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NEW YORK, SATURDAY, OCTOBER 15, 1864.

Contents:

(Illustrations are indicated by an asterisk.)

BENZINE AND BENZOLE.

A New York correspondent, O. H. K., requests us to point out the difference between benzine and benzole.

There are 68 elementary substances at present known, and these combine with each other in various ways to form all of the thousands of substances which exist on this earth. The compound substances are generally entirely different in their properties from the elements which unite to form them. For instance, nitrogen and oxygen are mechanically mingled together to constitute the air we breathe, but if these same elements are chemically combined in certain proportions they become nitric acid, a liquid of such corrosive power that if a single spoonful was introduced into the lungs of any person it would burn them to cinder.

Most of these elements combine together in only a very few proportions. For instance, carbon and oxygen in only two, one atom of carbon combining with one of oxygen to form carbonic oxide, and one atom of carbon combining with two atoms of oxygen to form carbonic acid. It is beyond the power of the chemist's art to induce these two elements to combine chemically without the presence of a third element, in any other proportions but these two. Hydrogen and oxygen also combine in only two proportions. One atom of hydrogen combines with one atom of oxygen to form water; and one atom of hydrogen combines with two atoms of oxygen to form the deutoxide of hydrogen, a sweet liquid wholly unlike water.

But carbon and hydrogen in their combinations with each other stand out as a remarkable exception to the general law. They combine in hundreds of different proportions, forming as many substances, each with its distinct and peculiar properties. There are several series of hydro-carbons, and the series which has been most studied is the coal tar series.

When bituminous coal is subjected to a high heat under shelter from contact with the air, it undergoes destructive distillation; it is decomposed and the elements of which it is constituted enter into new combinations, to form new substances. The kinds of substances formed vary with the temperature at which the destructive distillation takes place. At a bright cherry red are formed the hydro-carbons which mechanically mixed constitute illuminating gas and coal tar. Some of these are so volatile as to retain the gaseous form at ordinary temperatures, and all of the others are condensed in the form of tar by passing the vapors from the retort through cold water. Among the most volatile of the coal-tar hydro-carbons is benzole. This substance has the property of crystalizing at a temperature of 32°, and can therefore be easily separated from the mixture. It is a very volatile liquid, and is a powerful solvent of gums, oils and resins. This property adapts it for use in making varnishes. It is from benzole that the coal tar dyes are made. By treatment with nitric acid and nascent hydrogen, it is converted into aniline, which by oxidation is changed to magenta, solferino, and the others of these brilliant and beautiful colors.

Petroleum consists of hydro-carbons, only two or three of which have yet been separated from the mixture. It has recently been stated in England that a trace of benzole had been found in some specimens of petroleum, but other chemists have been unable to obtain it.

The benzine of our markets at the present time is merely the most volatile portion of petroleum. If it contains any benzole it is only a trace, and not enough to modify its properties. It is doubtless a mixture of various hydro-carbons, and varies in chemical composition and in its properties with the different wells from which it is produced. Its power of dissolving gums and resins is much inferior to that of benzole, and hence its unsuitableness for making varnishes. In the absence of benzole, of course no aniline, and therefore no aniline dyes can be made from it.

THE COOPER INSTITUTE.--WHAT ONE MAN HAS DONE.

Peter Cooper, Esq., of this city, commenced life as a poor boy, and while yet a young man he resolved that if he was ever able he would give to other young men like himself who might desire an education an opportunity of acquiring it. This generous purpose he has held with singular tenacity through many years of toil and saving, and now in his old age he has the exalted satisfaction of seeing the noble day dream of his life accomplished. He erected some years since a great building extending from Third to Fourth avenues and from Seventh to Eighth streets, in this city, and has given it into the hands of trustees to be devoted forever to the instruction of those desiring knowledge, without money and without price.

The building and grounds cost $630,000, more than half we are told of the donor's fortune. The lower story and a portion of the halls are rented, yielding an income of more than $25,000 a-year, which is all appropriated to the support of a magnificent reading-room, to teaching, and to lectures; all being perfectly free to all comers. The lectures on natural philosophy and chemistry are illustrated with costly apparatus, and competent teachers are employed in all departments, including engineering, draughting, sketching, painting, modeling, etc. The number of teachers and professors is 17, and the number of pupils who entered the several classes last year was 1,281. The term of instruction commences on the 1st of October, and now is a good time for any of the young men among our city subscribers to enter their names for a winter's course of instruction. Some of the young men in our office are availing themselves of this unusual opportunity of obtaining an education in engineering, draughting, etc., free of expense to themselves.

