A WONDERFUL LITTLE STEAMER.

A St. John's (N. F.) dispatch, dated the 22d of June, says: The little steamer *Anthracite*, which left London, via. Falmouth, England, 18 days ago, on a voyage across the Atlantic, arrived at this port yesterday. She is the smallest vessel that ever steamed from Europe to America. Her total length is 84 ft., beam 16 ft., and depth 10 ft., her engine and boiler room being 22 ft. 6 inches. Her gross tonnage is 70.26 tons. The voyage was undertaken for the purpose of testing the capabilities of the Perkins system of high pressure engines, and the success that has thus far been achieved by the little vessel is likely to lead to a revolution in marine architecture. Throughout the entire passage the weather was unusually boisterous, and there can be no doubt that under more favorable circumstances the time of the little ship would have been much better.

The economy in the consumption of coal and water affected by the use of the Perkins system of boilers is something wonderful. Only 20 tons of coal were consumed by the *Anthracite* on the trip across, and 436 gallons of water. The Perkins system consists of a tubulous boiler, in which the steam is generated at an exceedingly high pressure. By means of a special system of engine this steam is used and reused over and over again. The boiler is constructed of horizontal tubes, welded up at each end. These horizontal tubes are connected by small vertical tubes, and the boiler is proved to 2,500 lbs. per square inch. In the engine there are three cylinders, of different diameters: 8-inch, 16-inch, and 23-inch diameter respectively, with 15-inch stroke. The smallest one is placed over that of medium size, and worked from the same piston rod. The engines are of 20 horse-power nominal, and 168 horse-power indicated. The high-pressure and medium cylinders are single acting, the low-pressure one being double acting.

The *Anthracite* intends to leave as soon as possible for New York, in order to give a practical exhibition to the engineers and others interested in such matters in the United States of the benefits and advantages of the Perkins system. The captain and officers of the little craft profess to be abundantly satisfied with the results of the voyage.

The Heart as a Machine.—The heart is probably the most efficient piece of physical apparatus known. From a purely mechanical point of view it is something like eight times as efficient as the best steam engine. It may be described, mechanically, as little more than a double force pump furnished with two reservoirs and two pipes of outflow; and the main problem of its action is hydro-dynamical. The left ventricle has a capacity of about three ounces; it beats 75 times a minute; and the work done in overcoming the resistance of the circulating system is equivalent to lifting its charge of blood a little short of ten ft. (9.923 ft.) The average weight of the heart is a little under ten ounces (9.29 oz.). The daily work of the left ventricle is, in round numbers, 90 ft.-tons; adding the work of the right ventricle, the work of the entire organ is nearly 125 ft.-tons. The hourly work of the heart is accordingly equivalent to lifting itself 20,000 ft. an hour. An active mountain climber can average 1,000 ft. of ascent an hour, or one-twentieth the work of the heart. The prize Alp engine, "Bavaria," lifted its own weight 2,700 ft. an hour, thus demonstrating only one-eighth the efficiency of the heart. Four elements have to be considered in estimating the heart's work: (1) the statical pressure of the blood column equal to the animal's hight, which has to be sustained; (2) the force consumed in overcoming the inertia of the blood-veins; (3) the resistance offered by the capillary vessels; (4) the friction in the heart itself. This, in a state of health, is kept at its minimum by the lubricated serous membrane of the pericardium.—*Scientific American.*

DYNAMITE FOR REMOVING STUMPS.

A correspondent of an English agricultural journal gives the following account of his use of dynamite for removing stumps of trees felled in a park at Mentmore, Bucks, in order to improve the landscape and leave more room for the rest of the trees to develop themselves:

The only tools required are an earth auger, which is similar to an old-fashioned wood auger, two inches diameter at the bit end, about four ft. long, and fitted with a slightly hollowed shield or cap, which the man fits against his chest when boring (this is used for boring holes between the fangs), a crow-bar, a grafting and a stock ax. Suppose a large root is to be removed out of the ground: a hole is made with the earth auger between two of the strongest fangs; this is put in at an angle, so that the bottom of the hole is as near under the center of the root as is possible. The hole is then charged with a few cartridges of dynamite; according to the size and strength of the root; a primer cartridge, containing cap and fuse, is then inserted on the top of the charge, and the whole rammed down with loose earth by a wooden rammer. The end of the fuse is then lighted; this explodes the cap, and that in its turn the dynamite, and the whole mass is usually blown out, breaking the root into convenient pieces for loading up or burning. The fuse is cut off at sufficient length so as to allow the workmen to get out of danger, which is usually from 50 to 100 yards, according to the strength of the charge. After the charge has exploded, seldom anything remains but a large hole, much resembling the bed of a boiler. I took particular notice that no damage whatever was done to the surrounding trees. We had nearly 400 roots got out by this process, and with two of our common laboring men, with one man sent by the agents of the dynamite company, we have been able to remove from 25 to 30 per day of roots averaging from a foot and a half to four ft. and a half in diameter. I find from careful calculations made that we have been enabled to remove the roots in a far more expeditious manner than hitherto, and at from 50% to 60% less cost. No one need be prevented from using dynamite on the score of its being dangerous, for with ordinary care it is, in my opinion, as safe to use as gunpowder.

