## POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Tuesday evening, the 28th ult., the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; the chairman being Dr. R. Stevens, and John Johnson, Esq., acting as secretary *pro tem.*

MISCELLANEOUS BUSINESS.

*Deterioration of Cast Iron in Cylinders.*—Mr. Babcock described a peculiar deterioration of cast iron he had observed about the cylinders of an engine in Mystic, Conn. The water used was pretty pure spring or well water; steam worked at 60 lbs; india-rubber packing used in the cylinders; various kinds of oil used, but lately the best sperm. The steam pipes leading to the cylinder were not affected, and the interior of the cylinder, on which the friction of the packing took effect, was clean and bright as usual. But the parts of the cylinder beyond the reach of the friction were strangely changed. The surface of the iron was softened so that it might be whittled with a knife; bolts or screws lost their hold in it. The change sometimes reached the depth of one-half an inch.

Mr. Dibben—The effect was evidently not due to acids or other impurities in the water. The change seems to have begun at the point at which oil was used. The oil must have been quite impure, and the iron wsa converted into a kind of plumbago, which is a carburet of iron.

A stranger said he had observed similar changes of iron where there was no doubt that oil was the occasion of them.

Mr. Howe—There is not carbon enough in cast iron to produce its volume of plumbago; but the oil, which contains carbon, might furnish it.

The Chairman—Oils are often purified by acids, and the acids are not completely removed; also, the rubber of the packing contains sulphur. Both acids and sulphur destroy the tenacity of iron. It is quite common for boys to find pieces of iron about machine shops or foundries, which they carve with their jack-knives into images.

Mr. Seely—The facts which we are trying to explain are not clearly presented; we need a sample of the deteriorated iron. An analysis of it would show precisely the nature of the change. Cast iron completely dissolves or disappears in nitric acid; the iron is dissolved and the carbon is burned up. In hydro-chloric acid, the iron dissolves, and the carbon does not, but settles as a powder. But if the cast iron be left in salt water a long time, the iron is dissolved out, and the carbon is left in the coherent form of plumbago. The carbon being the electro-negative, possibly accumulates other negative matter with it; but we have no facts to warrant us in concluding that carbon itself is ever deposited by any electrical action. I do not believe, in the case in question, that the iron absorbs any carbon from the oil.

Mr. Stetson exhibited a sample of iron from the boiler which lately burst at a hat factory in Brooklyn. The plate was of reasonable thickness, but was composed of irregular laminæ—thickest and toughest on the outside—which might easily be separated from each other.

Mr. Selleck—Boiler plate is rolled down from "billets" about one foot in thickness. The billets are partly composed of old scraps, which should always be mixed in the same proportion to secure a uniform plate. But manufacturers are not careful enough, and often get an excess of scrap. Sometimes too large "blooms" are attempted to be worked with a light hammer; the strength is then on the outside, while, in the interior, the iron is rotten. Bits of soapstone (which lines the furnaces) often get into the mass of iron, and make bubbles and weak places. Iron may be good and its manufacture bad. The sample shown is good iron, but very poor plate.

The hour for miscellaneous business having passed, the chairman called up the regular subject—"Superheated Steam."

DISCUSSION.

Mr. Stetson—The trials of superheating have generally failed from overheating, and thus burning the superheating surface. The well-known trials on the *Arctic* and *John Farran* were unsuccessful from this cause and the complication of methods. At Mystic, Conn., they have had in operation, three years, a superheating system which realizes an economy of 25 per cent. It was the Wethered process of mixing superheated with normal steam, which failed on the *Arctic*. Mr. S. then illustrated, by an indicator card of the engine of the *Pacific*, made in 1853, the exact theoretical gain by superheating.

Mr. Babcock—The superheating contrivances at Mystic are automatic, and operate with great regularity; so that the temperature of steam does not vary 10° in 24 hours.

Mr. Dibben—Facts confirm the theory.

Mr. Goodwin—Was not a steam engineer, but saw many years ago an invention to remedy the difficulty from foaming in the boiler. The steam, before it issued away from the boiler, was made to pass through a considerable length of coiled pipe.

Mr. Fisher gave an account of several trials of superheating on steamers. There was as much failure as success; but we shall learn how to guard against the causes of failure. Superheating will some day be generally adopted.

Mr. Seely—Superheating steam, so-called, is much used in the chemical arts. Mechanics mean by "superheated" steam, "dry" steam; in addition to this, chemists sometimes mean only steam above 212°. Where steam is used for dessicating purposes, it must be dry; if hot-air has no injurious chemical effect, it is better and cheaper than steam. Steam is also used to effect decompositions by heat, as in charring wood, making stearine, &c.; and for this purpose it is not essential that it be dry. Superheated steam is also spoken of as a solvent, of quartz, for example. For this use, the steam must not be dry; and it is doubtful if water, at the same temperature, would not be more effective. I consider that a great deal of humbug is made about the use of steam for chemical arts.

Mr. Rowell—The subject of superheated steam for engines was first agitated here by Mr. Frost. He showed that steam at 212° was increased one volume by an addition of 4°; another by 12°; but that a third volume required about 500°. [This discrepancy, with the common notion of expansion by heat, is explainable by supposing that the steam at 212° maintains in suspension particles of water ready to burst into steam by a slight increase in heat.—Rep.]

The subject for the next meeting—the "Adulteration of Food"—was then selected, after which the association adjourned.

## AMERICAN NAVAL ARCHITECTURE.

In fulfillment of an intention expressed in the first paragraph of an article bearing the above caption, and published on page 131 of the present volume of the Scientific American, we now give the following details (reported expressly for this journal) of some recently-built steamers, embodying most of the modern improvements.

THE STEAMER "NEW LONDON."