THE "CHICKASAW."

We have already stated that the turreted steamer *Chickasaw*, which played so important a part in the fight in Mobile Bay, is not one of Ericsson's Monitors. She was built at St. Louis, by Mr. James B. Eads, from plans designed by himself. The monitors are understood to be vessels designed by Mr. Ericsson, with vertical side armor and an overhanging projection extending beyond the bow and stem, with one propeller, and turrets rotating on the deck. The *Chickasaw* has side armor flaring outwards at about 40 degrees from the vertical; has no long projecting overhang forward or aft; and has four propellers arranged to facilitate maneuvering. She exceeded the speed required by contract (which was 9 knots), and was 6 inches lighter than the contract draught, which was 6 feet. When the latter fact was known her deck plating was doubled by order of the Department, and is now of the same thickness as that on the *Puritan* and *Dictator*, 1½ inches. With this additional plating she draws but 6 feet, and her speed, with this extra burden, exceeds 9 knots. The deck and plating extend aft over the propellers to protect them, but do not touch the water.

The dimensions of this vessel are, extreme length 230 feet, extreme breadth 56 feet, 1,300 tuns measurement. Her propellers are 7 feet 10 inches in diameter; she has 4 engines, with cylinders 26 inches in diameter and 2 feet stroke, and 7 high pressure boilers. She carries 2 turrets, 7½ feet high, with walls 8 inches in thickness, and the base 8 inches below the level of the deck.

BRAGER'S PAINTING OF THE "KEARSARGE AND ALABAMA."

H. Durand Brager is one of the most eminent painters of France, his speciality being the painting of sea views. He has been much employed by the French Government, and during the Russian war was attached to the Admiral's ship with the purpose of making sketches for paintings of naval battles and other incidents connected with the operations at sea.

Mr Brager has executed a painting of the combat between the *Kearsarge* and *Alabama*, which is now on exhibition at Goupil's gallery, corner of Broadway and Ninth street, in this city. In making the painting the artist had the benefit of hints and directions from Captain Winslow, and he has doubtless produced a very correct representation of this immortal scene.

The time selected is just as the *Alabama* began to sink, and before she had lowered her pirate flag. In the fore distance is the *Kearsarge*, a stately man-of-war, presenting her port bow to the spectator and her starboard broadside to her antagonist, which is seen in perspective, her stern slowly settling beneath the waves. The *Kearsarge* is near enough to show the forms and positions of the men upon her, and a prominent group are seen on the forecastle deck training a heavy gun upon the enemy. There is a singular air of coolness and confidence about both the vessel and the crew. The genius of the painter has hit off the attitudes of the men with a touch of his brush, and they seem to be going through their duties with the promptness but deliberation of perfect drill. Though volumes of smoke are rolling from her chimney, there is no dash of spray around the vessel's bows, which rise majestically above the water,

"And in her look the calm that comes
From consciousness of strength."

There has been some talk of purchasing the picture and presenting it to Capt. Winslow. The price asked for it is $5,000.

SPECIAL NOTICE.

STANHOPE W. MARSTON, of New York City, has petitioned for the extension of a patent granted to him on Jan. 7, 1851, for an improvement in trigger operating revolving fire-arms.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, Dec. 19, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the final hearing.

New English Steam Engine.

An English Lieutenant has invented a new style of engine which is designed to be exceedingly compact and simple in its details. It is merely a cylinder fitted with a very deep piston. This piston has a cylinder inside of it, running at right angles with the bore of the main cylinder. There are two pistons in this cylinder which connect by rods to a crank shaft running through the large cylinder. The deep piston also connects to this crank shaft, so that when it has made one stroke, carrying the crank shaft part of the stroke, the small cylinders in the main piston act on the crank shaft, and also impel it. The whole engine is no larger than the cylinder; everything being enclosed in it. Steam is used on the smaller cylinders first, and then let into the larger one.

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