

also enable the goods traffic to be carried on more expeditiously than it is under the existing circumstances.

When the Channel Tunnel was projected with a view to connecting Dover on the English mainland with Calais on the French coast, the British War Office vigorously opposed the scheme, on the grounds of national defense. In this instance, however, it is anticipated that the military authorities will support the scheme, since it will enable them to transfer their troops from the military camp at Aldershot, which is also upon the main line of the London and South-Western Railroad, to the island, if the exigency arose, within three hours. Near the island entrance to the tunnel exist a number of modern forts, to guard the entrance to the Solent, and in case of war troops could be concentrated at this point with the utmost celerity. The military authorities have been seriously considering the advisability of strengthening the defenses of this island, which at present is in a very vulnerable condition, so that the construction of this railroad would probably facilitate the work of the military department. At any rate, it is not at all probable that they will offer any opposition to the enterprise.

THE INTERNATIONAL RACING-YACHT "INDEPENDENCE"

The very liberal policy which is being pursued by Mr. Thomas W. Lawson, the owner, and Mr. B. B. Crowninshield, the designer, of the 90-foot racing yacht, which is now under construction in Boston, for the defense of the "America" Cup, comes in pleasing contrast to the secrecy which of late years has surrounded the design and construction of challenging and defending yachts on their respective sides of the water. The illustrations of the "Independence" on the front page of this issue are made from photographs taken in the shed where the yacht is being built, and from the working drawings, blue prints of which were kindly furnished from the designer's office. The dimensions of the boat are as follows: Length over all, 140 feet 10½ inches; length on water line, 90 feet; overhang forward, 27 feet 5½ inches; overhang aft, 23 feet 5 inches; beam, extreme, 23 feet 11½ inches; beam at water line, 23 feet 5 inches; draft, extreme, 20 feet; freeboard at stemhead, 6 feet 11 inches; freeboard at taffrail, 4 feet 8 inches; freeboard, least, 4 feet; deck beam at forward end of water line, 15 feet; deck beam at after end of water line, 18 feet 9 inches; beam at taffrail, 11 feet 8 inches; area of lateral plane, 772.6 feet; area of midship section, 117.9 feet; area of L. W. L. plane, 1,771.5 feet; wetted surface, with small rudder, 2,913.5 feet; with large rudder, 2,956 feet; displacement, 146.75 tons.

Assuming that the new defender which Herreshoff is building will be an improved "Columbia," as "Columbia" was an improved "Defender," it is interesting, with the plans of the Lawson boat before us, to compare the points of difference between "Independence" and "Columbia." In the first place, comparing the midship section, the "Independence" has a harder bilge, a flatter floor and the curve at the garboards is of much smaller radius; in these respects, indeed, she is not unlike the "Shamrock." As we leave the midship section, the difference between "Independence" and "Columbia" becomes very marked. In the "Columbia" the bilges begin to ease away rapidly toward the bow until at the forward end of the water line the cross section of the bow approximates a blunt V form, thus giving a sharp and easy entrance and water lines that do not lengthen much as the boat heels to a breeze. Aft of the midship section the run and quarters of the "Columbia" are remarkably fine and easy, and although in a breeze she lengthens her water line almost to the taffrail, the form is such that there is but little perceptible drag, or quartering wave, when the vessel is reaching in a strong breeze. The characteristics of "Independence" are her extremely long overhangs, giving her an overall length fully 10 feet greater than that of any previous cup defender. Coupled with this great length is the fact that she carries her hard bilges and flat floor well out beyond the normal 90-foot mark, both forward and aft, thus providing an extremely long, flat floor and a great gain in water-line length when the boat is heeled. With this form of hull it is possible to carry a maximum amount of sail with a minimum amount of ballast, and as a matter of fact "Independence" will carry only 75 tons of lead in her keel as against the 85 to 90 tons which are generally credited to the "Defender" and "Columbia."

