

pec was approaching her at full speed, and the *Monongahela*, *Lackawanna*, and this ship were bearing down upon her, determined upon her destruction. Her smoke-stack had been shot away, her steering chains were gone, compelling a resort to her relieving tackles, and several of the port-shutters were jammed. Indeed, from the time the *Hartford* struck her until her surrender, she never fired a gun. As the *Ossipee*, Commander Le Roy, was about to strike her, she hoisted the white flag, and that vessel immediately stopped her engines, though not in time to avoid a glancing blow. During the contest with the rebel gunboats and the ram *Tennessee*, and which terminated by her surrender at ten o'clock, we lost many more men than from the fire of the batteries of Fort Morgan. Admiral Buchanan was wounded in the leg, two or three of his men were killed, and five or six wounded. Commander Johnston, formerly of the U. S. Navy, was in command of the *Tennessee*, and came on board the flagship to surrender his sword and that of Admiral Buchanan. The surgeon, Dr. Conrad, came with him, stated the condition of the Admiral, and wished to know what was to be done with him. Fleet-surgeon Palmer, who was on board the *Hartford* during the action, commiserating the sufferings of the wounded, suggested that those of both sides be sent to Pensacola, where they would be properly cared for. I therefore addressed a note to Brigadier General B. L. Page, commanding Fort Morgan, informing him that Admiral Buchanan and others of the *Tennessee* had been wounded, and desiring to know whether he would permit one of our vessels under a flag of truce to convey them with or without our wounded to Pensacola, on the understanding that the vessel should take out none but the wounded, and bring nothing back that she did not take out. This was acceded to by General Page, and the *Metacomet* proceeded on this mission of humanity.

"In this connection I must not omit to call the attention of the Department to the conduct of Acting Ensign Henry C. Niels, of the *Metacomet*, who had charge of the boat sent from that vessel when the *Tecumseh* sunk. He took her in under one of the most galling fires I ever saw, and succeeded in rescuing from death ten of her crew within 600 yards of the fort. I would respectfully recommend his advancement. The commanding officers of all the vessels who took part in the action, deserve my warmest commendations, not only for the untiring zeal with which they had prepared their ships for the contest, but for their skill and daring in carrying out my orders during the engagement. With the exception of the momentary arrest of the fleet when the *Hartford* passed ahead, and to which I have already adverted, the order of battle was preserved, and the ships followed each other in close order past the batteries of Fort Morgan, and in comparative safety, too, with the exception of the *Oneida*. Her boilers were penetrated by a shot from the fort which completely disabled her, but her consort, the *Galena*, firmly fastened to her side, brought her safely through, showing clearly the wisdom of the precaution of carrying the vessels in two abreast. Commander Mullany, who had solicited eagerly to take part in the action, was severely wounded, losing his left arm. In the encounter with the ram, the commanding officers obeyed with alacrity the order to run her down, and without hesitation exposed their ships to destruction to destroy the enemy. Our iron-clads, from their slow speed and bad steering, had some difficulty in getting into and maintaining their position in line as we passed the fort, and in the subsequent encounter with the *Tennessee*, from the same causes, were not effective as could have been desired; but I cannot give too much praise to Lieutenant Commander Perkins, who, though he had orders from the Department to return North, volunteered to take command of the *Chickasaw*, and did his duty nobly.

"The *Winnebago* was commanded by Commander T. H. Stevens, who volunteered for that position. His vessel steers very badly, and neither of his turrets will work, which compelled him to turn his vessel every time to get a shot, so that he could not fire very often, but he did the best under the circumstances.

"The *Manhattan* appeared to work well, though she moved slowly. Commander Nicholson delivered his fire deliberately, and, as before stated, with one of his 15-inch shot broke through the armor of the

Tennessee, with its wooden backing, though the shot itself did not enter the vessel. No other shot broke through her armor, though many of her plates were started, and several of her port-shutters jammed by the fire from the different ships."

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, Sept. 15th. From the proceedings we select a few items:—

NOVEL APPARATUS FOR RAISING PETROLEUM.

Dr. Rowell exhibited a glass model designed to illustrate the action of an apparatus previously mentioned by Mr. Overton as having been recently introduced in the oil region for raising petroleum. By the present mode, after a hole some four or five inches in diameter is bored through the earth down to the oil, a pipe is introduced with a pump near the bottom, and the oil is thus pumped out. In some cases the pressure of gas upon the surface of the liquid forces the oil nearly up to the surface, and it is in these cases that the new apparatus is employed. A second pipe is introduced into the hole with its lower end bent upward so as to enter the lower end of the first pipe. Air is then forced by an air pump down through the second pipe into the lower end of the first pipe, and as the bubbles rise along this pipe they so reduce the weight of the liquid column that the pressure of the gas raises it to the surface, and thus a constant flow is secured. Dr. Rowell's apparatus consisted of two glass tubes immersed part of their length in water, with the lower end of one tube bent up and entering the lower end of the other. On blowing into the bent tube, the weight of the aqueous column in the other tube was so reduced by the bubbles of air that the pressure of the water outside of the tube forced the water within the tube to the top, and it overflowed.

The President remarked that this plan would require a larger expenditure of power than the pump, as the friction of an air pump is very great.

Dr. Rowell suggested as a counterbalancing consideration, that with the pump, motion must be imparted at every stroke, not only to the long line of pump-rods, but also to the whole liquid column, while with this air pump arrangement the flow of oil would be constant. There would, therefore, be less expenditure of power in overcoming inertia.

