LATEST TYPES OF CRUISING POWER BOATS.

In the first-page illustration of this number of the Scientific American are shown three of the latest types of cruising power boats. The two shown in the upper part of the illustration are "La Mascotte III." and the "Dixie," the first of which was designed by Mr. H. J. Gielow for Mr. F. C. Havens, of San Francisco, and the latter by the Electric Launch Company.

"La Mascotte III." is 84 feet over all, 75 feet 9 inches on the waterline, with a beam of 13 feet, and a draft of 3 feet 6 inches. On deck forward are a pilot house and a cabin, provided with the usual transoms, table, lockers, and buffet. The staterooms, which contain berths and lockers, are arranged on each side of a passageway leading to the engine room.

Each of the staterooms connects with a private toilet room. The quarters of the crew are aft, and provide accommodations for two men. In the engine room are two berths, seats, lockers, etc., for the members of the engine-room staff.

The vessel is driven by two 75-horse-power Craig gasoline engines, and it is provided with the necessary lighting, ventilating, and other auxiliaries. The fuel supply—620 gallons at a maximum—is carried in tanks located in water-tight compartments. The vessel is steered from a bridge aft of the pilot house, and is equipped with a single military mast and a stack.

The "Dixie" is 93 feet over all, 85 feet 9 inches on the waterline, with a breadth of 13 feet 6 inches, and a draft of 4 feet. Her accommodations consist of a forecastle, finished in quartered oak with brass air ports for light and ventilation. The owner's quarters, which are also forward, and are finished in African mahogany, contain two Pullman berths equipped with regular Pullman car fittings with drawers for storage. There is also a bureau with plate-glass mirrors and extra wide and deep drawers. The owner's private bath is adjoining and contains a porcelain tub, shower bath, basin, and a large closet. The windows in the owner's quarters are of plate glass, protected by Venetian blinds, while additional ventilation is secured through a large skylight.

The galley is situated aft of the engine room and extends the full width of the boat. A large range burning either coal or wood is provided, together with a roomy ice box, having a capacity of 650 pounds of ice, a sink, cupboard, dresser, and closets.

The main saloon is 19 feet long, finished in mahogany, and contains a large Chippendale sideboard with glass doors, drawers for silver, linen, etc. There are also four standard Pullman berths, and a toilet room opening into the saloon on the port side forward. The windows in the saloon are protected by Venetian blinds, as in the owner's quarters, while a large skylight furnishes additional light and ventilation.

The engine room contains two 110-horse-power 6-cylinder Standard reversible engines and an 8-horse-power gasoline engine direct connected to a dynamo for supplying electricity throughout for lighting, searchlight, fan motors, heating and cooking.

The yacht will be steered from the bridge and will also be equipped with military mast, stack, one 14-foot dinghy, and a 15-foot 6-inch power tender, with a 2-horse-power engine; an awning covers the entire yacht.

The hull has been very substantially built, having an oak keel and frame and yellow pine planking, all copper or yellow metal fastened.

The craft illustrated in the lower engraving is the "Hawk," which was designed and built by Mr. C. Du Poix, of New York city, for a gentleman residing on the Isle of Pines. It was intended for use both as a pleasure yacht and as a passenger carrier during the busy season of commerce. The conditions of service necessitated a seagoing power yacht of fair speed and wide cruising radius for operation in and around the Caribbean Sea. Weather conditions in that part of the world often put the craft plying those waters to the severest possible tests, and the question of seaworthiness was a factor of the greatest importance in the design of the "Hawk."

The vessel is built entirely of steel, with six watertight compartments, and the construction is one which offers great strength of hull. The deck is flush, with but a single companion way, that leading to the owner's quarters. All other openings are either watertight torpedo hatches or watertight steel skylights. There are two engines, each of 75 brake horse-power, using gasoline fuel. The latter is carried normally in four tanks placed abreast, each in a watertight compartment and provided with a water seal. Extending forward from the engine room bulkhead for 14 feet is a double bottom, the space within which is adapted to be used as a reserve fuel tank, or otherwise as a ballast tank. The full tank capacity totals 2,000 gallons.

Most of the auxiliary power devices are electrically driven. They include the lighting plant, the fire and bilge pumps, an ice-making plant of the Brunswick Refrigerator type, and the ventilating system. The ice machine compressor is driven by a 1½-horse-power motor in the engine room. The cold storage and ice compartments are located in the galley. Twenty pounds of ice are manufactured per day, while at the same time two refrigerating compartments are cooled. The cooking is done upon an electric range, an auxiliary oil stove being provided for emergencies.

