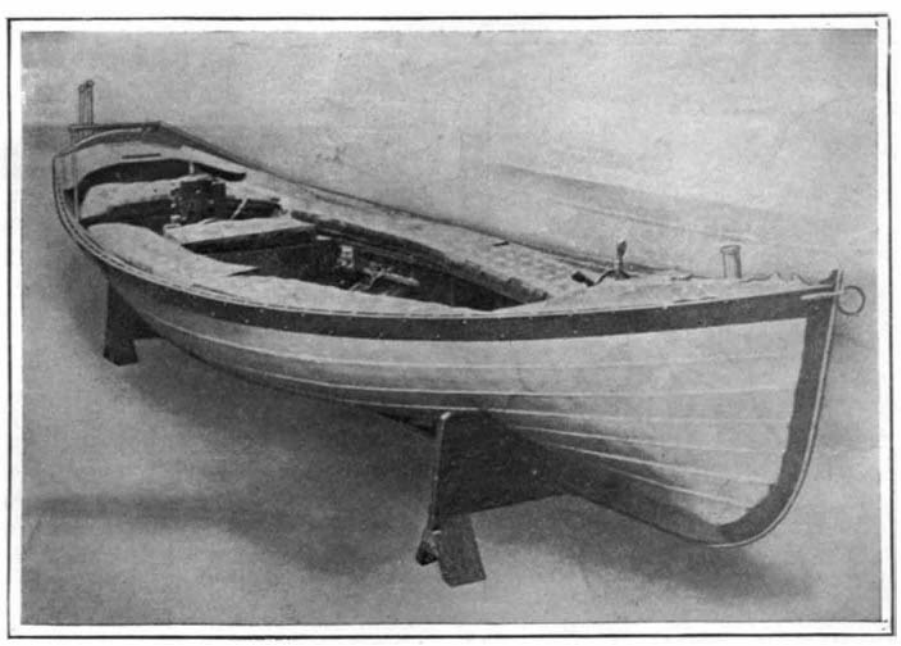
This, however, is altogether different from putting two motors in tandem and coupling their crankshafts together; for, as anyone can see, the crankshaft, barely large enough to sustain the power impulses of its own four cylinders, would be practically useless after sustaining the extra effort of four more cylinders for even a short while.

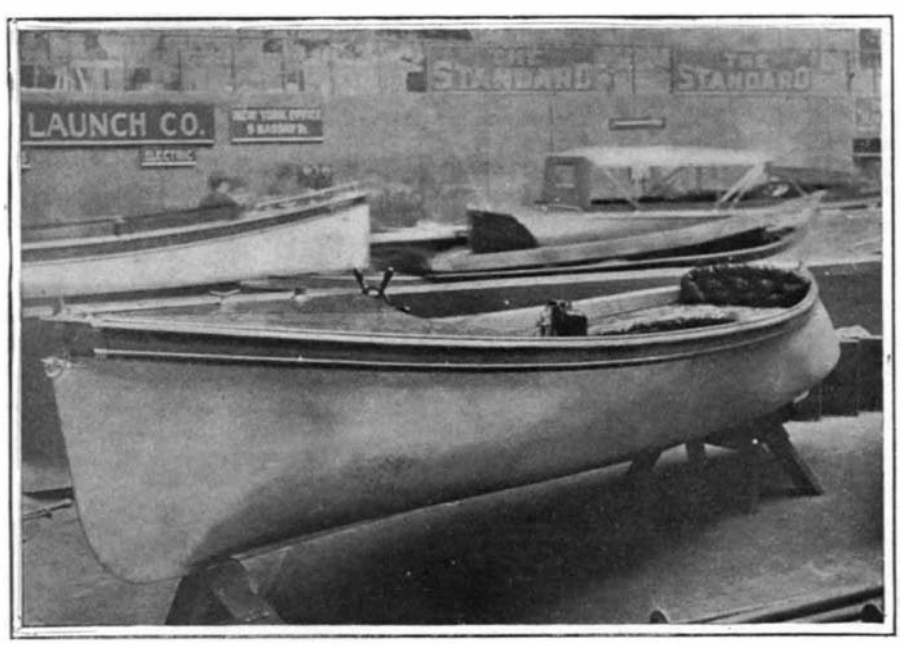
The best way, without any doubt, to realize the fullest benefit from the use of eight cylinders is to employ two motors in such a way as to afford two complete and independent power plants, even to the extent of employing two separate and distinct fuel tanks, and of course two screws, not to mention the attending accessories.