Perhaps the best idea of the full bow and stern sections and natural sail-carrying power of the yacht is derived from a consideration of the load-water-line plane as shown on the accompanying plan, and the photographic views of the interior of the hull looking toward the bow and toward the stern from the mast-step. Here it will be seen how the flat floor extends practically the whole length of the yacht, the hard curves at the bilges being main-

tained well into the bow, and carried out to the 79th or last frame, as shown in the cross-section of the hull at this point. Although there will be a certain bluntness in the bows it must be admitted that once entrance has been made, the lines of the yacht will be such as not merely to provide great sail-carrying power, but a form which will lend itself to high speed. Even when driven to the limit, the "Independence" should leave a wonderfully smooth wake behind her. It will be noticed that two rudders are provided; the after rudder will be used in place of the forward one, if the sailing trials prove that its more powerful control is necessary.

Considered from a structural standpoint, the new yacht shows how the principles of framed structures, as used by the engineer in bridge building, are being applied to yacht construction. The peculiar model of "Independence," with her great overhangs and shallow depth, renders the task of meeting and distributing the intense local strains which are set up in the structure of such an extreme racing yacht most difficult. For instance, it will be noticed that the mast is stepped fully 10 feet forward of the stem and at a point where the molded depth of the boat is not more than 4 feet and the draft 2 feet. Upon the thin bronze bottom of the boat, which at this point is less than ¼ of an inch in thickness, is to be carried the enormous vertical load of the mast with its towering structure of spars, canvas and rigging, a load which is intensified by many tons when the vessel is heeled to a breeze, and the vertical component of the pull of the shrouds is added to the normal dead-load of the mast. This vertical thrust is met by interposing between the heel of the mast and the plating of the hull a deep, cellular structure of steel plates, which measures 12 feet in width by 14 feet in length, and is 2½ feet deep at the center. This structure is riveted upon the frail floor of the boat, and serves to distribute the load of the mast throughout the surrounding framework of the hull. Associated with the mast foundation is a series of four, special, transverse, deck-beams, extending across the deck in the wake of the mast, which are in reality bowstring trusses, 17 inches in depth at the center, of great vertical stiffness. From the bottom of these trusses a number of ¾ inch steel tie-rods are carried down through the steel ring which forms the step of the mast and secured by knots below the bottom face of the same, thereby transmitting a portion of the mast load directly to these deck beams. Moreover, it will be seen from the transverse section of the boat at the mast-step that the special deck beams above mentioned and the mast-step framing are connected by a system of trussing, composed of 2¼-inch hollow steel struts and 3 by 3-inch angles. As the transverse strains which are set up at this point in a racing yacht when she is being pressed to the utmost in a strong breeze are enormous, not only is there the great downward thrust of the mast as above explained, but there is the upward pull of the shrouds on the side of the boat which in itself will run up to the total of a great many tons. The deep deck beams and the cellular structure of the mast step, with the triangular bracing of the angles and struts, together constitute a true bridge structure, admirably adapted to take care of the intensified local stresses at this point, and distribute them over a broad area of the delicate shell of the yacht.

Another interesting study is the provision made for giving the necessary longitudinal strength to the long, overhanging bow and stern of "Independence." It will be noticed that there is a deep, vertical keel-plate which varies from a depth of 9 inches at the bow to 18 inches at the point where the fin keel commences. At the center line of the deck there is also a horizontal steel plate of the average width of 18 inches associated with the vertical plate which is from 6 to 8 inches in depth. Between these two members, which might be called the top and bottom chords, there is worked in a system of tie-rod bracing and vertical, hollow, steel struts, the rods varying from ¾ of an inch to one inch in diameter and the struts from 1½ inches to 2 inches in diameter. This construction provides what is practically a deep steel truss which extends from the stiffened framing at the mast out to the end of the overhanging bow. The necessity of trussing of this kind will be appreciated by those of us who remember what happened to the over lightly built bows of the 70-footers of last season, which, yielding to the enormous upward pull of the head stay and topmast stay, were drawn upward out of their proper line from 12 to 14 inches. The after overhang, it will be noticed, is similarly trussed, the tie-rod bracing, however, running only in one direction—being put in, doubtless, to assist in carrying the weight of the crew, when it is massed toward the taffrail to keep the bow of the boat up when she is running before the wind. The hull is further stiffened by four lines of stringers, two on each side, with 2-inch tubular struts, extending from the stringers to the deck beams.