A system of forced draft provides ventilation. An electric blower is placed aft of the conning tower, where it is shielded from breaking seas. This forces air through lines of pipes, one on each side of the boat, just above the cabin floor. Each room contains proper regulating apparatus for use in connection with the ventilation system. The air is withdrawn from the various parts of the craft through flat pipes located near the gusset plates on each side of the hull. These pipes unite in the engine room and communicate with an exhaust blower, which expels the air through a ventilator.

The conning tower is located well forward, and not only provides a place for the steersman in bad weather, but is also a chart room and smoking den. It is provided with a large, comfortable leather divan, adapted for sleeping purposes in case of necessity. Two sets of steering gear are provided in the conning tower, as well as an engine-room telegraph, a telephone to all parts of the vessel, and the usual bell signal system and speaking tubes. The electric masthead and side lights have telltale lights showing in the conning tower. The lights, as well as the searchlight and the siren, are controlled from within the latter. An auxiliary steering gear is provided on the platform aft of the conning tower for use in fair weather.

The accommodations and living arrangements are all of the very best. The toilet and bath rooms are of the latest design. The main saloon is large, airy, and comfortable, and is provided with two transom berths, a self-playing piano, buffet, bookcases, lockers, etc. Accommodations are provided in the forecastle for a crew of four, and two berths are located in the engine room for the crew of that department.

The joiner work throughout is of composition fireproof board painted with white enamel. Interlocking rubber tiling is used in the saloon, bathroom, passageways, and in the pantry and galley. The upholstery is of dark green leather. Two boats are carried in patent folding davits—a power dinghy and a whaleboat. The deck is of teak, with all deck fittings of steel.

Aeronautic School in Germany.

Arrangements have just been completed to establish at Chemnitz a training school for aeronauts and constructors of airships. A similar school has been in operation in Paris for a year past. The Chemnitz institution will be the second enterprise in this new pedagogical field. A one year's course is contemplated for the present, the school to be opened in May, 1907. This course, at the outset, is limited to the construction and use of balloons. It will be enlarged so as to include aeroplanes, as soon as practical working types have been developed.

The successive divisions of instruction during the year's course are as follows: Calculation of volume of balloons; methods of cutting the material; methods of rendering the material impermeable; construction of nets; gases used for inflation; the general theory of balloon construction and use; scientific instruments used in balloon ascensions; meteorological observations; ascents alone; ascents with passengers; special instruction for passengers; methods of landing, and the application of airships. The tuition for a year's course is 600 marks, or $143.

The Current Supplement.

The current Supplement, No. 1625, opens with an article by Dr. Alfred Gradenwitz on the Southwestern African Railway, which is probably the longest road of its kind in the German colonies. Good pictures accompany his description. Mr. Walter J. May tells how unusual castings can be made. The mechanical design of ball bearings and roller bearings is ably discussed by W. S. Rogers. The first installment is given of a series of articles on plaster-of-Paris. Mr. W. E. Parsons contributes a well-considered forecast of our manufacturing industry. Mr. F. P. Fish's admirable elucidation of the ethics of trade secrets is concluded. The purchase by the British Admiralty of a gasoline, motor-driven torpedo boat is an official indorsement of a new type of fighting craft. For that reason the Supplement's illustrations of these new types, together with an article, will be of interest. The flights of Zeppelin's airship on October 9 and 10, 1906, are described in detail by Prof. Hergesell and Capt. von Kehler. Electric sleep or anesthesia is a subject of which we are bound to hear more in the future. Dr. G. H. Niewenglowski's brief review of his experiments and those of Prof. Leduc should, therefore, be read with interest. In an article entitled "Theory and Action of a 100-Mile Wireless Telegraphic Set," A. Frederick Collins tells something of the theoretical action and the practical working of the instruments employed in the 100-mile wireless telegraph equipment which is described in Supplement, No. 1605.

INFLUENCE OF THE AUTOMOBILE ON LAUNCH DEVELOPMENT.

BY W. P. STEPHENS.

Following closely on the Automobile Show comes the Motor Boat Show at Madison Square Garden, marking a new era in launch and gasoline-engine building. As the Automobile Show had its germ in the great bicycle shows of the late nineties, so the gasoline launch has served as an incidental attraction to the annual Sportsmen's Show until the present time, when it takes its place as one of the great yearly show attractions of New York.

Though antedating the automobile by nearly a dozen years, the marine gasoline engine was at the time of the first Automobile Show in 1900 but little advanced beyond its early primitive stage. Its manufacture was regularly established, it had found a limited market among yachtsmen and to a certain extent among fishermen and other workers, and, mechanically, it had reached a point where it was sufficiently reliable and economical in operation to justify its use in spite of many serious defects; but it was found in only one very heavy type, built almost entirely of cast iron, which made it bulky. Its design was such that it was limited practically to the low speed of about 300 revolutions per minute. Besides this it was weak in its respiratory organs (the primitive vaporizer or carbureter of the day), and was fitted with an ignition system of the make-and-break type that had hardly passed the experimental stage. Its possibilities being unknown to the yachting world, the only demand was for this ordinary heavy type of engine for cruising launches or working boats, and there was no inducement to the builder to invest large sums in the development of lighter and more efficient engines. Even the most progressive builders of the day aspired no higher than the improvement in detail of the heavy launch engine.

