The pier at Herne Bay, England, three-quarters of a mile in length, was designed by the distinguished T. Telford, C. E., and was built of timber in 1831. After standing seven years the timber piles were found so much injured by the worm that it was decided to use cast iron to a great extent in its repairs. Accordingly a large number of square cast-iron piles were driven down in 1838. These were examined recently by Mr. Webb, and found in a perfect state. The angles of the piles were sharp, and the surface as smooth and sound as when the castings left the foundry. About half of the piles only are of cast iron, and upon these not a penny has been expended since they were put down. The wooden piles have nearly all been cut down by the sea worm, and have required constant repairs and renewals. Mr. Telford had proposed cast iron in the first place for the piles of this pier, and had these been used, the whole structure would have been as sound to-day as when it was constructed. With the exception of the cast-iron piles which have been in the sea water 23 years uninjured, this pier may be termed a ruin. In the extension of Southend Pier, England, by James Simpson, C. E., in 1844, cast-iron piles were used. These have been under sea water for 17 years, and are perfectly uninjured.

As some kinds of cast iron become soft when exposed to water and in damp situations, the kind of metal to be used for docks and piers forms a most important consideration, as it is an undoubted fact that the several cases cited prove that cast iron has withstood the action of sea water perfectly for periods ranging from seventeen to forty years. With respect to the quality which should be employed in sea water, Mr. Webb states that James Simpson, C. E., the successful constructor of one of the piers mentioned, stated that grey cast iron, having a good surface, experienced little injury from the action of sea water. Iron composed of large crystals, and especially if these are irregular, is subject to rapid deterioration in sea water. The softer the iron, the greater is its liability to decomposition. A quality of iron between the limits of extreme softness on the one hand and extreme hardness on the other should be selected by the engineer. Hard cast iron is the most durable, but when very hard it is too brittle. Chilled cast iron corrodes faster than green-sand castings. The glazed skin produced by the sand of the mold in casting should be carefully protected from being broken, cut with a tool or otherwise removed, when the casting is to be placed under sea water. This glazed skin is like a coating of unchangeable silica. Lead, copper, and all metals less oxidizable than iron should not be permitted to come in contact with it, because a positive and negative metal, connected together in water, form a galvanic pile, and the positive metal then oxidizes with great rapidity.

PRESENT CONDITION OF THE "ROANOKE."

As some erroneous statements are going the rounds of the press concerning the iron-clad battery *Roanoke*, we paid a visit to the Novelty Works a few days since, in order to ascertain the facts in the case. The vessel is at present completely covered with her armor, as far as the hull is concerned, with the exception of one or two pieces on the sides; the plates are not beaten with immense sledges, nor are they of the same thickness in all parts, there being a vast difference between the bow and stern, and the side armor above the water line. The deck plating of 1½ inches is being placed in position as fast as possible, but the operations are tedious, involving the execution of many details, such as handling the plates, drilling or punching, and then relaying them. The turrets (three in number) are being bored for the guns; some of the ports are all finished. They are cut out of the solid eleven-inch wall by a machine rigged up for the purpose. The first cut makes a hole 15 inches in diameter; as the ports are oblong, however, there are two holes bored, and the space intervening removed by the same tool, which is necessarily very strongly made and powerful in its action. It runs continually without cessation. In fact all the work is prosecuted with the utmost vigor at all times—night and day, Sundays not excepted. A large force of men are in attendance doing all that can be done. It is undecided as yet whether the gun ports will be enlarged any from the original drawing. So far as regards the *Roanoke's* draft of water, it is less now than it was when she was a wooden frigate, so much has the removal of the guns, spars, top-hamper and two decks relieved her. When fully rigged she formerly drew at least, twenty feet of water; whereas at the present time, with her side armor all on board, and a great part of the deck plating and turret machinery (without the turrets, however), her present draft is 16½ feet forward, and nearly 20 feet aft. She will probably come down to the 20-foot mark, as the ram is fixed at that line.

The turrets are finished but are not set up on deck. Large quantities of additional machinery are being made for the *Roanoke*, such as condensers, turret engines, blowing engines, pumps, &c., these will occupy much time in their execution, and it is thought the frigate cannot be got ready before the expiration of three months at the earliest.