PETROLEUM FOR CURRYING LEATHER.

Mr. Page stated that the leather of which his boots were made was curried with petroleum in place of the fish-oil usually employed, and that, though a year old, it had shown no signs of cracking. He observed that many leather dealers thought petroleum made the leather tougher than fish-oil.

COST OF REFINING PETROLEUM.

Mr. Page, in reply to a question, said that the average cost of refining petroleum is about five cents per gallon, besides the loss or shrinkage, and that this ranges from 10 to 40 per cent.

PETROLEUM CANDLES.

Mr. Page remarked that he had compared the candles made of Marietta paraffine with the best sperm candles, and their superiority was very marked. They are just about as hard as lead, and remain perfectly solid and dry in the hottest climates.

The Preservation of Fruit was selected as the subject for the next evening.

THE ONE THOUSAND-POUNDER CANNON.

On page 282, Vol VI. (new series) of the *SCIENTIFIC AMERICAN*, was published the following report made to the War Department by Capt. Rodman, on the 17th of April, 1861:—

"The entire success which has attended the manufacture and trial of the 15-inch gun, leaves no doubt of our ability to make reliable guns of even greater diameter of bore than 20 inches, and to maneuver and load with facility, and without the use of machinery, guns of that caliber. A 20-inch gun, one caliber thick, 210-inch length of bore, and 20 feet total length, would weigh about 100,000 lbs. A solid sphere of iron, 20 inches diameter, would weigh about 1,000 lbs. A shell, 20 inches exterior diameter, 6-66

inches thick, would weigh about 985 lbs. The ordinary service shell need not be over 3.5 inches thick; would weigh about 725 lbs., and contain about 38 lbs. of powder, making the total weight of the loaded shell about 763 lbs. Shells only 3 inches thick may be fired without danger of breaking in the gun; they would weigh about 657 lbs. each, and contain about 48 lbs. of powder, giving the weight of the loaded shell about 705 lbs. Adopting the same method of loading as for the 15-inch gun, nine men, four at each end of the handspike, would load this gun with nearly the same facility that five did the 15-inch gun; and seven men could load it. The charge of powder to impart the ordinary velocity to one of these shells, would be about 100 lbs. The living force of the service shell would equal that of six 10 inch solid shot, and that of the battering shell would considerably exceed that of seven 10-inch solid shot; and the destructive effect of such shells, compared with 10-inch shot, upon iron-clad ships and floating batteries, would be in a much higher ratio; their whole crushing force being brought to bear upon a single point at the same time, while that of the smaller shot would be unavoidably dispersed, as regards both time and point of impact. While, therefore, fully recognizing the principle that the destructive effects of projectiles upon a strongly resisting object, increases in a higher ratio than as their calibers, and having no doubt that reliable guns of larger caliber may be readily made, yet, from the fact that 20 inches is about the largest caliber that can be readily loaded and maneuvered, without resort to machinery, and because it is not deemed probable that any naval structure, proof against that caliber, will soon if ever be built, I propose 20 inches as the caliber next to be tested."

This idea, so clearly formed in all its details in the mind of the ordnance officer three years ago, is now embodied in solid metal. The first 20-inch gun, the largest piece of practical artillery ever constructed, is lying on the wharf at Fort Hamilton, eight miles below this city. The muzzle is marked "20-inch No. 1, Fort Pitt, 1864, 116,497 pounds." The gun was cast at the Fort Pitt Foundry, Pittsburgh, Pa., on the 11th of February, 1864, under the superintendence of R. Aulick, U.S.N., and his official report of the operation was published, with an illustration of one of the furnaces, on page 182, Vol. X., *SCIENTIFIC AMERICAN*. The dimensions of this monster cannon are, total length, 20 feet 3½ inches; length of bore, 17 feet 6 inches, greatest diameter, 5 feet 4 inches; least diameter, 2 feet 10 inches. The chamber is simply a hemispherical finish of the bottom of the bore, as we ascertained by going inside and examining it.

NEW BOOKS AND PUBLICATIONS.

THE MARINE STEAM ENGINE. Main and Brown. H. C. Baird, 406 Walnut street, Philadelphia, Publisher.

Very many persons write to us weekly asking information on the subject of the Marine Steam Engine, and where they can find a work treating upon it in detail. To such persons we recommend this work, for it contains accurate descriptions of the marine engine in its various forms; both vertical, horizontal, and inclined. The subject of valve gearing and valves, especially the English D-valve, long and short, is treated of in a lucid and interesting style. In addition to the illustrations, there is a large amount of technical matter referring to the management of engines, when disabled or under peculiar circumstances, as for instance, "how to ascertain if the piston be tight," "danger from impure air in boilers," "to get a cylinder cover into its place," "piston loose on the rod," "on stopping cracks in boilers," and other subjects of a similar character. From this the engineer or student will see that the work is a valuable one, and any one at all connected with or interested in the steam engine should possess a copy.

WEBSTER'S UNABRIDGED.—Messrs. G. & C. Merriam, Publishers of Webster's Dictionary, have recently issued a new edition of the Unabridged, which renders the Lexicon more valuable than ever. The enterprising Publishers seem determined that no work shall excel theirs, and thus by additions constantly being made in their new editions they keep Webster the acknowledged standard.