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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 OCEAN RACE FOR THE GERMAN EMPEROR'S CUP.

With the recent closing of the entries for the German Emperor's cup, which occurred April 1, this great event, which in point of the size and number of yachts that are entered must rank as one of the most notable events in the history of yachting, begins to attract the attention which is surely its due. There is, of course, nothing new in the idea of a yacht race from Sandy Hook to some point on the English coast. There have been many such races, and the competing yachts were sailed with a reckless hardihood that has placed the records where it will be very difficult to surpass them in this or future races. Take, for instance, the "Henrietta," which, in 1866, made an average speed for the course of 9.36 knots and ran in one day a distance of 280 knots; and also the matchless "Sappho," which three years later made an average over the whole course of 9.66 knots, and ran in a single day 316 knots, a day's run which, however, was surpassed later by the "Dauntless," another famous schooner, which in 1887 reeled off 328 knots in twenty-four hours. This record of the "Sappho" stood until the year 1900, when the schooner "Endymion" averaged for the whole run across the Atlantic 9.66 knots, exactly the same average as that of the "Sappho." The "Endymion," moreover, broke the record for the whole course, which she still holds, crossing from Sandy Hook to the Needles in thirteen days, twenty hours, and thirty-six minutes. This fine run, however, was not made in a race, but in the course of an ordinary passage across the Atlantic, and therefore it stands in a class by itself.

There are so many variable conditions entering into a great ocean race such as this, that it is impossible, even for the self-constituted yachting sharp, to make any predictions either as to the winning yacht, or the speed at which the course will be sailed. Although all of the yachts are large vessels, the smallest of them being 86½ feet on the waterline, there is so much difference in their size, rig, model, and construction that it is futile to hazard a guess as to which boat would be the winner, even if they kept in close company all the way across, which they will not, and even if they should have steady, whole-sail breezes for the whole distance, which is even less likely. At the time of the year when the race will be sailed, the latter half of May, fair weather may be looked for, and in all probability not much reefing will have to be done.

If one were to endeavor to forecast the winner, he would have to prefix his guess with several "ifs" and a "but." We know that length means speed, and that size means ability to maintain headway in rough water; and hence, if winds from abeam to astern prevail, and strong winds at that, we should look to see the huge "Valhalla" lead the fleet into British waters; for with her waterline length of 240 feet, her ample sail spread, and big displacement, she should be able to reel off her 14 to 15 knots an hour with everything drawing. On the other hand, the form of the "Valhalla" is not nearly so fine or sweetly modeled as that, say, of the 101-foot waterline "Endymion" or the 135-foot waterline "Atlantic." This last named, a three-masted schooner, has certain recorded speeds to her credit which should enable her to drop the rest of the fleet in a reaching breeze and a fairly smooth sea.

It is interesting to note that there is one yacht entered in the race, the composite-built yawl "Ailsa," which is a fairly up-to-date racing machine. She was built in 1895 expressly as a competitor against the Prince of Wales's "Britannia," which at that time was sweeping everything before her. She has the light construction, fine model, deep lead, and large sail spread of the racing craft; and if she is so fortunate as to meet with weather that enables her to carry her full sail spread, she should make a creditable showing. The nearest approach to her in fineness of model and relative area of sail spread is the three-masted schooner "Atlantic." And, of course, the extra 36 feet of length of the latter will enable the "Atlantic" to leave the older racing yacht in a breeze of any strength.

From the standpoint of sentiment, interest will naturally center in that veteran yacht, the "Sunbeam," the story of whose wanderings was so delightfully written by Lady Brassey, many years ago. The "Sunbeam" has the length and the lines to maintain a fairly good speed if conditions are favorable. She has proved her staunchness in some of the most lengthy cruises in yachting history, and no doubt she will be able to carry her canvas with the rest of the fleet.

Of the eleven yachts that are entered, five were built in England, and six in America. Two of them will sail under the flag of the Royal Yacht Squadron; seven will fly the flag of the New York Yacht Club; one, the "Thistle" (which, by the way, will be sailed by her owner, Robert E. Tod, and will, therefore, be the only yacht in the race having an amateur skipper), will fly the Atlantic Yacht Club flag; and to a single yacht, the former Watson schooner "Rainbow," now the "Hamburg," which will fly the flag of the Kaiserlicher Yacht Club, will fall the honor of representing the yachtsmen of Germany.

THE DANGERS AND DIFFICULTIES OF TUNNEL BORING.