This is a new vessel, built by the New London Propeller Company, and has recently taken her appropriate position on the route of her intended service, between New York and New London. Her dimensions, with minute particulars of engine and boiler, will be found annexed:—Length on deck (over all), 130 feet; breadth of beam (molded), 26 feet 8 inches; depth of hold, 8 feet; draft forward, 8 feet; draft aft, 10 feet; tunnage, 260 tuns. Her frame is of white oak and chestnut (molded), 12 by 8 inches and 9 inches, and is 24 inches apart at centers.

The *New London* is fitted with a vertical direct-action engine; diameter of cylinder, 34 inches; length of stroke of piston, 2 feet 6 inches; diameter of propeller, 9 feet; length of same, 1 foot 6 inches; pitch, 17 feet; and possesses 4 blades. She has one return tubular boiler; length, 18 feet; hight (exclusive of steam drum), 8 feet 8 inches. It contains two furnaces, the breadth of which is 3 feet 3 inches; length of grate bars, 7 feet 3 inches; number of flues, 26, internal diameter above, 16 of 8 inches: below, 8 of 3½ inches, and 2 of 16 inches; length of flues above, 16 feet 10 inches; below, 9 feet 8 inches; diameter of smoke pipe, 3 feet. The boiler is located on deck, and uses a blower to her furnaces.

She is fitted with one independent steam fire and bilge pump, and has, in addition to this, bottom valves or cocks to all openings in her bottom. She is schooner-rigged, has poop cabin and freight house forward to foremast.

Her hull was built by George Greeman & Co., of Mystic, Conn.; her engines, by C. H. Delamater of this city.

THE STEAMER "ALABAMA."

This steamer is a fine specimen of modern naval architecture, and does honor to her builders, Samuel Sneden & Co. She has been plying between the ports of New Orleans and Mobile since December last, and has, upon all occasions, more than exceeded the sanguine expectations of those who were interested in her erection. Annexed will be found full particulars of her dimensions, with minute details of engine and boiler:—Length on deck (from fore part of stem to after part of stern post, above the spar deck), 235 feet; length between perpendiculars, 225 feet; breadth of beam (molded) at midship sections, above the main wales, 32 feet 3 inches; depth of hold to spar deck, 9 feet; draft of water at load line, fore and aft, 4 feet; tunnage, 656 tuns; area of immersed section at above draft, 115 square feet. Her frame is of wrought iron plates, 5-16ths to ½ inch in thickness, and fastened with rivets ⅝ of an inch in diameter; the frames are molded, 3½ inches, sided, 5-16th inch, and 17 inches apart at centers; shape of same, Z Z; width of flanches, 3½ inches. The cross floors are 15 inches high, and 5-16ths inch in thickness; shape, Z, and fastened with ⅝ inch rivets every 2¼ inches.

The *Alabama* is fitted with a vertical beam engine; diameter of cylinder, 50 inches; length of stroke of piston, 10 feet; maximum pressure of steam, 25 lbs.; cut off at one-half stroke.

She has one return flue boiler, the length of which is 30 feet 6 inches; breadth of same at furnace, 12 feet; diameter at shell, 10 feet 9 inches; hight (exclusive of steam drum), 10 feet 9 inches. The boiler has 3 furnaces; breadth, 3 feet 7 inches; length of grate bars, 7 feet 2 inches. Number of flues above, 6 of 18 inches, and 6 of 9 inches; number below, 2 of 10 inches, and 8 of 15 inches; length of same, above, 26 feet 2 inches; length below, 17 feet 5 inches; diameter of smoke pipe, 4 feet 2 inches; hight above grates, 30 feet.

The diameter of her paddle wheels (over boards) is 29 feet 8 inches; length of blades of same, 8 feet; depth, 24 inches, and 26 in number. The boiler is located in the hold, and does not use blowers.

She has one independent (extra size) steam fire and bilge pump, one bilge injection, and bottom valves or cocks to all openings in her bottom; also, water wheel guards fore and aft, bunkers of wood, and four water-tight bulkheads. There is a commodious saloon on the main deck, and a saloon cabin above.

The machinery was built by the Morgan Iron-works, this city; the owners are J. L. Day and others.

THE STEAM TUG "YANKEE."

This tug is a very powerful one for her size, and a short time since began her duties as a tow-boat in the harbor of New York. She was built in this city by Thomas Collyer, and is owned by Russel Sturgis. Her frame is of white oak and chestnut, and very securely square fastened with copper and treenails. The dimensions of her hull are as follows:—Length on deck, 146 feet; breadth of beam (molded), 25 feet 6 inches; depth of hold, 10 feet; area of immersed section at load draft of 5 feet, 170 square feet.

The *Yankee* is fitted with a cross-head engine; diameter of cylinder, 38 inches; length of stroke of piston, 8 feet 8 inches.

The diameter of her water wheels (over boards) is 21 feet 6 inches; length of boards, 9 feet; depth, 3 feet; number of same, 20.

She has one return flue boiler, built in this city in 1858; length, 20 feet 3 inches. It is located in the hold, and uses a blower. Her bunkers are made of wood. She is not rigged, and not coppered; possesses one smoke pipe; has no independent steam fire and bilge pump, and no opening in her bottom, has, however, one bilge injection; is not supplied with water wheel guards; tunnage, 376 tuns.

The builder of the engines of the above vessel is J. P. Allaire, of this city.

## SAVING LIFE IN SHIPWRECK.

Messrs. Editors:—The recent marine disasters (stranding of ocean steamers, and loss of life) has prompted me to make, through the columns of your much valued paper, the following suggestion to the minds of those interested. When a ship is stranded with a strong wind on shore, why would not a common kite,

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