It is the purpose here within the brief space afforded to point out the most conspicuous features of one of the latest creations in the Simplex series. The main dimensions of this twin-screw boat are as follows:

HULL DIMENSIONS.—Extreme length, 45 feet; Load-water length, 44 feet; extreme beam, 6 feet 6 inches; water line beam, 6 feet; draft, 10 inches; propeller draft, 2 feet 5 inches; approximate speed, 20 miles per hour.

MOTOR DIMENSIONS.—Number of motors, 2; rated horse-power of each, 30; total rated horse-power, 60;





LIGHT, CHEAP, AND SERVICEABLE STEEL LAUNCHES FITTED WITH AIR TANKS WHICH MAKE THEM UNSINKABLE.

number of cylinders, 4 per motor; bore of cylinders, 4½ inches; stroke of piston, 5½ inches; type of motor four cycle; rated speed of crankshaft, 800 to 1,000 R. P. M.; fuel tank capacity, 60 gallons; fuel radius, 150 miles.

The first essential and important difference between this equipment and the conventional motor-boat installation, lies in the fact that the machinery equipment in its entirety is a separate self-contained unit, or, in this case, double unit in fact. The machinery complete is in no way dependent upon the hull for even its supports, for the entire equipment is first set up on its own independent girders in the shop, and upon its completion and test is lowered into the hull as a unit ready to run.

The old method of hanging the magneto to the skin on the starboard side and the carbureter to the ribs on the port side, or suspending the oil piping from the sheer-strake and hiding the battery in the fore peak where no one would be able to find it, is not adhered to in the least in this new system of construction. As just stated, the machinery in this case is absolutely separate and distinct from the hull in every way. It was found, in fact, that men accustomed to hull work were not efficient around machinery, and it has been the invariable custom with the present constructors to keep the respective classes of work separate, even to utilizing separate buildings remote from each other, the one for motors and the other for boats.

The appearance and general arrangement of the new twin-screw boat is made apparent from our illustration. As can be readily seen, the engines are very compactly placed in a cockpit at the center. The spark coils and control levers are on panels just back of the motors, where they are very accessible.

The sparking equipment consists of both a magneto and a storage battery, either one of which may be used at will. The timing of the spark is properly fixed by means of the Simplex jump spark timer.

The carburetion is taken care of by a governor-controlled Mercedes type of carbureter. There are important differences, however, between the Simplex carbureter and the Mercedes type it represents. As a matter of fact, the mixture provided to the motor through this carbureter is always rich enough to assure prompt starting, and is adjusted thereafter automatically to afford the right air dilution for all speeds.

The governor is of the "flyball" type on the camshaft, and is connected up by straight-line levers, while the oil pipes and other parts are neatly and securely fixed to the motor.

Among the novelties of construction may be noted an improved sea cock, by means of which the water for cooling is taken through the skin of the hull aided by a scoop, and screened before it reaches the gear circulating pump. This sea cock has a rubber ball which acts as a check valve and as a positive valve as well, and it is one of the nice fittings especially developed for motor-boat work, which differs in important details from the work done in hulls prior to the advent of motor boats of the higher order.

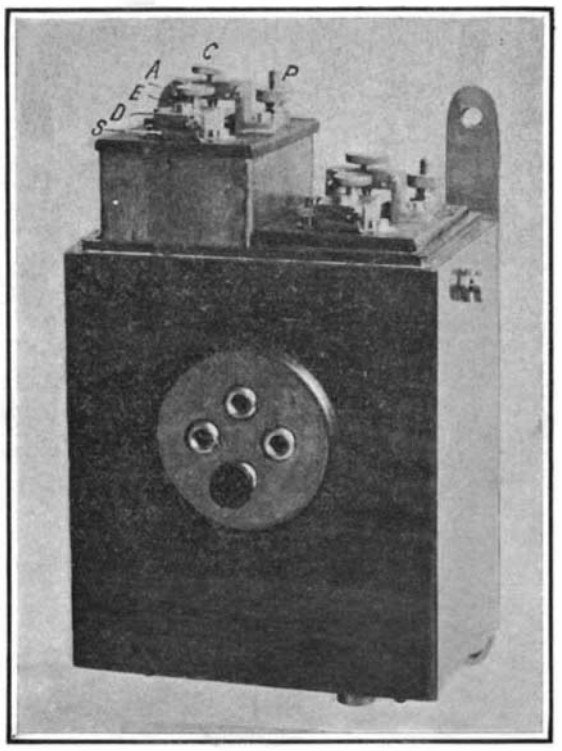
The gasoline tanks are protected by surrounding them with a copper jacket, and thus keeping them submerged in sea water. The fittings are so arranged as to afford entire immunity from accidents as a result of a leaky joint if, perchance, such a contingency should arise. At the same time, one may examine every joint in a moment at will, without even shutting down the plant. Moreover, leaks are highly improbable, because the scheme of piping is so thoroughly worked out as to eliminate such occurrences excepting as a rare contingency.