The joining of one of the twin passages of the 12¼-mile Simplon tunnel on February 24 last—which was fully described in recent issues of this journal and of the Supplement—brought to an end most of the difficulties the engineers of that great enterprise had to surmount, and made the completion of the work fairly easy. Never before in the history of land tunneling have such formidable obstacles been met and successfully overcome. Not only was there trouble from cracking and crumbling of the masonry walls by the great pressures they sustained, but also formidable springs of hot water were encountered, which made the temperature unbearable and flooded the workings. These hot springs made the boring of this celebrated tunnel through the Simplon range almost as difficult and dangerous a piece of work as is the boring of the North River and East River tunnels in New York city. Attention was called to this latter work, and the difficulties which attend it, by an accident which happened in the northernmost tunnel under the East River on March 27. This tunnel is being driven from the Brooklyn side of the river. It starts just west of Clinton Street, and has reached a point in the river 1,400 feet away, or about 20 feet beyond the stringpiece at the foot of Joralemon Street and between piers 17 and 18. It is being driven by a tunneling shield similar to that used in 1868 by the late editor of this journal, Mr. Alfred E. Beach, in constructing an experimental tunnel under Broadway. While this shield (with which our readers are doubtless familiar, as we have described it at various times) operates very well in solid earth, it having been used not only for land tunnels, but also for tunnels under water in various places, when it is used near the river bed in soft sand, such as is found in the East River, there are liable to be "blowouts," as they are termed, and these are exceedingly dangerous. As the shield is forced forward through the sand, the latter is kept from oozing in by means of compressed air. If it were possible to carry on the work with the air pressure at the point where it is equal to the pressure of mud and water at the top of the shield, there would be no difficulty; but as the bottom of the shield is nearly 20 feet below its top, a greater pressure than is needed at the top has to be employed in order to keep out the sand at the bottom. The result is that if the sand is not very firm or thick, the excessive air pressure at the top of the shield is liable to make an opening through the river bed and blow out, whereupon, if the air pressure is not maintained, water will flow in. It was just such an occurrence as this that cost the lives of twenty men in 1880, during the first attempt at driving a tunnel under the North River, although at this time work was being carried on without a shield and great risks were taken. The men doing the work in the East River tunnel knew that the river bed was treacherous, and they were provided with sandbags with which to stop up any small leak that might start, before it should have a chance to enlarge. In the accident mentioned, a workman in the upper part of the shield discovered a leak, and called to his mates below to hand up a sandbag. They did this, and he was about to stop up the leak when a large hole was blown through the river bed, and the rapidly escaping air forced the workman up through it and the water above and projected him, in a column of water, a few feet above the surface. He was rescued by men on the pier, and, save for a wetting, was unhurt. The other men in the shield managed to make their escape and shut the doors behind them. One of these men became wedged while making his escape, and it took half an hour to dislodge him. The air pressure meanwhile was kept at the point to which it fell as a result of the blowout. This was only a few pounds lower than the pressure that had been maintained.

In order to resume work, it was necessary to stop up the hole in the river bed. This was done by sinking a large sheet of canvas and loading it with bags of sand. The water was then pumped out of the shield, and work was begun once more. The river bed above the shield is only 8 or 9 feet thick where the accident occurred, and there is about 19 feet of water.

The air pressure in excess of atmospheric used to hold up this weight of water and sand was only just sufficient to balance the pressure of the water and sand at the bottom of the shield, and it caused a few pounds per square inch more pressure than was needed at the top. A bowlder was encountered and blasted a short time before the leak was discovered, and it is probable that the blast so loosened the sand that when the air once started to escape, it easily broke through a large passage for itself, and kept escaping until the air and water pressures became equalized. This accident is an example of what may happen when boring a tunnel under a river and near the surface of the river bed. In constructing the North River tunnel, it was necessary to thicken the river bed on the line of the tunnel, in order to prevent blowouts. In the present instance these have been avoided only by the greatest vigilance.

The system of constructing a tunnel from the surface by putting together the upper half, sinking it, placing it on piles, and then constructing the bottom half on a concrete foundation beneath—a system which was employed in the subway tunnel beneath the Harlem River successfully, and which we described in our July 2, 1904, issue—does away with the dangers we have mentioned and is also more expeditious. We understand it is to be employed in constructing a tunnel across the North River at 42d Street in the near future.

ELECTRIC STREET RAILROADS VERSUS MOTOR-PROPELLED VEHICLES FOR PASSENGER TRAFFIC.

During the past two or three years the conversion of the various street surface railroads in Great Britain to electricity has been carried out very extensively. But now a halt has been called in this development. During the past few months innumerable experiments have been carried out with motor-propelled omnibuses and the results have been somewhat remarkable. From these experiments it is evident that this type of vehicle and means of propulsion has been brought to the requisite standard of efficiency and reliability for this class of work. There are several motor omnibus services already being maintained in various parts of the metropolis, and as they have been introduced in competition with the electric railroads, some interesting comparative results have become available. From this it is conclusively demonstrated that for all-round work the motor vehicle is far more satisfactory, especially in crowded thoroughfares. In the first place, while its speed may not be so great as compared with what the electric vehicle running on the railroad can attain when the road is clear, yet, owing to its greater mobility, it can thread its way in and out of the other traffic with greater facility. It has been shown on numerous occasions that when the two types of vehicles have started from one point for another distant station, the latter has been reached by the motor omnibus in the shorter time. In one instance the motor omnibus service is able to maintain an average speed of 12 miles an hour through ordinary thoroughfares, whereas the electric car has only been able to average a speed ranging from 7 to 9 miles per hour.

At the present moment there are 162 motor omnibuses in course of construction for the various companies of London, which number, in the course of the next two years, is to be increased to 1,000. These vehicles cost on the average $4,000 apiece and have accommodation for 34 passengers. One of these 'buses has just completed a 2,000-mile reliability test. The vehicle is propelled by a four-cylinder motor developing 24 horse-power. The average daily run was 100 miles, the total weight of the car when loaded representing 5 tons. On average roads a speed of 16 miles an hour was maintained. The longest run made without any involuntary stop was 971 miles, which, considering the fact that no overhauling, cleaning, or other adjusting work was permitted upon the vehicle during the whole time, is in every way satisfactory. The gasoline consumption throughout the whole 2,000 miles aggregated 297 gallons, representing an average of approximately seven miles per gallon. Another important point in regard to these vehicles is their economy in operation as compared with their earning capacity. A motor vehicle running 700 miles per week can earn on the average from $250 to $350, while the working expenses for the same distance and period aggregate only $90.

At the present moment the London County Council are converting the whole of the surface railroads under their control to electric power. In one district, owing to the advance of the gasoline vehicle, the scheme of