The Novelty Works are also busily engaged on the engines for the Italian iron-clads now building by Wm. H. Webb, Esq., in his yard at the foot of Sixth street. These are very massive engines in their design and execution; being much the same as those furnished to the *Grand Admiral* now in the Russian Navy. Two large beam engines of respectively 100 and 105 inches diameter of cylinder, and 12 feet stroke, are also in hand for the Pacific Mail Company, and, under the able superintendence of the foreman, Mr. James Van Riper, are progressing rapidly.

VALUABLE RECEIPTS.

Composition for Leather.—One of the very best compounds known to us for rendering leather boots and shoes almost perfectly water-proof, and at the same time keeping them soft and pliable, is composed of fresh beef tallow, half an ounce, yellow bees-wax, one ounce and one-eighth of an ounce of shellac. Melt the tallow first and then remove all the membrane from it; add the bees-wax in thin shavings and when it is melted and combined with the tallow, add the shellac in powder and stir until it is melted. Bees-wax is one of the best known preservatives of leather. This compound should be applied warm to the boot or shoe, and the soles should receive a similar application to the uppers. In using it a rag or a piece of sponge should be employed, and the boot or shoe held cautiously before the fire or stove until the compound soaks into it. Care must be exercised not to expose the leather too close to the fire. If the boot be blackened and brushed until it becomes glossy before the application of this preparation it will remain black and shining for a long period after it is applied. A little vegetable tar mixed with the foregoing composition makes it more adhesive and improves its quality for walking among snow. A liberal application of this composition every two weeks during winter will keep boots and shoes that are worn daily water-proof and soft.

Glazed Leather.—The basis for glazed or what is called "enameled leather" is boiled linseed oil. The oil is prepared by boiling it with metallic oxides, such as litharge (oxide of lead) and white copperas (sulphate of zinc) until it acquires a sirupy consistency. Five gallons of linseed oil are boiled with 4½ pounds of white lead and the same weight of litharge until the whole becomes thick like cream. This mixture is then combined with chalk in powder, or with yellow ocher, is spread upon the leather and worked into the pores with appropriate tools. Three thin coats are thus applied, each dried before the other is put on, and when the last is perfectly dry the surface is rubbed down with pumice-stone until it is quite smooth. A mixture of the prepared oil without ocher or chalk, but rendered black with ivory-black and thinned with turpentine, is now put on in one or two thin coats according to circumstances; then dried. The final coating consists of boiled linseed oil and copal varnish thinned with turpentine and colored with lamp-black. The apartment in which such leather is dried is maintained at a temperature ranging from 134° to 170° Fah. White enamelled leather is prepared in the same manner; but white lead and chalk is exclusively used to thicken the oil. Copal varnish colored with lamp-black, will make very good enameled leather if it is put on in several thin coats and dried after each application.

Preparing Kid Leather.—Yelk of egg is largely used in the preparation of kid leather for gloves in France, to give it the requisite softness and elasticity. The treatment of the skins in this manner is called by the French glove-makers *nourriture.* As a substitute for the yelk of egg the brains of certain animals, which in chemical nature closely resemble the yelk of egg, have been used. For this purpose the brain is mixed with hot water, passed through a sieve, and then made into dough with flour and the lye of wood ashes. The glove leather is also steeped for a short period in a weak solution of alum. The Indians of our forests employ the brains of deer and buffalo, mixed with a weak lye of wood ashes, and after this they smoke the skins; the pyroligneous acid of the wood in the smoke accomplishes the same object as the alum used by the French skin-dressers. Indian-prepared skins stand the action of water in a superior manner to French kid. Furs dressed in the same manner resist the attacks of insects. It is believed that the carbolic acid in the smoke is the preservative principle which renders the skins tanned by the Indians superior to those tanned with alum and sumac in the usual way. The skins are rubbed with the mixture of the brains of the animals and the lye by the squaws; then dried in the open air. Three and four such applications are necessary before they are smoked in pits covered with the bark of trees.

Tanning Nets, Sails and Cordage.—The cloth of awnings, sails, also nets and cordage may be prepared in a simple manner to endure for a far greater length of time than is usual with such articles. Take about 100 pounds of oak or hemlock bark, and boil it in 90 gallons of water until the quantity is reduced to 70 gallons; then take out the bark and steep the cloth, sails or cordage in the clear liquor for about twelve hours; then take it out and dry it thoroughly in the atmosphere or in a warm apartment. The cloth should be entirely covered with the tan liquor, and should lie loose in it, so as not to press the folds too closely together. By boiling the cloth or cordage in the tan liquor it will be ready in a shorter period. Sail and awning cloth so prepared will resist the action of damp for years in situations where unprepared cloth will decay in a few months.