In the construction of the hull, Parsons manganese bronze castings are used, to the exclusion of composition or other cheaper brass products. The framing of the hull, while light, is of the finest white oak, while the planking is of Mexican mahogany and British Columbia cedar. Natural knees take the place of jointed members where knees are used, and copper fastenings are used throughout. The cutwater is of bronze finished to a knife edge, while the propellers of three blades each, as well as the rudder quadrant and other similar devices, are all of a special design of the same high-grade bronze.

This boat has a large seating capacity, possesses great stability, and is intended for family use on one of our inland lakes. The internal arrangements include every requisite for comfort, with ample storage under seats, while a canopy top will enable the owner to use the boat in fine and inclement weather alike. For the accommodation of ladies, the after end of the after pit may be curtained off; but all super work may be removed at will to accommodate a large fishing party on a fine day.

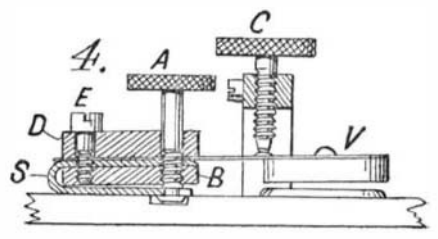
IMPROVEMENTS IN SPARK COIL CONSTRUCTION.

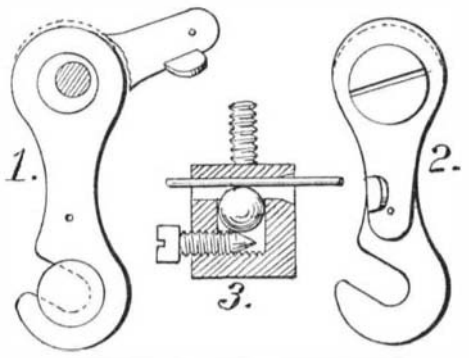
The spark coil depicted in the accompanying engravings embodies a number of interesting constructional features. The coils are made up in sets of two, three, or four, according to the number of cylinders of the engine, and are compactly stowed in a single case. The cover of the case is locked in place by means of



AN IMPROVED SPARK COIL.

the hooks which are shown in Figs. 1 and 2. These, it will be observed, are mounted eccentrically on the hubs of a pair of thumb levers, which may be operated to lift the hooks, as in Fig. 2, thus causing them to tighten their hold on the pins. When it is desired to remove a coil, only the primary terminal, *P*, need be unfastened, as the other connections are made by means





DETAILS OF THE SPARK COIL.