In England and France the development was even more backward, launches being few in number and mainly propelled by kerosene, in every way inferior to gasoline as a fuel. The awakening came, however, in the latter country, where in 1900 the new type of light, high-speed, automobile engine was first tried in a launch hull. The experiment was successful. New hulls of special design and construction were soon afloat, driven by the leading makes of automobile engines; the vocabulary was enriched by a brand-new term—"canot-automobile"—and the new sport of high-speed motor-boat racing was fairly launched.

From the start the "auto-boat" or "canot-automobile" all but rivaled the motor car in popularity. Races were held for valuable prizes; the cleverest of naval architects were called on for designs of lighter and faster hulls, and all the resources of automobile engineering were called into play for the perfection of the new type of "auto-marine" gasoline engine. The fever was by no means confined to the Seine and the Mediterranean, but found its way across the Channel and even across the broad Atlantic, meeting a hearty welcome from American clubs and yachtsmen.

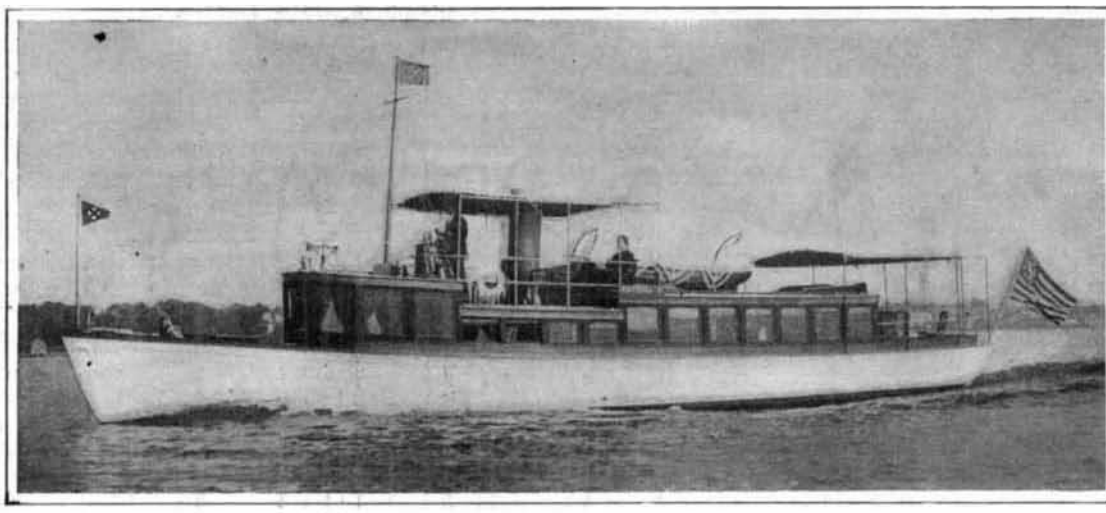
The high-speed auto-boat has proved to be little more than a costly and useless toy; the hull, designed solely for the highest possible speed, gives neither comfort nor accommodation, while the passenger, even in smooth water, is drenched with a cataract of spray thrown by the razor-like bows. The extremely light construction makes the boat useless except for racing; the light and delicate engines require the highest possible skill for their care and manipulation, and they are always liable to derangement and breakdowns. The first excitement over, the sport has proved far less fascinating than at first promised, owing to the great number of failures of entered boats to start, or, having started, to finish the course.

In spite of its own defects, however, the auto-boat has been a blessing to yachtsmen and to engine builders alike, in that it has forced in less than five years a development that, to all appearances, would in its natural course have taken twenty years. To put it briefly, where the average speed of the pleasure launch was well under ten miles per hour half a dozen years ago, the effort to attain a speed of thirty miles in the auto-boat has raised the average speed probably 50 per cent, while there are staunch, strong, and seaworthy launches that run regularly over twenty or twenty-two miles in the hour.