FOREIGN SCIENTIFIC ITEMS.

French Aniline Colors.—A complicated law trial has lately terminated in France on suits for the infringement of the patent of M. Renard, of Lyons, for manufacturing *rouge d' aniline.* One of the pleas of the defense was that this color had been discovered by Professor Hoffman, of London, and an account of it published six months before Renard's patent was taken out. Upon evidence it was shown that Professor Hoffman while making some experiments submitted one part of bichloride of carbon and three parts of aniline for thirty hours to a heat of 180° in sealed tubes, and casually noticed that a substance of a splendid crimson remained in dissolution, but he took no very special notice of it then. Renard not only produced the color and applied it to dyeing, but discovered several agents for producing this aniline red, and took out a series of patents for each discovery. He exhibited at the International Exhibition and received two medals—one in the class of dye-stuffs, the other for chemical productions. The following is the pedigree of aniline colors:—Coal, when distilled, produces tar; distilled tar produces benzine; benzine, treated with nitric acid, produces nitro-benzine; nitro-benzine, treated by certain reagents and notably by hydrogen, produces aniline; aniline, treated by reagents (under divers patents), produces fuchsine, azaleine, analeine, &c.; fuchsine, azaleine, analeine, &c., treated by ammoniacal agents, produce the pure coloring principle or rosaniline. Fuchsine, azaleine and analeine are the different salts of this one base—rosaniline. The French court decided in favor of Renard's patent, and awarded him several thousand francs in damages.

An Ancient Oven containing Loaves.—A correspondent of the London *Athenæum*, writing from Naples, states that a baker's oven was lately discovered in Pompeii. He was present when the iron door of the oven was removed, and he says: "We were rewarded with the sight of an entire batch of loaves which were deposited in the oven seventeen hundred and eighty-three years ago! They are eighty-two in number, and are, so far as regards form, size and every characteristic except weight and color precisely as they came from the baker's hand. They are circular, about nine inches in diameter, rather flat and indented (evidently with the elbow) in the centre; but they are slightly raised at the sides, and divided by deep lines, radiating from the center into fragments. They are of a deep brown color and hard, but exceedingly light."

MAKING CHEESE.—Professor Voelcker, of the Agricultural College, Cirencester, England, has been devoting considerable attention to the manufacture of cheese, and especially the celebrated Cheshire qualities. He states (through the journal of the Royal Agricultural Society) that some English cheese-makers have adopted the use of the centrifugal drying-machine for separating the whey from the curd; and he relates the following incident connected with a trial between machine and hand made cheeses:—"In an experiment 80 gallons of milk were made into four cheeses by hand; 80 other gallons were made with the centrifugal machine. The hand-made cheeses weighed, when sold, 75 pounds; the machine-made, 67 pounds. All were sold at 7d. per pound when only five weeks old, and no perceptible difference in those fine, full-flavored cheeses could be noticed. It seemed strange that the hand-made cheese should weigh more by 8 pounds than the machine-made. Equal quantities of milk had been measured out; the machine-made cheese contained rather more water than the other, as was exactly ascertained. Quite by chance, the dairy-maid—who was determined not to be beaten by the machine—was caught incorporating cheese-parings of the preceding day's make, from a large supply she kept under the cheese-tub!" He asserts that a skim-milk cheese always deteriorates when kept more than two months; whereas, a rich Cheddar is gradually improved by keeping for many months. The Cheddar system is the best for producing good marketable cheeses everywhere. In Cheshire where the best cheese is made, the curd is but slightly heated. "The finest-flavored cheese which I ever tasted," says Dr. Voelcker, "was made at Ridley Hall, near Crewe, Cheshire."

