Manufacture of Hollow Iron Ware.

Our English cotemporary, *The Ironmonger*, gives a description of Dartmouth Works, Birmingham, carried on by Mr. David Jones, from which we condense the following :

The manufacturer of wrought iron hollow-wares procures the bars or rods and plates or sheets which he wants, from the iron-master. The first operation is to cut the wrought iron plates or sheets into the required shapes ; this is done with huge bench-shears, which are worked simply by hand ; they are made of the best-tempered steel, and are apparently so little affected by the hard wear and tear of the edges in cutting through endless successions of tolerably stout iron plates, that they want sharpening only once every three months. The disks for rice-bowls, sugar-bowls, tops and bottoms for iron casks, &c., are cut to shape by circular shears, which can be set to any guage required. Frying-pans, bowls, and a variety of other articles are stamped in dies. In Mr. Jones' establishment there are five stamping machines in active operation ; three of these are of the usual kind, whilst the other two are, to all intents and purposes, steam-hammers, upon Nasmyth's principle. The first step in the manufacture of frying-pans is, to heat the plate to redness, and then to place it in that condition on the lower or bed die of the first of three stamping machines, standing side by side in a row ; the hammer or drop, which bears the upper or counter die, is then released, by drawing forward the trigger or lever, and let fall upon the lower die, on which the disked plate lies. As the drop falls from a considerable elevation, the violence of the blow makes it recoil and bound upwards some distance ; the drop or recoiling is caught by a pair of pall levers, locked in racks fixed on the sides of the upright standards of the machine. The shallow pen is now rapidly shifted, by means of tongs, from the first to the second machine, and stamp again, to bring it nearer the required depth ; from the second machine it is then again shifted, in the same way, to the third, where it receives the final blow of the stamp. To mere superficial observation the pan looks now as if it required only paring the rough edges, and putting on the handle, to make it fit for use. This is, however, very far from being the case ; on the contrary, it is only now that the work begins. Violent concussion tends to impair the toughness of wrought iron, and to change the fibrous structure back to the original crystalline and brittle structure of cast iron. Now, this result is produced in the wrought iron disk, by the powerful blows of stamping machines ; to correct this and restore the iron to its proper condition, and also prepare it for the subsequent operation of tinning, the pan is re-annealed, and then subject to a systematic process of hammering, in which the hammer is made to fall with the greatest possible uniformity upon one spot, the pan being moved about beneath it until every part of it, from the center to the edge, has passed under the face of the hammer. When this has been fully accomplished, the rough edge or rim is properly pared, and the pan thoroughly scraped with an appropriate iron tool, to remove every scale of oxyde. It is then hammered once more, and after this taken to the mounting-shop, where the handle, forged out of a wrought-iron bar or rod, is firmly riveted on. A great many attempts have of late been made at simplifying the manufacture of frying-pans by introducing the aid of machinery, but hitherto without success.

The rice-bowls, sugar-bowls, &c., are stamped as already stated, under the steam-hammer. It is constructed somewhat after the fashion of the ordinary stamping machine, with upright planed standards, which serve as guides. The drop or hammer-block is connected with a piston-rod coming out at the bottom of a cylinder in which the piston works. High-pressure steam is let in over the piston, which raises it, together with the hammer attached to it, to any required hight within its vertical range of motion between the two planed guides. When the valve of the cylinder is opened the steam escapes, and the hammer, with the upper die attached to it, falls on the disked plates that lie on the lower die, dipping with unerring precision into the central parts, and converting the flat plate into a bowl of greater or less depth. The force with which the hammer is to descend may be measured to a nicety, by simply regulating the escape of the steam from the cylinder. The deep rice-bowls require several stampings with different dies before the full depth is attained, after which they pass the same processes of annealing and hammering as frying pans.

