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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE "LARCHMONT" DISASTER.

The awful disaster which occurred on the evening of Lincoln's birthday off Block Island, and resulted in the sinking of the steamer "Larchmont" with a loss estimated at not less than 150 souls, is not only one of the most tragic events in the history of navigation of Long Island Sound, but there are disquieting elements connected with the event, which may well shake the faith of the public in the safety of the older boats, and in the skill and heroism of the navigation and seamanship in these famous and much-traveled waters. The conditions under which the collision occurred, so far as they can be gathered from published reports, are altogether bewildering. Here, in comparatively sheltered waters, on a clear and starlit night, in spite of the fact that the captains of the two vessels, one a three-masted schooner, the other a side-wheel steamer, distinctly saw each other's lights when they were fully half a mile away—in spite of all this and the further fact that they had deep water and ample sea room, we find these two vessels so handled as to crash one into the other at full speed, and with all the appearance of deliberation. It is useless to speculate on the facts as here presented, and for an explanation we must be content to await the searching inquiry which must follow. It is certain, however, that the sailing vessel had the full right of way, and that it was the duty of the steamer to avoid her. The fact that the schooner rammed the steamer bow on would seem to indicate that the captain of the latter had made the too-frequent mistake of supposing that the superior speed of his ship would enable him to cross the bows of the sailing vessel.

Another feature which is disquieting, and certainly does not ring true with the best traditions of the sea, is the fact that so large a number of the officers and crew were saved, or at least got away in boats, while so many of the passengers, among them several women, went down on the vessel. In the presence of such a fact one's mind harks back to that fine old legend of the sea to the effect that the captain is always the last to leave his ship. On this point also will the public look for further and very definite information; and we can only hope that facts may be developed at the investigation which will give this phase of the question a more wholesome complexion than it wears at present. That the "Larchmont" should have foundered so rapidly after receiving the blow of the schooner proves once more how utterly unfit are some of these older steamers on the Sound and in the sheltered waters of our harbors and rivers for the safe carrying of passengers. It is certain either that there was no safety bulkhead construction in the hull of the "Larchmont," or that, if it existed, it was of a flimsy and practically worthless character. According to one account, the ship had transverse bulkheads built up of six-inch timber, but this, unless it was very heavily braced, would be altogether inadequate to withstand the water pressure, especially when the water in the hold was surging, as it would be, against the bulkheads with a momentum due to the rolling and pitching of the vessel. As a matter of fact, this question of non- or inefficiently-bulkheaded passenger vessels, whether for harbor or Sound travel, is one of wide significance, and fraught with untold danger to the passenger. If the traveling public knew how many of these vessels would prove, in case of collision, to be mere death traps, the shrinkage of travel upon them would be such as to compel the substitution of more modern and safer ships. If it shall result in stringent legislation to debar all but thoroughly well-bulkheaded vessels from the passenger-carrying trade, the loss of life on the "Larchmont" will not have been altogether in vain.

TREND OF MOTOR-BOAT DEVELOPMENT.

One of the most prominent facts connected with the present development of the motor boat is the waning interest in craft of the lightly-constructed and over-powered racing type, and the growing popularity of the more stanchly-built, roomy, seagoing boat of moderate power, with ability to make an extended cruise without replenishing the fuel supply. The decline in popularity of the type which is built exclusively for racing has been gradual, but decided, and particularly so during the past two years. It is unquestionable that there is a fascination about mere speed, which appeals strongly to the public mind; and in the earlier development of any of the high-speed devices which have figured prominently in the great field of sport and pastime, the accomplishment of high speed has appealed to the imagination and stimulated the efforts of designers and builders, largely to the exclusion of other and more valuable considerations. In the later years of the past, and the opening of the present, century this has been particularly true, as witness the construction and development of the yacht, the bicycle, and the automobile. But because of the great cost and limited usefulness of all mechanical creations which sacrifice every other consideration to that of high speed, the cost is so exceedingly high as to place them within reach only of men of considerable wealth and leisure. History shows us that when the possibilities of speed have been pretty well exhausted there is an inevitable reaction in favor of more moderate speeds and more durable and reasonable construction. The "speed mania," however, has always left behind it a valuable legacy in the way of useful knowledge as to the strength of materials, and as to just how far bulk and weight may be cut down without any sacrifice of absolutely essential strength.