POISONOUS CHEESE.—Professor Voelcker, in the course of his experiments on cheese-making, has discovered that not only is cheese made poisonous by a compound of white vitriol, infused to give it the flavor of old cheese, and of blue vitrol, to prevent it swelling, but that under certain unknown influences, cheese becomes poisonous without any particular offensive taste or smell or color. In 1861, a quantity of Cheshire cheese, purchased from a respectable farmer by a factor, was returned from the workhouse at Warrington as poisonous. The people who had eaten it were seized with sickness, vomiting, &c. A specimen having been sent to Cirencester College, a piece of the size of a hazel-nut made the professor ill for four hours; and both his assistants, who took each not more than a quarter of an ounce, five hours afterward were seized with vomiting and violent pains in the bowels. One was ill all night and the next day. Careful analyses on large quantities failed to detect even traces of zinc, copper, mercury, antimony, arsenic, or any of the metallic poisons. The professor thinks that the poison generated in this modified decay of cheese is identical with the sausage poison sometimes found in German sausages.

PROPELLERS FOR BALLOON NAVIGATION.—Dr. Isaac Ashe, M.A., read a paper before the British Association for the Advancement of Science, at their meeting lately held at Cambridge, on the employment of screw propellers for guiding balloons. His proposition was the of a very light screw, capable of elevation and depression through an angle of about 150° so as to be capable of being hoisted while the balloon should be on the ground, of being used horizontally as a propeller or vertically underneath the car, to cause a temporary ascent, as for the purpose of crossing a mountain range without loss of ballast or a descent without loss of gas. Such a screw, he considered, could be worked at small elevations—2,000 feet—by the exertions of the aëronaut, and its advantages would consist in the conferring of definite direction and also of steering power, and in obviating the objection to hydrogen balloons, which consisted in the expense of the gas, as the descent could be effected without loss of gas. Hence smaller and much more manageable balloons might be constructed than those now used, and propulsion would be so much easier. He proposed to steer by means of two small screws connected by a cranked axle placed at right angles to the axle of the propeller, and in front, so as not to interfere with the hoisting of the propeller. These steering screws should have their spirals turned the same direction, and by revolving them in one direction or the reverse, the balloon might be made to rotate vertically, as might be desirable. The disagreeable rotation incident to balloons would also be thus obviated. Dr. Ashe suggested the employment of balloons in investigating aërial currents, and for the exploration of unknown continents, as Australia and Africa. This is exactly the method not only proposed but used, during several balloon ascents made twelve years ago, by Capt. J. Taggart, of Roxbury, Mass. We examined his balloon with the propellers on it, in Jersey City, in November, 1850; it is described on page 61, Vol. VI. (old series) SCIENTIFIC AMERICAN.

ILLUSTRATIONS OF ENLARGED PHOTOGRAPHS.—At the closing soiree of the British Association at Cambridge M. Claudet, exhibited, by the aid of the oxyhydrogen light, the enlarged images of the solar camera thrown on to a screen. A number of *cartes de visite* were enlarged showing the great perfection of proportion and the natural expression which may be imparted to portraits when they are taken in a very short sitting. In order to show the working of the solar camera, it was placed in a room adjoining the great hall, and M. Claudet exhibited in this manner pictures of persons enlarged to the size of nature, and some considerably larger from small *cartes de visite*. The effect was very striking and beautiful. He also exhibited some photographs, taken by the Compte de Montizon, of all the most curious animals of the Zoological Gardens, and some views of Java, taken by Messrs. Negretti and Zambra, with instantaneous views of Paris by Ferrier, showing the Boulevards full of carriages and people, as they are in the middle of the day. One of the principal objects of M. Claudet was to explain how it is possible to trace or draw with pencil on canvas those enlarged portraits when they are to be painted, and for this purpose how it is even more advantageous to apply the colors, not on a surface containing the chemical substances of photographic pictures, but on the usual medium employed by artists without the black shadows forming the delineation of photographs.

THE PROPER USE OF FUEL.