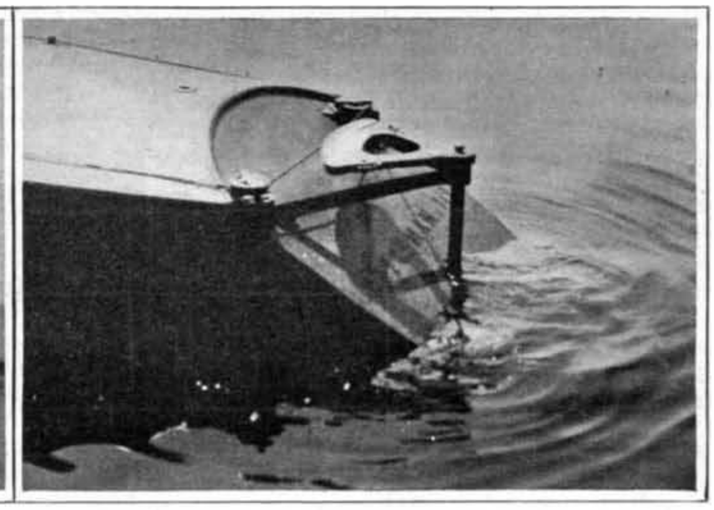
One of the most generally useful and popular of the many new types is that called "the ferry launch," of 50 to 80 feet length, fitted with at least a cabin for bad weather, if not with conveniences for a meal and a bed on occasion, with large comfortable cockpit, and having sufficient power to carry the owner and his family or friends from his home on the Sound or the Hudson to some New York pier at a regular speed of eighteen to twenty miles an hour or even higher.

The first step in this development has been through the engine. In France all the resources of the automobile builder—the highly-skilled engineer-designer, the chemist and metallurgist, the maker of fine steels and bronzes, the expert machinists, and fine machine

(Continued on page 170.)

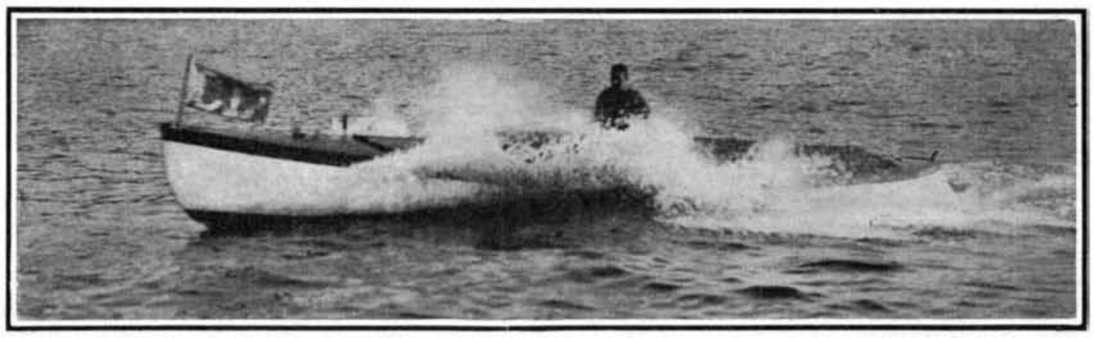


The 50 H. P., Twin-Screw, 60-Foot Motor Yacht "Katrina II." Speed, 13 Miles an Hour.

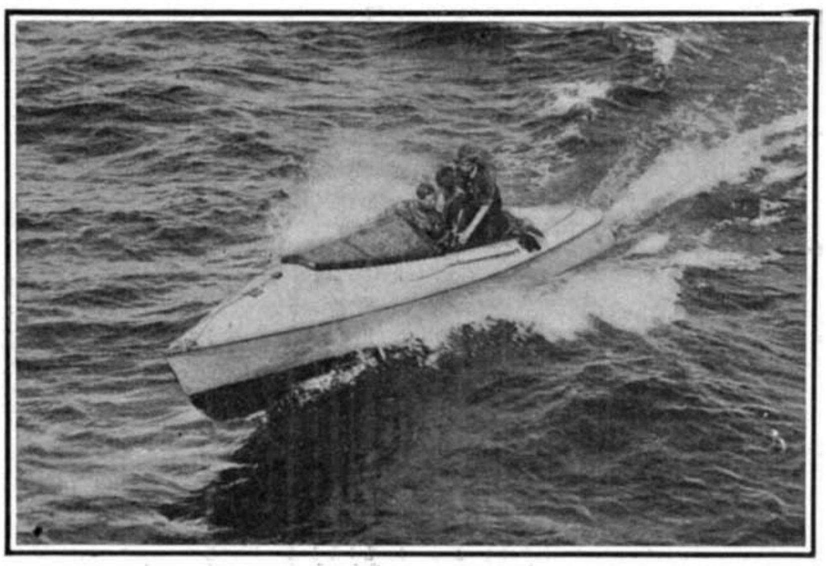


A Typical Racing-Boat Stern.