There are 79 frames in the yacht, spaced about 2½ feet apart. The frames consist of nickel-steel angle

bulbs. The plating of the hull is of bronze from the keel to the sheer strake, which latter is of steel. From amidships to a little forward of the mast the sheer strake is 9-32 of an inch in thickness, while from forward of the mast to the bow it is ¼ of an inch, and from amidships to the stern it is ¼ and 3-16 of an inch in thickness. From the garboard strake to the sheer strake the bronze plating is 7-32 of an inch and ¼ of an inch in thickness amidships and 3-16 of an inch thick forward and aft. From the garboard strake to the bottom of the keel the bronze plating is ¼ of an inch and 5-16 of an inch in thickness, while the bottom plate of the keel is a bronze casting ⅝ of an inch in thickness. In constructing the yacht the keel was first built up and riveted, and then pig lead, with shot to fill up the interstices, was stowed, until 62 tons of the same was in place. Molten lead was then run over the top, to form a crust, and keep it in place. After the yacht is afloat, about 13 tons of pig lead will be stowed above this until the vessel has reached the desired trim. The deck beams are angle bulbs of the same weight as the frames. The deck plating is of steel and aluminium, distributed as follows: Continuous steel side stringers run from stem to stern, and vary in diameter from 3-16 by 10 inches at the ends, to ¼ inch by 2 feet in width amidships. There is also the longitudinal centerline steel plate, already referred to, which varies from ¼ inch by 2 feet amidships to 3-16 of an inch by 1 foot in the ends. The deck is covered with 3-16 of an inch steel plating for a distance of 10 feet forward and aft of the mast. The rest of the deck is plated with aluminium. As the displacement of "Independence" is given as 146¾ tons and the total lead ballast will amount to about 75 tons, it is fair to presume that the total weight of the hull, spars, rigging, sails, stores and crew, when the boat is down to her 90-foot water line, will be about 72 tons.

There can be no question of the great originality and skill with which the construction of this interesting boat has been worked out. The peculiarity of her form, her great sail-carrying capacity, involve that she will be put to severer strains than any yacht of her size that has yet been launched; and we think that the designer is to be congratulated upon the success with which he has combined lightness and strength in producing a powerful form. Had the "Independence" been built upon what might be called the commonly-accepted lines of a 90-footer, and had there been less originality shown in the design, there would not be the great public interest attending her trials against the Herreshoff boat which is now certain to be manifested.

Electric Wind-Registering Apparatus.

A new apparatus for registering the direction of the wind is in use at the observatory of the Agricultural College, at Berlin, which permits of registering eight directions of air-currents by electrical means, using but two pendulums, each provided with a stylus. The apparatus carries at the top a vane of the usual type, carried upon a rod which passes below and has on its lower end a metal sector which may rub over four contacts placed at the corners of the platform carrying the pivot of the rod. The dimensions of the sector are calculated so that it may touch but a single contact or two adjacent contacts. The movable sector is connected to one of the poles of a battery. Each of the four contacts has a wire which passes to the coil of an electro-magnet and the four magnets are placed horizontally so that between each of the two pairs of coils oscillates a pendulum carrying the ink stylus. The other ends of the coils are connected with the other pole of the battery. With this arrangement each of the two pendulums will be attracted to the right or to the left according as one or the other contact is touched by the revolving sector; if the sector touches two contacts at once the two pendulums will be attracted either in the same or contrary directions. If the contacts 1, 2, 3, 4 correspond to the directions N., S., E., W., of the compass, suppose that the pendulum I. is deviated to the left by contact 1 and to the right by contact 4, while pendulum II. is deviated to the right by contact 2 and to the left by 3. Under these conditions a left deflection of the pendulum I. alone indicates N.; while the same deflection, combined with that of pendulum II. to the right, indicates N. E., etc. If the indications are to be given at regular intervals, the wire from the coils to the battery passes through a relay and clock mechanism by which the circuit is closed at periods of 5 or 10 minutes, etc. The current required to work the apparatus is very small.

The famous statue of Voltaire, by Houdon, is probably the most important art object displayed in the Théâtre Français. The fire in the theatre last year excited great alarm for the safety of this precious souvenir of the French stage. The architect of the new building has designed means by which, in case of emergencies, the statue can be moved out of danger. A series of wheels has been arranged under the pedestal so that the mass can be moved with as much ease as if it stood on a trolley.