The stamped tops and bottoms for casks, kegs, buckets, corn-bins, &c., are taken to another department of the works, where they are properly joined in various ways, by seaming, soldering, riveting, to the body and the other parts of the vessel to which they belong ; thus for instance, the bottom of a bucket is seamed on, and the hoop then driven on to it. The heads of large casks for shipping cements, white-lead, oils, &c., are generally secured with screw-pins. Iron kegs and casks are now in extensive demand both for fluids and dry goods, as they present decided advantages over wooden-casks, being much more durable and secure.

In the brazier's department are made tea-kettles, saucepans, and other culinary utensils, sugar-boilers for the West Indies, and a variety of other articles too numerous to mention. The spouts of brass tea-kettles are made to assume the curved form in which we see them in the finished article, by filling the straight tube with molten metal, which is poured in at one end, the other end being stopped up with a paper plug, and when the metal has become solid, hammering the spout into the required shape, after which it is placed in the fire to get out the fusible metal. The process of soldering is conducted pretty nearly in the same way as for brass articles.

Some of the articles made of wrought iron, such as kegs, casks, corn-bins, bushel measures, &c., are painted, generally blue or green, or brown, with black hoops, &c. The painting shop contains a large drying stove, heated by steam supplied from the boiler, in which the painted articles are dried.

Frying-pans, bowls, and a variety of other articles, are coated over with tin, to protect them from oxydation.

Tin has a silvery white color, inclining slightly to yellow. It constitutes an important element in many alloys, imparting hardnesss, whiteness, and fusibility to them. It is the basis and principal component of the several varieties of pewter ; also of Britannia metal. The better sorts of pewter generally contain about 80—84 parts of tin to 16—20 of lead, occasionally also a trifling proportion of zinc, antimony, &c. The finest pewter, known in the trade as "*tin and temper*," is made of tin, with a very small proportion of copper. Britannia metal contains 900 parts of tin to 64 of antimony, 18 of copper, and 18 of brass. It is also largely used for solders ; the common plumber's solder, which melts at about 500° Fahrenheit, consists of 1 part of tin to 3 of lead ; the fine tin solder, which melts at about 360° Fahrenheit, contains 2 parts of tin to 1 of lead.

The wrought iron articles intended to be tinned are taken to the "*tinning*" department,—a large, thoroughly ventilated shop, with a number of vats containing dilute sulphuric acid, technically termed "*pickle*," and several "pots" containing molten tin, covered with a layer of some oily or fatty matter, or some other suitable material, to keep the surface of the liquefied metal free from oxydation. The articles which it is intended to coat with tin are first placed in the pickle, which thoroughly cleans them ; the action of the acid being aided by the application of a gentle heat, obtained by blowing in the steam from the boiler of the engine of the establishment. When the pickle has done its work, the articles are well washed in water, properly dried, covered on the surface with powdered resin, and then dipped into the tin bath ; they are finally wiped and rubbed with hurds. If a vessel is simply to be tinned on its inner surface it is, after pickling, &c., in the usual way, heated, and a portion of the molten metal having been poured in, the vessel is swung and twisted about to apply the tin on all sides ; after which the excess of the latter is returned to the pot.

Artificial Madder.

M. Dumas lately announced to the Academy of Sciences of Paris, that M. Roussin had obtained alizarine (the coloring principle of madder) from naphthaline, as follows:—

A mixture of binitro-naphthaline with concentrated and pure sulphuric acid is placed in a large porcelain capsule heated by an oil or sand bath. By raising the temperature, the binitro-naphthaline dissolves completely in the sulphuric acid. When the mixture has reached 392° Fah., granulated zinc is dropped into the mixture gradually, and with careful observation not to allow the temperature to rise much. In a few minutes a disengagement of sulphuric acid takes place, and the operation is terminated in about half an hour. If a drop of the acid liquid is then allowed to fall into cold water, a magnificent violet color is developed, due to alizarine.