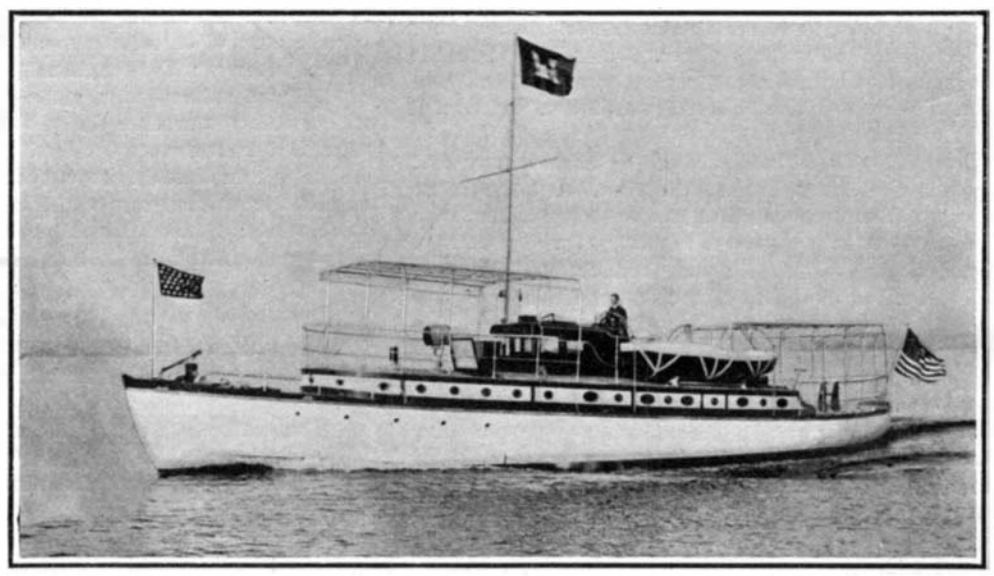
A Typical Cruiser. The 25 H. P., 46-Foot "Hazel."



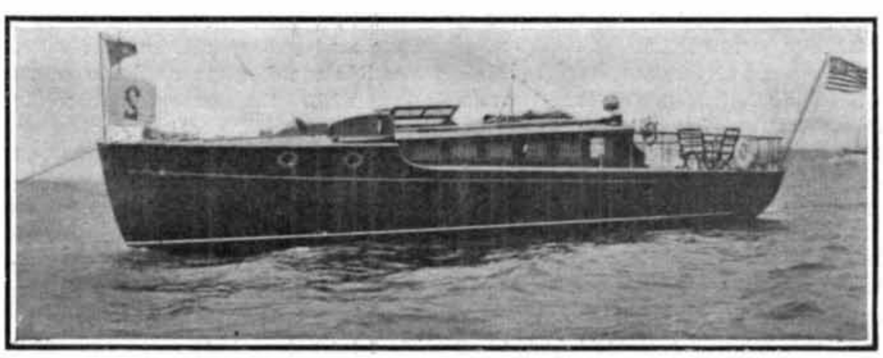
The 33½-Foot "Josephine." Her 36 H. P., Speedway Engine Has Driven Her at a Speed of 22.9 Miles per Hour.



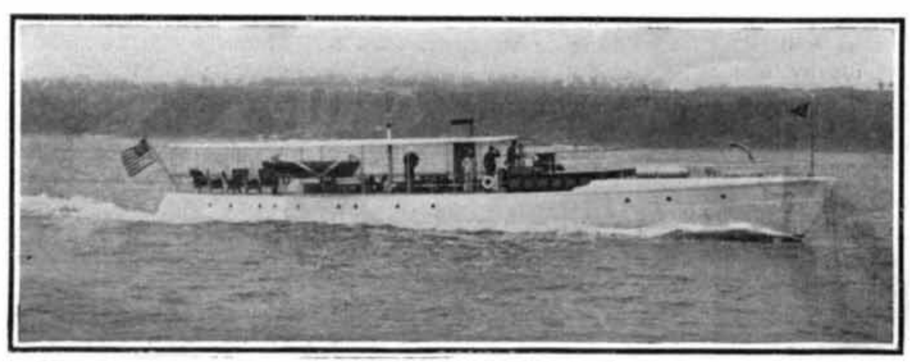
The 26¾-Foot Cruiser "Buddie II."
Photo copyright 1906 by Edwin Levick.