The motor-boat industry may be said to have now passed from the first to the second and more important stage of its development, and although the high-speed races of the last year or two have shown that there still exists some enthusiasm in this form of sport, the number of extreme racing craft that is being built on the orders of private yachtsmen is relatively diminishing, while the orders for stancher vessels, of the fast and moderate-speed cruiser type, are increasing at a really remarkable rate. To-day not many of the extreme racing craft are built on private orders, the predisposing motive for such of these craft as are constructed being found in the desire of the makers and builders of engines and hulls to demonstrate the high quality of their product, by exhibiting it under the severe conditions necessary in the construction of a successful racing machine.

The popular type of motor-boat to-day is a moderate-powered cruiser, provided with a roomy cockpit and a substantial cabin with ample headroom, one or more staterooms, abundant lockers, a toilet, galley, and pantry, and all the accessories necessary for comfort on a cruise of several days' duration. Of course, the meeting of these requirements has necessitated an increase in size, and particularly in boats intended for deep-sea cruising, or for an extended trip in the more sheltered waters of Long Island Sound, or the extensive harbors of the South. Hence, the dimensions of a modern cruiser will be represented by a vessel from 30 to 60 feet in length, and furnished with engines of from 20 to 100 horse-power.

Perhaps the most potent influence in the development of this type of craft has been the institution of the long-distance races, which have grown in frequency and popularity during the past few years. Confined at first to courses laid through the Sound from New York to some point on the Massachusetts coast, these races have developed fast cruising boats, of such power and excellent sea-going qualities, that in the present year two important races are being run over ocean courses; one from Miami, Fla., to Nassau, a distance of 190 miles, and the other from New York to Bermuda. The latter is, of course, the more formidable undertaking, and the restrictions which have been laid down regarding the size and construction of the contesting boats have been so well drawn that there is no reason why all the contestants should not make the 700-mile trip in safety.

Although the flimsy racing craft has waned in popularity relatively to the moderate-powered cruiser, there will always be a demand for high-speed yachts, capable of averaging about 18 knots an hour, for what is coming to be known as "ferry" service, or the work of carrying business men to and fro between New York or other maritime cities and their distant summer residences. These craft run in length from 75 to 100 feet or over, and carry engines capable of giving them a sustained speed in sheltered waters of from 16 to 20 knots an hour. They are provided with ample deck space and spacious cabin accommodation, while frequently they will have a dining room and galley sufficient to enable the owner and guests to dine aboard if they should so wish.

The question has been asked as to whether the gasoline engine will be applied to ocean-going yachts of a size capable of making the transatlantic passage. One of our leading naval architects has recently expressed the opinion that in the present condition of the art this is not practicable, because of the prohibitive cost of the fuel. Moreover, it is undeniable that many prospective yacht owners would be deterred by considerations of the supposed risk attaching to the storage of large supplies of gasoline; although, as a matter of fact, by the use of proper precaution, the danger may be so greatly reduced as to be practically negligible. It is likely that under the stimulus afforded by the introduction of free alcohol, the designers of internal-combustion engines will succeed in designing motors so well suited to the use of this fuel, that it will ultimately prove to be more economical than gasoline; and there is not the slightest doubt but that with the more extended use of alcohol the price must ultimately come down to a point which will render it as economical as gasoline. When that point is reached, the added advantages of safety and absence of odor, etc., will render it such an ideal fuel that we may look for its extended use in the larger sizes of yachts, even in those capable of making the transatlantic passage.