When the reaction is over, the liquid is diluted with eight or ten times its volume of water and brought to the boiling point, and after boiling a few minutes, thrown into a filter. The alizarine is deposited upon cooling as a red jelly ; sometimes adhering to the vessels—sometimes suspended in the liquid. Examined by the microscope, it is seen to be composed of needle-shaped crystals of great definiteness. The mother waters are strongly red from dissolved alizarine, and may be used to dye directly. A quantity of alizarine remains in the filter, which may be removed by caustic alkalies.

In the preceding reaction, the zinc may be replaced by any one of a number of substances—such as iron, mercury, sulphur, carbon, or, in short, by any substance which reacts at a high temperature with sulphuric acid, with the production of sulphurous acid.

The substance thus obtained possesses all the characters and reactions of alizarine. It is but slightly soluble in water, but soluble in alcohol and ether ; volatilizes between 419° and 464° Fah., with a yellow vapor, and gives deep red needle-shaped crystals, whose tone of color is very variable. It is not attacked by chlorhydric or concentrated sulphuric acid. It dissolves in caustic and carbonated alkalies, with a deep purple color. Acids precipitate this solution in deep orange-red flocculi. Like alizarine from madder, it furnishes lakes of the most beautiful colors. It is fixed on stuffs like natural alizarine, and gives similar tints.

Mount Vesuvius.

Professor Palmieri, the resident director of the Royal Meteorological Observatory on Mount Vesuvius, writes to the *Athenæum*, London :

We do not find in the history of Vesuvius so long a period of continued eruption as that of these late years.—Since December 19, 1855, up to the present time, there has been a series of little continued eruptions of greater or less duration, with various phases. That which most attracted public attention was undoubtedly the opening of the cone in seven clefts, toward the end of May, 1858, with a great emission of lava, which devastated much fertile land, filled up the famous precipitous valley called "Fusso Grande," and destroyed fully a half of the carriageable road which led to the observatory. The greater part of this lava issued from the base of the cone, almost without interruption, from the end of May, 1858, to the beginning of April, 1861, that is to say, for little less than three years, which is a perfectly new fact in the history of our volcano.

Prof. Palmieri adds in a postscript:—"Just as I had finished writing the above statement, the guide of Vesuvius made his appearance with the following report, dated May 5 : 'Three small craters have been formed this morning, which make a great noise, but each different. One sounds like a steamer, and throws stones into the air ; another throws large masses out ; and the third, without ejecting matter, makes a noise like the report of a cannon.' "

To Clarify Oil for Rifle Gun Locks.—Fill a phial three parts with almond oil, then fill up the remainder with clean lead chips. Keep the phial in a warm room, and shake it now and then for a month, at the end of which time most of the mucilage acid naturally in the oil will have combined with the lead, and thus the oil will be clarified and fit for lubricating gun locks and other similar work. The lead is easily procured in chips by cutting up with a knife a couple of elongated bullets.—*Septimus Piesse.*

CORN LEAF AND GRASS PAPER.

Paper has been and is now manufactured somewhat extensively from dry grass and straw, but P. W. Runel, of Plumstead, England, states he has made the discovery that paper pulp can be manufactured at less cost, by using green, instead of dry grasses, for its production. He has taken out a patent for the improvement, and he states that when grass becomes dry its silica becomes hard and difficult of solution, whereas, when it is taken green, the silica and other unfibrous substances in it are more easily separated. He takes any green plants, such as sea grasses, which are abundant and cheap, and first mashes, then steeps them in warm water, and after this he boils them in a weak alkaline solution. They are now easily reduced to pulp by passing them between crushing rollers, or through the common beating engines used in paper mills. The pulp is bleached in the usual manner with chlorine.