SCIENTIFIC AMERICAN

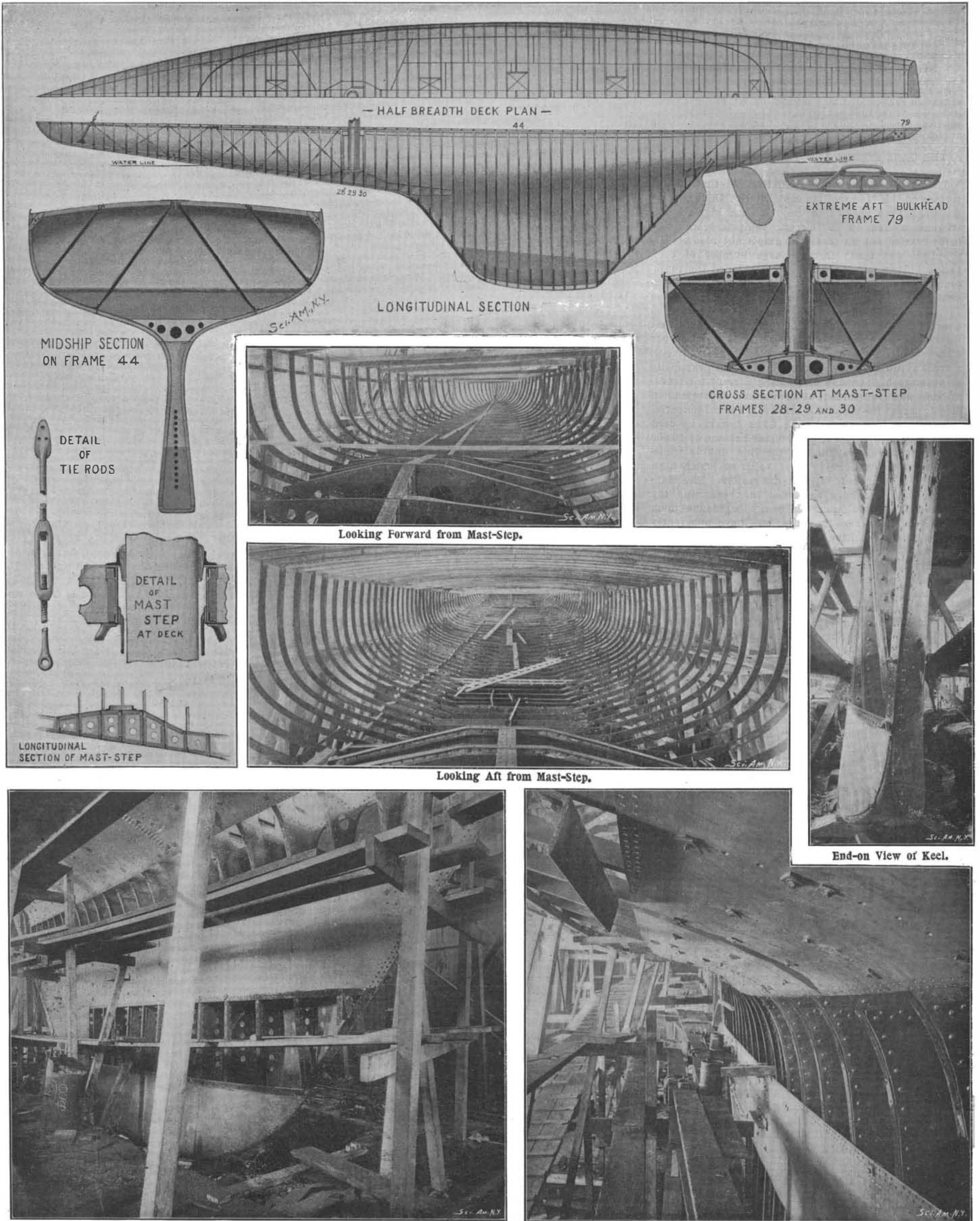
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— HALF BREADTH DECK PLAN —

LONGITUDINAL SECTION

MIDSHIP SECTION ON FRAME 44

EXTREME AFT BULKHEAD FRAME 79

CROSS SECTION AT MAST-STEP FRAMES 28-29 AND 30

DETAIL OF TIE RODS

DETAIL OF MAST STEP AT DECK

LONGITUDINAL SECTION OF MAST-STEP

Looking Forward from Mast-Step.

Looking Aft from Mast-Step.

End-on View of Keel.