Furthermore, the internal-combustion engine has several collateral advantages which must commend it strongly to the prospective yacht owner. By saving the expensive installation of boilers for a steam plant, the first cost of a gasoline or alcohol plant will be considerably less; and there will be a decided saving in the important matter of space. Also, for the same bunker or tank capacity, the steaming radius, or sailing radius, will be much larger than where steam power is used; while the comfort of the owner will be further assured by the absence of smoke and ashes, and the inevitable dust and disfigurement attendant upon coaling. Already, the way for the appearance of the large ocean-going gas-driven yacht has been prepared by the successful operation of the large auxiliary schooners, in some of which gasoline engines of considerable power have been installed and successfully operated.

GYROSCOPIC ACTION OF MARINE TURBINES.

We are most of us familiar with that ingenious device for preventing, or rather modifying, the rolling of ships, which consists of a heavy gyroscope, placed with its axis of rotation transverse to the longitudinal axis of the ship. The machine works on the principle that, to change the plane of rotation of a swiftly-rotating body by tilting the axis, requires an amount of effort which is determined by the weight and rotative speed of that body. The anti-rolling gyroscope, rotating in a plane at right angles to the direction in which movements of rolling of the ship take place, tends to resist those motions and modify their extent.

Simultaneously with the appearance of this device, and possibly suggested by it, there has arisen a discussion of the action upon turbine-driven vessels of the heavy and swiftly-rotating rotors of the steam turbine; for these, in addition to their proper work of driving the ship, undoubtedly act, because of their weight and high speed of rotation, with a powerful gyroscopic effect upon the pitching motion of the vessel. In this case, however, the gyroscopic action is felt in the direction of the longitudinal axis of the ship, and not, as in the case of the anti-rolling device, transversely thereto. Moreover, just as the anti-rolling gyroscope tends to modify rolling, so the gyroscopic effect of the heavy rotors of the steam turbines must tend to modify pitching, or vertical movement in a plane passing through the keel. Whatever modifying effect the device above referred to may have upon the rolling of a vessel, it is certain that the gyroscopic action of the turbine rotors can have none, or practically no effect upon the pitching. But since the gyroscopic resistance of the heavy rotors to a change of position of their plane of rotation is present and is considerable in quantity, it follows that they must exert a stress of no little amount upon the framing of the vessel itself. The proportion which these stresses will bear to the normal stresses for which the hull was designed will be largest in the case where turbines of great weight and high speed of rotation are carried in a long, shallow, and lightly-constructed hull, as in the case of a high-speed turbine torpedo-boat destroyer. These stresses would act very materially to increase the bending stresses which occur when a torpedo boat is being driven rapidly across the seas. In such a vessel they would become so large as to call for an increase in the scantling of the vessel, beyond that which would be necessary were reciprocating instead of turbine engines installed.

In the course of a valuable analysis of this action of a steam turbine, Mr. A. H. Gibson, of the Institute of Civil Engineers of Great Britain, some months ago called attention to the fact that the "Cobra," one of two high-powered turbine destroyers, built several years ago for the British government, and capable of steaming 36 knots an hour, broke her back and went down during a gale in the North Sea. This destroyer was built of the same scantlings as other destroyers in the British and Japanese navies, the difference be-

tween them and her being that they were driven by reciprocating engines and the "Cobra" by steam turbines of nearly double the power. Although no satisfactory reason was assigned for the disaster, Mr. Gibson believes that the additional stresses caused by the gyroscopic action of the rotors were mainly responsible for the disaster. Assuming that the two high-pressure turbines weighed 8 tons each and the two low-pressure 14 tons each, and that the speed of revolution was about 1,100 per minute, he finds that under certain conditions a couple might be called into play of 48 foot-tons, which would have to be resisted by the framing and shell of the vessel.

LONG-DISTANCE MOTOR-BOAT RACES FOR 1907.

There are at present but two important power-boat races scheduled for the coming season. Both of these are for cruising craft, and it is noteworthy that no contestant is eligible to entry in both races. These are known as the Marblehead and Bermuda contests.