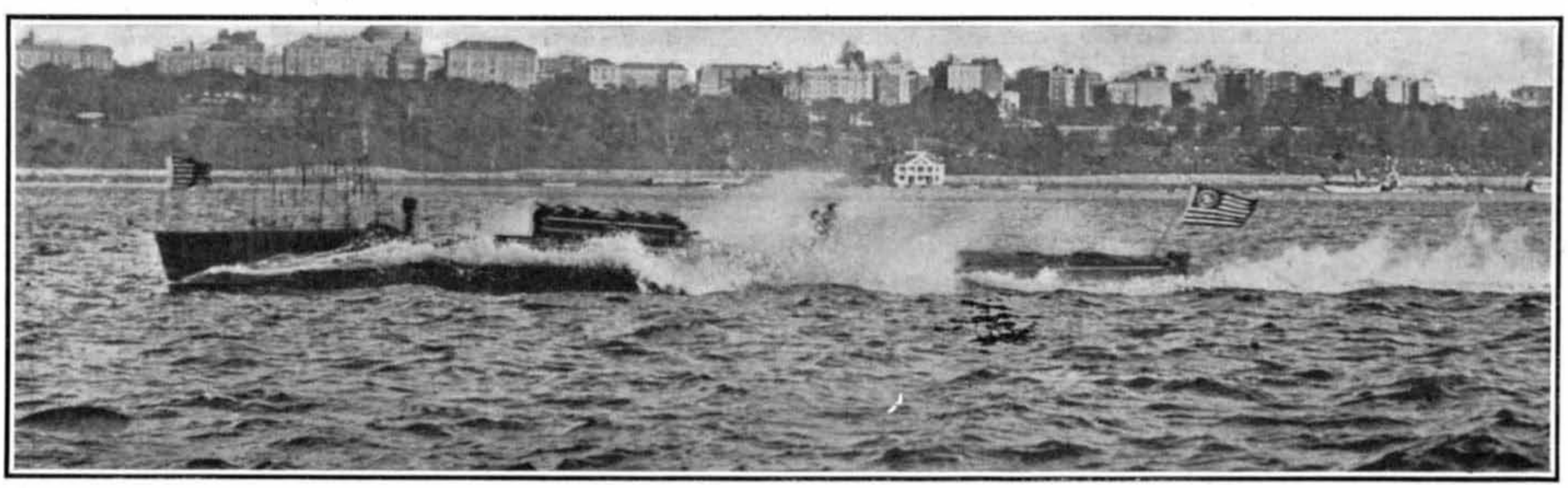
The 67-Foot, 50 H. P., Twin-Screw Coast Defense Inspection Motor Boat "Norka." Speed, 14 Miles per Hour.



The 36-Foot, 30 H. P. Cruiser "Unome," Which Reached College Point First in the Race Last Year from Marblehead, Mass. Average Speed, 9.5 Miles per Hour.



The 90-Foot, Twin-Screw, Gasoline Motor Yacht "Dodger" Driven by Two 300 H. P. Standard Engines. This Boat is Said to Have Reached a Speed of 25 Miles per Hour.



The 60-Foot Racer "Standard," Fitted With a 300 H. P. Double-Acting Standard Gasoline Motor. Average Speed in Mile Trials, 29.39 Miles per Hour.

VARIOUS TYPES OF MOTOR BOATS.

of ample dimensions worked by direct gearing on the main shaft. It is found by this means that ample cooling water can be maintained from a very moderate original supply of fresh water, and the objectionable features of having salt-water circulation are entirely obviated. Unquestionably this will be an important factor in all salt-water installations of this kind, and will greatly add to the endurance and protection of the outfit. Where the circumstances make a keel condenser in any degree objectionable, a regular tube condenser (more properly a cooler) can be adopted with circulating pump for it, and secure ample provision for the work.

In the boat inspected containing this motor, an independent installation of a small 4-horse-power "Standard" motor was made for the purpose of driving a dynamo for lighting the vessel and charging storage battery, a bilge pump for constant use, an air compressor for pumping up the compressed-air tanks whenever necessary, and a small magneto for sparking. This auxiliary is not necessary to use except when particularly desired, as, when the main engines are in operation, the air supply is kept up in the tanks by attached pumps, and it is easy, of course, to attach bilge pumps to the main shaft, so as to permit disuse of the auxiliary engine, except at night.—Journal of the American Society of Naval Engineers.

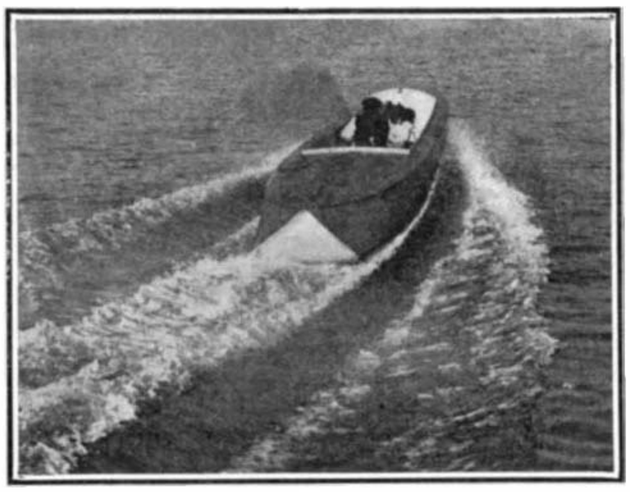
A HIGH-SPEED MOTOR BOAT THAT CAN BE BUILT AT HOME.