In order to obtain a full equivalent for the capital expended upon this necessary and expensive item in manufacturing, more economy in its use and management should prevail. In the navy, reports are required from the engineers as to the amount in pounds of coal burned, and the gallons or cubic inches of water evaporated by the same. In this way an approximate idea may be formed as to whether the full duty of the fuel is obtained. Different sorts of coal produce opposite results, wholly proportioned, of course, to the purity of the article. The kind used, therefore, must be specified, and a relative idea can then be formed of its value for generating steam. The same plan might be pursued on land, as indeed it is in a few instances. A general adoption of this system, however, would, we think, give great satisfaction to manufacturers. Waste in a great measure might be detected, dirty fires would cease to be in vogue, and carelessness, in an important particular of engineering, would be arrested. There are, however, many minor matters in relation to the economical burning of coal beneath steam boilers that depend upon other features than the quality of the fuel used, and these are contained in the disposition of the heating surfaces of the boiler, its location, whether exposed to cold currents of air, the loss by radiation from its vast surfaces, and, in fact, an almost endless category of technicalities which must be considered when the questions of economy in fuel are balanced. One thing is certain, that coal, as burned beneath steam boilers in this city, in a great majority of cases which have fallen under our observation, is not properly used; nor are the distinctive brands, such as nut, stove or egg, or even pea coal, applied to the particular work for which they are most suitable. This, of course, is no fault of the engineer, but is a matter of consideration for the manufacturer. A little careful experimenting will soon determine the particular size required.

MASON JONES, THE IRISH ORATOR.

Ireland has long been celebrated for her orators. Curran, Grattan, Burke, Sheridan, Canning and O'Connell were among the most noted orators that ever lived. Mason Jones, a young and educated Irishman from Dublin, has just come to our shores to deliver a series of lectures on the great men of history, and several of these have already been given in this city. His delivery is unlike those of our lecturers in general, because he is untrameled with notes of any kind. He rushes into his subject like a steed going up to the charge at the sound of the bugle. Sometimes he is vehement, thrilling with Celtic fire; then again he is soft, tender and pathetic. The principal fault which we find with him is an inclination to be rather flowery in style and rather violent in gesticulation. His orations are pervaded with a high moral tone and a genuine love for liberty. We heard him lecture on John Milton—the greatest poet, next to Shakespeare, that ever lived, and the greatest man, next to the prophets and apostles. He did full justice to the great Englishman, who like Moses, forsook the pleasures of irreligion and the royal party, and cast in his lot with the despised Puritans. Mr. Jones is an able critic and his orations are certainly rich intellectual entertainments.

BOYNTON'S HEATER.

Mr. Boynton and the firm with which he is connected, Messrs. Richardson, Boynton & Co., 260 Canal street, New York, are very widely known to the public in connection with their many admirable inventions pertaining to stoves and heaters. The present improvement is the embodiment of many years' practical experience and study of the calorific art. To produce a complete and reliable heater—one that is simple of management, economical to the last degree in fuel, seldom requiring replenishment or looking after, and above all one that will not, under any circumstances, clinker up—this is the problem that has long puzzled the wisest of the stove makers. Such heaters are wanted in almost every household, conservatory, store or manufactory. Unless we are greatly mistaken, Mr. Boynton has, in this new invention, found the solution of the above problem. By an ingenious combination of parts, which we could not render intelligible without an engraving, it is alleged that he makes a single charge of coal last for 24 hours, no clinkers are formed and the fire may be kept burning the whole winter through, if desired, giving out much or little heat, according to the variable necessities of the weather. We predict great popularity for this invention.

How a Western Editor made Ten Dollars.

The Fishkill *Journal*, referring to the great advance in the price of printing paper and the necessity of publishers increasing their subscription prices, says:—We notice that our old and valued friend, the SCIENTIFIC AMERICAN, is among the number, and that on and after January 1st., the price of single subscriptions to that paper will be $3, with a corresponding reduction to clubs, as heretofore. An acquaintance of fifteen years with it, however, warrants us in saying that it is well worth the money, and we have often wondered that a paper containing so much valuable information could be afforded at the low price of $2. The SCIENTIFIC AMERICAN is one of the very best journals of its class in the world—containing something instructive and useful for all. In its typographical appearance, as well, it is not excelled by any publication, and charms the eye while it instructs the mind. We remember that several years ago, while an apprentice in a western city, our employer obtained from its columns a receipt for which a sleepy cotemporary paid ten dollars. So much for taking a good paper.

ILLINOIS COFFEE.—It is said that Mr. Hoffman, of Illinois, raised two bushels of coffee last year. The seed was sent to him from Australia. The plants were unproductive the first year, but the second they bore slightly, and the third year witnessed the result set forth above, that is, two bushels. Mr. Hoffman thinks thirty bushels per acre can be grown. This last production of Illinois is certainly somewhat startling. With corn, cotton, wheat, tobacco, sugar and coffee, we think she may be literally classed as the Garden State.