The Marblehead race is the third annual race of a series which has been pulled off between New York and Marblehead, Mass., while that to Bermuda is an entirely new venture in the long-distance cruiser field. Both these races are laudatory, since such contests tend to develop a seaworthy, convenient, comfortable, and sensible type of cruising craft. If the results this year do not prove this to be true, indications are certainly misleading.

The first long-distance race for cruising power boats was conceived by Mr. Thomas Fleming Day, of "The Rudder," who offered a $250 trophy, to be known as "The Rudder Cup," to the Knickerbocker Yacht Club of College Point, with absolutely no restrictions as to conditions except that it was to be raced for by cruising power boats. This was late in 1904. The Knickerbocker Yacht Club accepted this cup, but, as there had been no previous contests of a similar nature, the club fully realized the amount of strenuous work such an enterprise would entail.

After several meetings the regatta committee presented to Mr. Day, for his approval, a draft of the conditions for the first race in 1905. These rules provided for a race for *bona fide* cruising power boats, not exceeding 40 feet length over all, and for the exclusion of any craft not having living and cruising accommodations for a crew of at least four persons. Paid navigators were also barred. American Power Boat Association rules were to govern. As a result there were sixteen entries, with twelve starters, as follows:

Boat.	Owner.	Engine.
"Blink"	C. W. Estabrook	Buffalo.
"Aquila"	A. H. Chase	Chase.
"May"	A. A. Low	Fulton.
"High Ball"	Richard Hutchison	Essex.
"Woodpile"	A. L. Lincoln	Barber.
"Glissando"	F. L. Andrews	Standard.
"Yeddo"	S. M. Smith	Twentieth Century.
"Em Bee"	Louis Neumann	Buffalo.
"General Bumps"	P. D. Irwin	Giant.
"Igniter"	C. A. Mezger	Buffalo.
"Aranca"	Arnold Schlaet	Standard.
"Talisman"	William Saville	Murray & Tregartha

Of these, all but six, viz., "Yeddo," "General Bumps," "Aranca," "Glissando," "Em Bee," and "Talisman," were new boats, built to conform to the conditions of the race.

The weather was the worst of the season, and after a hard trip across Nantucket Shoals, but five were able to finish and in the following order: "Talisman," "Blink," "Aquila," "Glissando," "Woodpile."

As "Talisman" was entitled to an allowance of nearly seventeen hours, there was no question of her winning the cup.

"Glissando" received second prize, and the other three handsome souvenirs.

In this race, as in that of the year following, the Eastern Yacht Club, of Marblehead, rendered valuable assistance, not only to the Regatta Committee of the Knickerbocker, but to the contestants themselves, the other two yacht clubs, the Boston and Corinthian, each vying with the Eastern as to which could do the most in that line.

Before the close of the year 1905, the Knickerbocker Yacht Club decided on a race for 1906. This was to be run in the opposite direction, i. e., from Marblehead to College Point. As a result, four prizes were offered, with fourteen entries and the following twelve starters:

Boat.	Owner.	Engine.
"Davy Jones"	Richard Hutchison	Jager.
"Unome"	Alfred L. Lincoln	Barber.
"May"	A. A. Low	N. Y. Kerosene Oil.
"Yo-Ho"	R. R. Curry & Sons	Ideal.
"Whew"	F. C. Webb	Murray & Tregartha
"Aranca"	Arnold Schlaet	Standard.
"Sis"	Eben Stevens	Craig.
"Susie"	J. B. Schmelzel	Fulton.
"Gertrude"	J. J. Tobin	Murray & Tragartha
"Shawna"	George C. Sutton	Lamb.
"Alice J"	Sidney Williams	Hasbrouck.
"Sarapa"	Swasey, Raymond & Page	Buffalo.

In 1905 "Talisman" took nearly 54 hours and 25 minutes to cover the course.

"Unome" finished first in 1906 in 33 hours, 45 minutes, and 40 seconds, with "Whew" second, "May" third, and "Sis" fourth. The last boat of nine to finish, "Susie," completed the 280 nautical miles in 39 hours, 5 minutes, and 29 seconds elapsed time.