Fin-Keel and Bulb, Looking Toward Stern.

Garboard Strake and Keel Framing.

Length over all, 140 feet 10 $\frac{1}{2}$ inches. Water-line length, 90 feet. Extreme beam, 23 feet 11 $\frac{1}{2}$ inches. Draught, 20 feet. Ballast, 75 tons. Displacement, 146.75 tons.

Photographs by Thos. E. Marr, Boston.

THE INTERNATIONAL RACING-YACHT "INDEPENDENCE." [See page 198.]

Science Notes.

The meteorite which fell at Porto Alegre, Brazil, has now been measured, and the results are most astonishing. It measures 56 feet from the base and is 85 feet high.

German towns are increasing rapidly in population. In five years Posen has increased 58.6 per cent; Berlin has now 1,884,345 inhabitants; Hamburg, 704,669; Munich, 498,503; Leipzig, 455,120.

William Couper, the sculptor, is engaged in modeling a heroic portrait-bust of the late Prof. Thomas Eggeston, and funds are being collected for this memorial to the founder of the School of Mines of Columbia University.

A marked rise in the level of the Dead Sea has been noted. A broad lagoon has been formed on the north side of the Jordan delta. The water does not sink in summer, and it is surmised that the whole bottom of the Dead Sea has been raised by volcanic action.

A London dealer in physical apparatus, etc., offers for sale a strictly limited number of vacuum tubes, containing neon, krypton and xenon. Also tubes of argon and helium. They cost from one to three pounds each without quartz ends, and the whole set of five gases, with quartz ends, costs about \$100.

At a recent Headmasters' Conference held in England, a committee was appointed to take up the study of archaeology in schools and the foundation of an archaeological museum. It was thought that the more extended study of this science would quicken the students' imagination of the lives of men who made classical history and literature.

Berlin has refused a legacy of \$120,000 for an orphan asylum, as one of the conditions of the bequest was that the orphans should be brought up on a vegetarian diet. Those who are making bequests should not thrust their fads on institutions, and Berlin is to be commended, as Breslau is to be condemned, in this matter, as the latter city expressed a willingness to accept the gift with the conditions imposed.

The latest issue of The Geographical Journal contains a most interesting account of the results of Mr. Moore's recent expedition to Lake Tanganyika and the regions to the northward. Mr. Moore brings forward additional arguments in favor of the marine origin of the fauna of this lake (which includes shells of a marine type and a jelly fish); and from the absence of a similar assemblage of animals in the more northern lakes, he is led to conclude that Tanganyika communicated with the ocean by way of the Congo Basin, and not through the Nile Valley.

In a paper printed in The American Journal of Insanity Mr. G. Styles presents statistics regarding the occurrence of suicides. Forty years ago it was shown that only 4 out of 10,000 persons rated as paupers died by their own hands, while 7 coachmen or other servants, 5 bankers or professional men, nearly 8 soldiers, 7 tailors, shoemakers or bakers, and only 13-10 carpenters, butchers and masons out of 10,000 were suicides. Sweden had the lowest average of all the countries considered, namely, 1 suicide to 92,000 persons; Russia had 1 to 35,000; the United States 1 to 15,000; Saxony 1 to 8,446. In St. Petersburg and in London the proportion was 1 to 21,000. If we take the statistics of the fifty years just passed for France the following results: For every 100,000 inhabitants of France there were in 1841-45, nine suicides; in 1846-50, ten; in 1861-70, thirteen; in 1871-75, fifteen; in 1876-80, seventeen; in 1889 alone, twenty-one; in 1893, twenty-two; in 1894, twenty-six. During the years 1826-1890 the percentage of suicides increased in Belgium 72 per cent; in Prussia, 411 per cent; in Austria, 238 per cent; in France, 318 per cent; in Saxony, 212 per cent; in Sweden, 72 per cent; in Denmark, 35 per cent.