An improved system of constructing and driving piles, lately introduced in London, seems to have proved quite successful. According to the *Engineer*, these piles, which are tubular, can be made of either cast or wrought iron, and the thickness of the metal can be proportioned to suit the varying circumstances of construction; the lower end of the pile is made solid and pointed, is generally of wrought iron and steel tipped; the piles are also formed in sections, screwed together by strong steel sockets or joint covers, which are barrel-shaped on the outside, in order to diminish friction when being driven. Instead of blows being delivered on the head of the pile, the driving force is expended just where it is needed, namely, at the point, and this result is attained by using an elongated cylindrical driving weight, which travels easily inside the tube; the weight is raised by means of ropes or rods, and is allowed to fall on the flat head of the solid point, the pile thus forming its own guide for the driving weight. The effect of each blow is to drag, rather than drive the pile down; the point is swelled, and of sufficient diameter to effect a clearance for the joint covers, which have to follow it down, the whole operation being one of entire simplicity.

Mineral-tanned leather is impervious to water, and is said to be much more durable than leather prepared in the ordinary manner. Tests have been made, which show that belts of mineral-tanned leather are not only 30% cheaper, but are stronger than common belts. The mineral process of tanning is reported to have been introduced into eight tanneries in Germany.

A GRAND WORLD'S FAIR IN NEW YORK.

For two years a constant agitation has been kept up in New York for the holding of an international exhibition in this country in 1883. The dwellers in towns remote have, during this period, heard but little of the labors of the handful of public-spirited men who have persistently carried forward the movement to the point it has now reached. Patiently and prudently they have gone on from stage to stage, having the satisfaction at each successive step to witness a decided advance in all the essential elements of success. The holding of an international exhibition in this country in 1883 is now an assured fact. The initiatory difficulties inseparably connected with a scheme of such magnitude, particularly those in regard to the obtaining of necessary legislation, have all been overcome, and the preliminary arrangements and complete organization of the United States International Exhibition Commission of 1883 are being pushed forward to a speedy completion. A special act of Congress providing for the holding of such exhibition has been obtained; bills have been passed in the New York Legislature granting to the Commissioners who may be appointed powers to acquire such lands, etc., as may be requisite, and the Governors of the several St tes are rapidly nominating Commissioners to assist the project to a successful termination. The plan of the proposed exposition is on a scale of such magnitude that it completely eclipses everything of the kind in the past, and may probably never be surpassed in the future, and the movement has now entered upon a career of popular recognition and public favor which guarantee the ultimate accomplishment of all its projectors have hoped to realize.

The Phosphates in Food.—Prof. Horsford says, in a recent paper, it is a familiar fact that some persons of a feeble digestive power prefer embrowned meats and toasted bread, to undone flesh and plain bread. The difference between them is mainly due to the effects which incipient burning has produced; and one of these effects is the more or less perfect separation of the phosphates from the organic radicals entering into the composition of the tissue. The ashes of wheat, rye, oats, Indian corn and barley, and of seeds in general, contain phosphoric acid. It also occurs in the ashes of most animal tissues other than bones or teeth. In some of them, as in fish meat, the phosphates are feebly combined. A mere soaking of a piece of cod-fish in water for a few moments will separate sufficient phosphoric acid to yield a ready reaction with the usual tests. Fish as an article of diet has been commended, because of the facility with which it may be digested, and because it has been supposed to be especially suited to supply nutriment to cerebral tissue. It has been suggested that the facility with which the phosphates may be disengaged from the complementary part of the fish tissues, is the explanation of both these peculiarities, and in some degree of the process of digestion as a whole. The emulsion, which results from the action of the ferment and mineral acid, like hydrochloric acid in artificial digestion, is to produce an acid phosphate. It is but reasonable to infer that the addition of the acid phosphate to food, or its administration as a medicine, will prove nutritious.—*Medical and Surgical Reporter.*

Economical Engineering in the St. Gothard Tunnel.—Colladon enumerates the following advantages from the use of his compressors: 1. A saving of more than 600,000 francs ($120,000) in the simple purchase of compressors. 2. The reduction of the cost of buildings to about one-tenth of what would otherwise be required. 3. A ventilation so complete that the ventilating fans, which had been previously purchased, are entirely useless, and their whole cost might have been avoided.