Time allowance was figured on a modification of the 1905 American Power Boat Association rules, using 60 per cent of the table, with arrivals corrected so that the winners in their order were as follows: "Sis," "May," "Susie," and "Davy Jones."

The owner of "Sis," Mr. Eben Stevens, promptly offered a cup for a race in 1907. The Knickerbocker Yacht Club could not see its way clear to undertake the management of another race. Consequently, the New Rochelle Yacht Club will this year have supervision over the third Marblehead race.

Very slight modifications in the rules governing the 1906 contest have been made, the two principal ones being to limit the minimum length to 30 feet over all, instead of on the waterline, and the use of 50 per cent of the table of time allowance of the American Power Boat Association rules, rather than 60 per cent. The race this year will be from New Rochelle to Marblehead and will probably start on July 4.

The other race is from Gravesend Bay, off the Brooklyn Yacht Club, to Bermuda, a distance of about 700 statute miles. The minimum length of boats eligible for this race is placed at 39 feet, and the maximum at 60 feet.

This race is for a valuable trophy offered by Mr. James Gordon Bennett, the well-known yachtsman. It will be run under the joint auspices of the Brooklyn and Royal Bermuda Yacht Clubs. Careful conditions have been formulated, to avoid probability of disaster to any competing craft, each one being compelled to carry 6 square feet of sail for every foot of over-all length, and one and one-half times the quantity of fuel necessary to cover the distance under favorable weather conditions; while several other important salutary regulations are embodied in the requirements for eligibility for entrance. The conditions under which entries are to be made were published in the SCIENTIFIC AMERICAN of December 22, 1906.

This race is scheduled to start from the club house of the Motor Boat Club of America on June 1, and with good weather the run should not consume more than two and a half or three days.

It is reported that several boats are already under construction for each race, and it is likewise probable that boats already built, and eligible for the Marblehead race, will compete, while slight modifications, consisting in the main of the addition of auxiliary sail equipment, will allow several well-known boats to enter in the Bermuda trial, which will test the best points of such craft, such as their seaworthiness and endurance.

POWER BOAT NOTES.

You cannot "throttle" a four-stroke cycle engine to slow speed, unless the exhaust valve springs are sufficiently strong to prevent ingress of the spent gases through the exhaust valves, when there is a partial vacuum in the cylinder formed by the descent of the piston during its induction or drawing-in stroke. Weak exhaust-valve springs are sometimes encountered on marine gasoline engines.

There is an island near Marblehead, Mass., which is often mentioned in print. It is sometimes called Thatcher's and often Thatcher. It could not be Thatcher's, for in all geographical names now the apostrophe is omitted. What used to be called Riker's Island is now Rikers Island, while Fisher's Island has become Fishers Island. In the particular case mentioned, the latter is and has always been correct. It is Thatcher Island.

Conditions may necessitate installing propellers with excessive pitch, but such an installation should be avoided if possible. It must be remembered that the flywheel of the engine must be kept out of the water in the boat's "run," or space below the floor. This is sometimes accomplished by using a copper or galvanized pan under the lower part of the flywheel. Two-cycle engines give more trouble usually than four-cycle, when thus installed, and two-port engines more than three-port, if supplied with float-feed carbureters, the usual tendency being to get too rich a mixture in the after cylinder and too poor a mixture in the forward cylinder. Too much lubricating oil is quite likely to interfere with the ignition in the after cylinder if the engine is of the four-cycle type.

If you are in a power or sail-driven boat, and some other craft, steam or gasoline driven, willfully violates well-known "rules of the road," you should, at your earliest convenience, report the occurrence to the nearest United States inspector of steamboats, giving a full account of the occurrence, with names and addresses of eye-witnesses. A few cases of this sort would give many of our licensed masters and pilots what they richly deserve—suspension of their licenses—even although they are often goaded to desperation, as no doubt many of them claim, owing to the wanton disregard of the usual rules by many of our power-boatmen. Moral: Learn the "rules of the road" yourself, and do not take any chances, giving the other party plenty of leeway.

