Naval Architecture and Engineering

A SAILING yacht, being designed to attain the highest speed without the usual restrictive commercial considerations, provides an opportunity for the development of the ideal form of hull. If this is nicely balanced, the yacht keeps her course when heeled over, whereas if, on heeling, she tends to change course, she becomes a difficult boat to steer and can be described as unbalanced. In "A Law of Hydrostatics and its Influence on the Shapes of Sailing Yachts"—a paper read at the spring meeting of the Institution of Naval Architects held in March—Engineer Rear-Admiral Alfred Turner dealt with this question of balance. On heeling, the hull displaces an unsymmetrical volume of water, and may be considered as resting on the line of centres of buoyancy described as the metacentric shelf. This line does not form a plane curve; it may be very irregular, and from its irregularities there may arise a variable tendency to alter course according to angle of heel. The author investigates this by poising transparent paper patterns of a set of cross-sections and, after setting out Bouquer's law of balance with slight modifications, explains, by reference to the characteristics of some thirty-six vessels of which diagrams are given, the rules he has formulated.

In another paper, "The Development of the Two-stroke Cycle Oil Engine", read at this session, Mr. W. S. Burn, treating the subject from the marine point of view, explained its advantages over the four-stroke type in offering a cheaper, smaller, lighter and more efficient unit. The feature of first importance in its design is the evolution of a satisfactory method of scavenging, a process which has to be completed during the small movement of the piston and the small interval of time in which the exhaust ports are open. By means of a set of diagrams illustrating successful systems in use, the author explained their merits and classified them as uniflow or double-flow types. Scavenging being satisfactorily provided for, the two-stroke engine is shown to present, in other respects, a simpler problem for the designer owing to the greater freedom in arranging the combustion chamber, the cylinder head and piston crown, on each of which useful comment was made.

Marine steam boilers have, in the past, been regarded as immune from what is known as 'caustic embrittlement', but as in recent years a few cases have occurred in which the shells were found to be seriously affected and were condemned as unfit for further service, the problem has demanded the attention of marine engineers. The term is more picturesque than accurate, but the nature of the attack is characteristic and well defined, taking the form of intercrystalline fracture due to chemical action occurring only at the seams where two surfaces are in contact, and when the water is strongly alkaline and low in sulphates. The cracks follow the grain boundaries and are not transcrystalline as in the case of fatigue fractures. These points were illustrated by photomicrographs in a paper entitled "Note on the Chemical Intercrystalline Fracture of Riveted Joints in Boilers" read by Dr. S. F. Dorey, in which also he showed how the cracks in several joints examined were found to extend along the lines of rivet holes and along radial lines from these holes, invariably on the faces in contact.

While these results have always occurred in cases in which caustic soda was present, recent investigations suggest that the actual cause is the presence of sodium silicate in the soda or other chemicals used in the boilers. As soda was used in boilers long before caustic embrittlement was spoken of, the author thinks that possibly some difference in the method of manufacture of soda during the last thirty years may account for it and suggests that particulars of the analysis of the earlier supplies of soda may give some hint. He advises that care should be taken that nothing containing sodium silicate should be used in the treatment of boiler water and that, where soda is necessary, no more should be used than will maintain a neutral condition.

Science News a Century Ago

The Morse Recording Electric Telegraph

ON October 3, 1837, Samuel Finley Breese Morse, the American artist and professor of the "Arts of Design" at the New York City University, filed in the United States Patent Office a "Caveat" comprising: "1st, a system of signs by which numbers and consequently words and sentences are signified; 2nd, a set of type adapted to regulate and communicate the signs, with cases for convenient keeping of the type, and rules in which to set up the type; 3rd, an apparatus called a port-rule for regulating the movement of the type-rules, which rules by means of the type in their turn regulate the times and intervals of the passage of electricity; 4th, a register which records the signs permanently; 5th, a dictionary or vocabulary of words numbered and adapted to this system of telegraph; 6th, modes of laying the conductors to preserve them from injury."

Morse was born in 1791. He was the eldest son of Jedidiah Morse (1761–1826), "the first American geographer". Educated at Yale College, he determined to be a painter, and at the Royal Academy in London in 1813 exhibited his picture "The Dying Hercules". During 1829–32 he paid his second visit to Europe, studying art in France and Italy, and it was on his passage home in the sailing ship *Sully* that, after a conversation on the possibility of sending electric currents along wires, he conceived the "Morse code". He had little scientific knowledge, but at the New York City University was assisted by Leonard W. Gale, professor of chemistry, who was acquainted with the work of Henry.

On September 4, 1837, with an apparatus made by Morse, a continuous dispatch was effected in the form of V-shaped lines inscribed on a paper fillet, consisting of the numbers "215—36—2—58—112—04—01837" which, interpreted by a numbered vocabulary, made the phrase "successful experiment with electric telegraph, September 4, 1837". Early in 1838, Morse discarded the numerals and employed an alphabet of 'dots and dashes'.

The Thermo-electric Light

IN the *London and Edinburgh Philosophical Magazine* of October 1837 is a communication from Francis Watkins, a partner in the firm of Watkins and Hill, opticians and philosophical instrument makers, of 5 Charing Cross, in which he says: "I