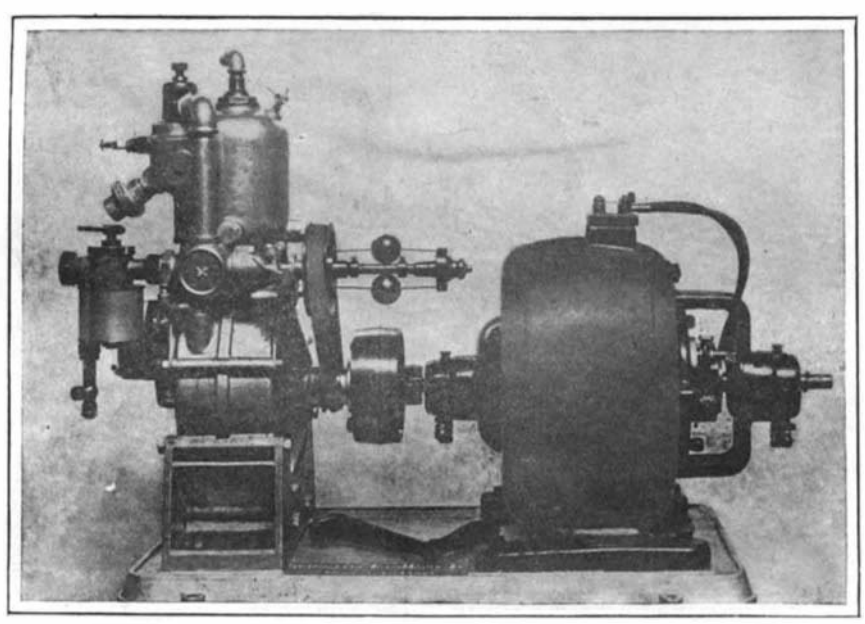
of contact plates at the bottom of the casing. The secondary terminal wire, which passes down inside of the coil, makes connection with a binding post at the bottom of the casing. This post differs from the ordinary type. Instead of binding the wire by screwing a setscrew against it, the setscrew is fed against a ball which bears against the wire, as shown in section in Fig. 3. This insures a good contact, and prevents injury to the wire. An important feature of the coil is the novel construction of the interrupter, which is clearly indicated in Fig. 4. The spring of the vibrator, *V*, is held between the block, *D*, and the heavy spring plate, *S*, which are clamped together by means of a screw, *E*, threaded into the plate, *B*. The thumbscrew *A* provides for the adjustment of the vibrator toward and from the core of the coil. The thumbscrew is threaded through the plate *B*, and is formed at its lower end with a groove adapted to engage a slot in the lower portion of the spring plate, *S*, which is secured to the coil head. Since the lower portion of the plate, *S*, is fixed, it follows that when the screw, *A*, is turned in one direction, it will move the block, *D*, down, carrying the vibrator toward the core, and when turned in the other direction it will positively lift the vibrator from the core, regardless of the spring tension of the plate, *S*. It is customary in other constructions to depend on a spring for the adjustment in one direction, but the spring is apt to become weakened in time, and for this reason the positive adjustment in both directions is provided in the present construction. The thumbscrew, *A*, passes through a split bearing in the block, *D*, and a setscrew is provided for tightening this bearing onto the body of the thumb-screw when the proper adjustment has been secured. By loosening the screw, *E*, the vibrator is released and may be withdrawn, as the vibrator spring is slotted to clear the body of this screw and that of the thumbscrew, *A*. The contact screw, *C*, is threaded into a split yoke-frame, which may be closed onto the screw to hold it at the desired adjustment.

Elastic Supports for Machines.

In a recent conference at the Sorbonne, M. Anthoni gave an account of the means which were used to do away with shocks, noise, and vibration, and showed the advantages and disadvantages of different kinds of compressible and non-compressible materials for this purpose. The first class, such as cork, carpet, felt, fur, etc., have the disadvantage of a lack of homogeneity and lack of constant properties, since they are resilient and work by the flexion of their particles, thus breaking down gradually. The second class, the incompressible materials, he divides into non-plastic matter such as sand and asphalt, and the plastic and elastic materials like rubber. To allow a machine to run without noise or shocks he devised a new elastic support which is portable. It is formed of two concentric cubes, the inner one being heavy and firmly fixed to the ground, and the outer one being hollow and attached to the machine. The two cubes are separated by six washers bearing on the cube faces, tending to compress the inner cube and press out the faces of the outer cube. The lower face of the large cube is formed of a steel disk. From it a bolt passes through the inner cube without touching it. The base which connects the inner cube to the ground passes between the steel disk and the vertical faces of the large cube which carry brace-pieces allowing the washers to be tightened. In this way he mounted two engine and dynamo groups of 125 and 60 horse-power with Willans engines running at 500 revolutions. No noise or other trouble was found in this case.

VIBRATIONLESS ELECTRIC LIGHT SETS FOR YACHTS.

One of the interesting exhibits at the National Motor Boat and Sportsmen's Show is a vibrationless direct-connected electric light set, which we illustrate herewith. These sets are made up with genuine imported De Dion engines direct-connected to generators especially built for the purpose. The engines are throttle governed and the whole equipment is thoroughly up-to-date. They are the most compact, light-weight sets on the market for their output, and are provided with a special vibrationless support which allows them to be used for launch and yacht work. By means of this special coiled spring suspension, every particle of vibration and a large part of the noise is eliminated, so that the sets are exhibited in operation, placed on a light box without being fastened down. The engines run at moderate speed, and are of an especially durable type, well known to the automobile public for their reliability, endurance, and steady running. These sets will produce perfectly steady light, there being no flickering whatsoever. A special type of ball throttle governor is used for controlling the speed, and the ignition is jump spark. These sets are wound for various voltages depending upon their use—for storage battery charging, house lighting, and launch and yacht lighting. They have proven very popular, quite a number having been installed up to the present. One of these sets is shown in operation in the basement of Madison Square Garden at the present show.



DIRECT-CONNECTED ELECTRIC-CURRENT GENERATING SET FOR STATIONARY OR MARINE USE.