The illustrations shown herewith depict the Brooks Boat Company's "No. 13," as viewed from the front, rear, and side when traveling at high speed through the water. When the fact is considered that this boat was claimed to be going 28 miles an hour when the photographs were taken, one can readily see that the model of hull used is a good one, and one that throws but little spray when compared, for instance, with the "Standard," shown at the bottom of page 168. Fitted with a 60-horse-power, six-cylinder Sterling engine, "No. 13" is claimed to have made a measured mile in 2 minutes 8 seconds last summer, which would be at the rate of 28.12 miles an hour. As the photographs show, this boat looks every inch a racer, and appears from the shape of the hull to be capable of attaining the speed claimed. It is 39 feet 7 inches in length by 5 feet beam, with a depth of hull at the bow, amidship, and at the stern of 31, 29, and 19½ inches, respectively. The draft depends upon the size of propeller used, as the hull is made flat at the stern, so that it glides nearly on the surface of the water.

The builder of the above-described speed boat is one of the oldest boatbuilding concerns in this country. This company not only builds boats, but also makes a specialty of furnishing frames complete, with all the necessary material for putting them together and with patterns for cutting the planking. When supplied with all this material and instructions, which can be had at relatively small cost, the amateur can build himself a boat during leisure hours, knowing that when it is completed, his craft will not be an experiment either with regard to appearance or speed.

Besides the racer shown, the Brooks Company builds, or supplies frames for, several smaller speed craft, among which are a 30-foot racing boat claimed to make 16¼ miles an hour with an engine of 10 horse-power, and a 22-foot speed launch, claiming also 8½ miles an hour with a 2-horse-power motor, and which should therefore make as high as 12 miles an hour with 6 to 8 horse-power. Still another interesting model is a stern-paddlewheel boat, which can be built in varying sizes from 25 to 40 feet in length. This boat can be built as an open or closed launch or as a boat for freighting purposes on shallow lakes or streams. Equipped with a 7 to 12 horse-power motor, it will attain a speed of from 6 to 9 miles an hour.

Bow View, Showing Wave Formation.



Stern View, Showing Wake.

The Brooks "No. 13" Making 28 Miles an Hour.

A RACING MOTOR BOAT FOR AMATEUR BUILDERS.

Cupro-nickel, says the Brass World, is used for two purposes: In the manufacture of bullet jackets and in the production of five-cent pieces. Bullet jackets consist of 80 per cent of copper and 20 per cent of nickel. The five-cent pieces made by the United States government are composed of 75 per cent of copper and 25 per cent of nickel.

INFLUENCE OF THE AUTOMOBILE ON LAUNCH DEVELOPMENT.

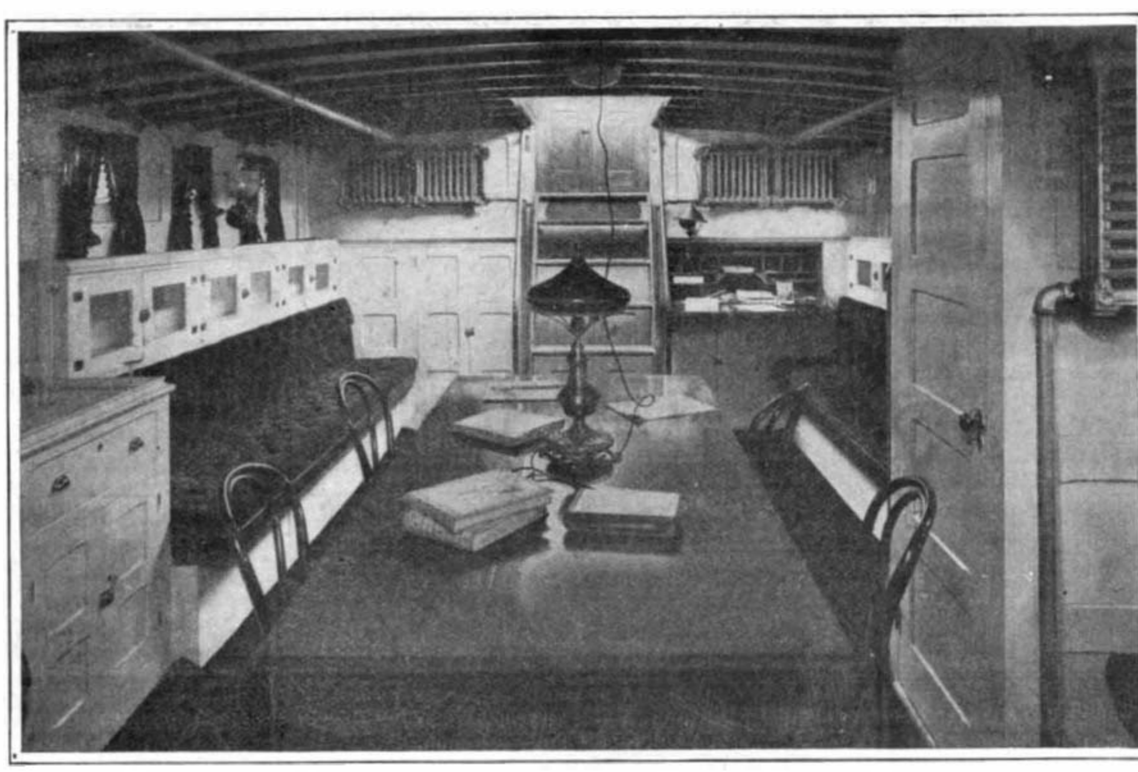
(*Concluded from page 167.*)