A sailing yacht shows the same lights as any sailing craft, the regulation red and green side lights, when under sail, and the white riding light when at anchor. A light is sometimes suspended from the end of the main, or spanker boom, to reduce liability of fouling, and while of great utility, and in a measure considered necessary, is not demanded by federal law or regulation. Small sailing craft are allowed to show a combination red and green light displayed in front of the mast, in place of the usual separate side lights. Small power craft, when using combination lights, should have a white light showing between the red and green. When showing separate side lights they should display a white masthead light. Towboats or any power craft when towing another craft alongside, should show two white masthead lights, one above the other, and when towing astern there should be three of these lights vertically arranged. The regulations governing lights on all craft are the same, no matter whether used for pleasure or business purposes, and are in force from sunset to sunrise.

Galvanized sheet-iron gasoline tanks are unsafe, and their use should be prohibited in all boats. Copper is very much better than any other material for fuel receptacles, although high-grade house boilers, galvanized after they are made up, on account of their cheapness, are permissible. The electric-welded, pressed-steel tank, however, is preferable to the riveted style. A precaution to be observed in the use of galvanized-iron or steel tanks is to see that salt water does not collect on them, or that they are not partially submerged in the boat. More important it is that no oak, or any wood carrying tannic acid, comes in contact with galvanized-iron tanks, else their life, owing to corrosive or galvanic action, is materially shortened. Galvanized-iron "swash" plates are preferable to those made of copper, owing to their greater rigidity, and such plates should be used in copper tanks. Soft, or hot-rolled, copper makes safer tanks than cold-rolled, and even this should be "tinned" on the inside, to insure the solder holding. All copper tanks should be protected against any possibility of fracture or puncture, by means of suitable bulkheads.

Rarely does a power-boat owner aspire to own the second craft with the propeller unprotected. Speed maniacs have set the custom. Floating debris, rocks, shallows, etc., make bad work with the unprotected propeller. It has been abundantly proven that high speed, with its allurements, is not all that is claimed or desired, that a comfortable, safe, good sea boat is a much more merchantable article and one less often offered for sale than so-called semi-speed or racing craft. It is possible so to design power boats that a good, satisfactory type with sufficient speed for comfort, may be produced rather than "freaks." Boats of abnormally high speed are decidedly dangerous playthings, not only for their own occupants, but those of other craft, who have equally as good rights to navigate crowded harbors and other constricted bodies of water. Power-boat racing, except for sensible cruising craft, died naturally something over a year ago. There is but one really good power-boat racer, and that is the very fastest one afloat. When such a craft is once beaten, her value is considerably decreased. In designing a boat to get the very highest speed possible, it is usually necessary to have the propeller project below the keel.

A jump-spark coil may be put out of commission easier by too high voltage than from any other cause. Adjusting the trembler, or vibrator, until there is very little play between the core and the small button or armature, is quite likely, especially with cheap coils, to fuse or burn up the metal contacts, between which a small spark shows when the primary, or low-tension, circuit is closed at the timer or distributor. Some coils are wound for but six volts, because they can be produced more cheaply than if wound to stand nine or twelve. Such coils should never be used with more than four dry cells, or six cells of so-called oil battery. A very frequent source of trouble with coils may be traced to their use in connection with sparking dynamos or generators. It is not safe to use them in the jump-spark system, without using an accumulator or storage battery, and a cut-out, either by means of a switch or an automatic device to prevent short circuiting the storage battery through the generator, when the engine stops. If the governor on the generator could be depended upon to maintain just the proper speed to produce the correct voltage, there would be no trouble, but around salt water particularly the governor is liable to "stick," with disastrous results. This is one of the bad features incidental to the use of jump-spark ignition. In the make and break system an increase of voltage to even twelve volts has no bad effect other than a tendency to burn out the igniter points, unless it runs so high as to break down the generator itself.