The third series of reports to the Malaria Committee of the Royal Society has just been issued, and contains the results of observations made by Drs. Stephens and Christophers on the west coast of Africa, and by Dr. Daniels in West Africa, says Knowledge. The two former writers state that it cannot be too clearly realized by Europeans living in the large towns of West Africa that the danger of dwelling amid thousands of cases of malaria is not so much the less dangerous from the fact that the native children suffering from the disease do not exhibit the usual signs of fever. "Malaria is essentially a contagious disease, the contagion being conveyed by the mosquito; the laity must appreciate this fact and, when they dwell in the midst of contagion, they must realize that malarial fever is a contagious disease communicated (through the medium of the mosquito) from one native child to another. Malarial fever, we are convinced, is best avoided most readily by avoiding the cause of contagion, and living as far removed as possible from the huts. . . . The adult native possesses an immunity against malaria, and though living under the same conditions as the children, constantly suffering from the bites of infected Anopheles, yet examination of his blood shows that parasites are always absent.

Electrical Notes.

McGill University, Montreal, has recently installed two large electric furnaces, taking a current of 100 amperes at 110 volts.

Marconi has sent wireless messages 200 miles from St. Catherine's to the Lizard. Perfect communication has been established between these points.

A submarine electric arc light will soon be experimented with to aid in the sponge fishery off the coast of Florida. At present, the sponges are obtained only from a comparatively small depth, as the sponge fishers at present can only see to a limited distance by the aid of a water glass, and if this distance could be increased, larger areas would immediately be opened up where sponges have been growing unmolested for years.

A new electric fire alarm consists of a metallic case containing a charge of a Bengal light surmounted by an igniting charge in which is buried an electric fuse. The whole is made water-tight, and is arranged to be put in position on a cornice or other prominent part of the building. The fuse is connected through thermostats to the battery. When the temperature rises unduly the circuit is closed, the igniting charge is exploded and the compound is ignited, making a brilliant light in the neighborhood. A device of this kind will doubtless prove of considerable value in sparsely-settled districts where there is no fire alarm system.

There have been many prosecutions in New York recently under a new law which provides for the punishment of theft of gas or electricity. The law is very comprehensive, and provides for the tapping of supplies without passing through the meter or other instrument provided for registering the quantity consumed, and for the obstruction or injury to a meter. Until this law was passed the electric companies knew perfectly well that they were being robbed, but found no way of punishing in any adequate way those responsible. Several offenders have been convicted, and one of them was sentenced to pay a fine of \$150 or spend sixty days in prison. A number of Chinese laundries were found where the meter had been bridged so that their bills were only about half what they should be, and nine of the laundrymen were arrested.

Now that the Behr monorail scheme between Liverpool and Manchester has been rejected by the English Parliament, it is proposed to connect the two cities by an electric tramway. There will be 84 miles of lines communicating with all the principal towns en route, and forming junctions with other tramway systems. In view of the densely populated nature of the districts through which the tramway will extend, a heavy and remunerative passenger traffic is assured. Then again, owing to the number of manufactories in the area served by the tramway, it is anticipated that considerable revenue will accrue from the carrying of freight, which will be conveyed cheaper by this means than by any other, and also from the supply of electrical power. The undertaking is being developed by the South Lancashire Electric Traction and Power Company, Limited, and the capital required to establish the enterprise will amount to about \$7,500,000.

A determined attempt is to be made in England to prove the capabilities of Marconi's wireless telegraphy for the prevention of disasters at sea. The experiments are being conducted under the auspices of the Board of Trade, Lloyds', the Trinity House Corporation, and several other institutions interested in maritime affairs. A mast thirty feet in height has been erected upon the pier at Southend, which town is situated at the mouth of the Thames. At the top of this pole is fitted a metallic conductor, which is connected with the usual instruments arranged in the pavilion. The apparatus is entirely automatic in its action, thus dispensing with the constant attendance of an operator. The vessels are each supplied with a bell, connected to a receiving instrument, which is actuated directly the ship enters the zone of influence of the shore apparatus, which in this case is a distance of seven miles. By this means the captain of the vessel receives ample warning of the danger he is approaching, since the bell continues ringing until he has once more passed beyond the sphere of influence. It is also intended that the shore apparatus shall transmit the nature and name of the danger spot to which it is attached, be it a sandbank, rock, or submerged wreck, so that the captain of the vessel is able to retain his bearings. If necessary, messages may be transmitted between the station and the vessel, since at the shore station it is only necessary to raise the transmitting wheel containing the name of the danger spot, and to actuate the apparatus in the usual manner. It is anticipated that the installation of such apparatus along both banks at the mouth of the Thames will be of inestimable value, especially during foggy weather, when the navigation of the river, which is difficult under normal conditions, is often rendered impossible, and strange vessels have to wait at the estuary, often for days at a time, until the fog has sufficiently cleared to enable them to make their way up the river to their desired destination.