tools—have been utilized in the production of engines of phenomenal lightness, up to 300 horse-power or higher, and especially designed for launch installation. At the same time every improvement in the automobile world in the line of carbureters, ignition devices, lubricators, etc., has been transferred to the marine engine.

In this country, under somewhat different conditions of manufacture, the builder has had on the one hand his old, heavy, slowly-turning engine, and, on the other, the French automobile and auto-marine engines, of wonderful refinement and lightness. The result is seen in several magnificent machines in the larger sizes, purely of the marine type, with the skeleton framework of the steam torpedo-boat engine, light and powerful to an extent not dreamed of five years ago, with all the latest advances in gas-engine practice and electrical science making them as reliable and practically as flexible and tractable as the steam engine. Every development of automobile engineering in the line of better materials, finer tools, and improved methods has gone to further the perfection of the marine engine.

But the full measure of advance is not to be gaged solely by such costly machines as the double-acting, six-cylinder engine of 500 horse-power, started and reversed by compressed air. The improvement begins with the smallest and cheapest of the two-cycle engines, where better materials, improved design, standard tools of greater accuracy, and more scientific carbureters and ignition devices, have raised the standard and decreased the relative cost. Throughout the whole range of heavy engines, still in demand for much of the yacht work and in fishing and working vessels, there has been a general improvement along the same lines. Next to these stands a new class of launch engines of varying sizes from 20 to 80 horse-power, mostly of high speed as compared with the old type, but far lighter, more compact, practically as strong and durable, and superior alike in reliability and economy.

With the improvement of the engine and the multiplication of types and sizes has come a reconstruction of the entire power pleasure fleet on new lines. Limited no longer to a few sizes of engine of a single type, the yachtsman and his designer have been free to plan a great variety of new craft. For day use there are launches of comparatively high speed of from 20 to 80 feet; for ordinary pleasure running there are comfortable and convenient craft of good speed, easily handled by one person and safe in any ordinary weather. Where cruising is the main object, the reduction in size and weight of engine has brought about a corresponding change in the refinement of the hull, which is no longer a homely box from which a speed of but six or seven miles per hour is expected, but is as handsome and graceful as a sailing yacht, with double the accommodation on the same length, and with a speed of at least a dozen miles. Still another new type is the rough-water cruiser, from 30 feet upward, including the 40-footers that raced around Cape Cod in 1905 and 1906 and the 40 to 60-footers that will race to Bermuda this year. While for this special work the old type of heavy engine still takes precedence of all others, the development of this most useful and interesting class may be traced back directly to the autoboat racing of two and three years ago—a reaction and a protest it is true, against the extreme racing type, but nevertheless owing its origin to it.



Cabin of the U. S. Coast Defense Inspection Boat "Norka," Which is Noteworthy for Its Roominess and Comfortableness.

A TYPICAL MOTOR-BOAT INTERIOR.

CANOVETTI'S AIR-RESISTANCE EXPERIMENTS.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

In view of the great activity which we find at present in the line of aeroplanes and airships of different forms, the study of the resistance which the air offers to moving bodies becomes one of considerable importance. This question is also of interest in the design of high-speed trains or automobiles and in another field, in the design of projectiles for artillery. Newton was the first who formulated a series of laws for air resistance, supposing that it is produced directly by the inertia of the molecule of air as acted upon by the moving body. But this hypothesis is far from being in accord with what happens in reality, and the laws which result from it