Automobile News.

The Automobile Club of America has been notified by Col. John J. Astor that at least one of the proposed country houses on the road between New York and Albany will be ready this season. The house which Col. Astor has offered to place at the disposal of the club, without expense to them, is "The Maples," which forms a part of Col. Astor's Ferncliffe estate. It will be fitted up in the best manner for the requirements of the club.

King Leopold II. of Belgium is an ardent lover of the sport, and takes a keen interest in the development of the automobile in that country. He has decided to improve the roads, which in some parts of the kingdom are in a very bad state, and has charged one of the government engineers with the work of drawing up the plans. He is now having built in France a large automobile which approaches somewhat the idea of a palace car, as it will be divided into compartments. According to reports it is to have a sleeping chamber, a toilet room and a servants' compartment. This vehicle is to cost no less than \$50,000; the motor is built for 30 horse power, and its reservoir will contain 25 gallons of gasoline. The consumption of gasoline will cost about \$2 per hour. In this way King Leopold is to make his voyages in the future when he does not use his machine of the ordinary type.

A somewhat novel system for carrying the mail is now in use between two towns in France—Bonnéttable and Connerré-Breillé. These towns, 10 miles distant, are on a line of narrow-gauge railroad, but a part of the mail was formerly carried by a four-wheeled car running on the rails, provided with two bicycle movements and worked by two men. As this system of locomotion proved too slow, the railroad company has substituted a four-wheeled automobile car which has a 3-horse power gasoline motor, water cooled; the movement of the motor is transmitted to the rear axle by two round belts passing over two speed changing pulleys which are loose on the shaft and may be coupled by friction to a fixed pulley, mounted on the intermediate shaft. This shaft is connected by reduction gearing to a second intermediate shaft which carries a chain passing to the rear axle. Ball bearings are used throughout. A pedal operates a powerful band-brake upon the rear axle. The total weight of this car is 1,050 pounds, and it makes an average speed of 20 miles an hour. Since it has been put into use for carrying the mail its performance has been quite satisfactory.

An automobile exposition will be held at Hamburg, lasting from the 31st of March to the 14th of April. It will be installed in the Exposition Palace of the Rotherbaum Velodrome, a vast building, well lighted and having an area of 45,000 square feet. The Organization Committee are preparing for an exposition of considerable importance. Nine classes have been distinguished: 1. Automobiles and motors. 2. Automobiles in construction. 3. Moto cycles and voiturettes. 4. Boats. 5. Motors and accumulators. 6. Accessories. 7. Apparatus for automobiles and cycles. 8. Models, drawings, maps, etc. 9. Divers. At Breslau is held each year a kind of international fair or exposition of machines, which includes machines of all kinds, steam engines, etc., as well as automobiles and bicycles. This exposition, which is known throughout all Germany, attracts a large crowd of visitors to Breslau every year, the number being estimated at 25,000. The exposition lasts three days, and in general more than 150 exhibitors are represented, most of these being German firms, but some American, English, Swiss and Austrian firms are represented. This exposition is in its thirty-eighth year of existence. This year it will be held from the 6th to the 8th of June. It is expected that this year's exposition will contain a large number of automobiles shown by the principal German and European firms.

Telephone Journal at Budapest.

The system of "telephone journal" which has been in operation in Budapest for several years is meeting with increased success. The system was inaugurated in 1893; the subscribers receive their news by telephone instead of by a printed journal. All the interesting news is telephoned from the central office to the subscribers from 8 A. M. to 11 P. M. Each class of news comes at a certain hour, except for the news of the Stock Exchange and Parliament, which are given every half-hour as they are obtained. The subscription price is 75 cents per month by periods of four months each; no extra charge is made for the receiving apparatus or lines. The receiver is double, so that two persons may hear the news at the same time; the announcement of the communications is made by an electric bell. At the end of 1898 the system, which was limited to the city of Budapest, had already 550 miles of lines. At present the number of subscribers reaches nearly 7,000, this being eight times the number during the first year. The system is likely to be extended to the neighboring towns of Szegedin and Arad, as the preliminary trials which have lately been made have given good results.