The leaves of Indian corn are now used for making good paper, in Europe. There is one paper mill in operation in Switzerland, and another in Austria, in which paper is made from such leaves exclusively. The husks, which envelope the ears of corn, make the best quality. It is stated by the London *Mechanics' Magazine* to be excellent, and in some respects superior to that made from rags. As we are dependent upon Europe, in a great measure, for our supply of rags to make our paper, if we can obtain as good qualities from Indian corn leaves, we may yet become the manufacturers of paper for the whole world, as the greatest supply of cheap raw material is found in America. This is a subject worthy of deep attention, as we import rags to the value of about $1,500,000 annually, and paper manufactures to the value of about one millions of dollars.

It is really wonderful to what uses paper may be applied, and what a field there is still left for improvements in its manufacture. We may take some instructions from the Japanese in this department of the arts. A writer in *Blackwood's Magazine*, in describing the manners of the Japanese, says :—"It is wonderful to see the thousand useful as well as ornamental purposes for which paper is applied in the hands of these industrious and tasteful people. Our *papier mache* manufacturers should go to Yedo to learn what can be done with paper. We saw it made into material closely resembling Russian and Morocco leather ; it was very difficult to detect the difference. With the aid of lacker, varnish and skillful painting, paper makes excellent trunks, saddles, telescope-cases, the frames of microscopes ; and we even saw and used excellent water-wroof coats made of paper, which did keep out the rain, and were as supple as the best macintosh, (india rubber). The Japanese use neither silk nor cotton handkerchiefs, towels or dusters ; paper in their hands serves as an excellent substitute. It is soft, thin, and of a pale yellow color, plentiful and cheap. The inner walls of many a Japanese apartment are formed of paper, being nothing more than painted screens. Their windows are covered with a fine translucent description of the same material. We saw what seemed to be balls of twine which were nothing but long shreds of tough paper rolled up. If a shopkeeper had a parcel to tie up he would take a strip of paper, roll it up quickly between his hands, and use it for twine. In short, without paper, all Japan would come to a dead lock." The writer says "Japanese mothers-in-law invariably stipulate in the marriage settlement, that the bride is to have a certain quantity of paper allowed her."

The Japanese do not use rags for making paper, but the inner bark of trees. A partial description of the process of making their paper was given on page 407, Vol. 2, present series of the Scientific American. It is evident from the correspondent of Blackwood, that this peculiar people are far in advance of all the rest of the world in paper making.

Paints from Aniline.—A patent has been taken out in England, by T. H. Smith, of Islington, for obtaining paints from analine as follows :—He makes up a paste with alum and starch, mixed with water, and to this he adds liquid aniline used for dyeing, and stirs the whole together, then passes them through a grinding mill. The mass is now allowed to drip so as to remove from it the excess of water, when it forms a pigment capable of being used as a paint or for staining paper.

Improved Mode of Case-Hardening Metal Articles.

Case-hardening is the term used for converting the surface of forged iron articles into steel. A number of the parts of gun locks, and the mountings of gun stocks, are generally case-hardened. The old method of conducting the process was to cover the articles with scraps of old leather, hoofs, horns, &c., place them in an iron box, and heat them in a clear fire. It was found that the nitrogen in the hoofs, &c., was the element which caused the conversion of the iron into steel. A chemical, such as the prussiate of potash, containing nitrogen, is now used, as a more convenient substance than leather.

The accompanying engravings, which have been published in the London *Engineer*, illustrate the improvement which has lately been patented by Jules Cazanave, of Paris, and it covers the conversion into steel of wrought-iron, and the cementation of cast-iron, either moulded or in bars. Several chemical mixtures are specified in the patent for carrying out the objects of the inventor, and it embraces some features most useful to every worker in iron.

The processes are as follows :—For wrought-iron a mixture is to be formed of equal parts of any vegetable and animal matters—either solid, liquid, or gaseous, —containing nitrogen, the following being preferred, namely, for the vegetable matters charcoal, soot, or waste from oleaginous matters, or waste from spinning cotton, flax, and other similar vegetable substances, and for the animal substances, woolen rags, woolen waste, flesh, horn, hide, or other similar waste or refuse animal matters. This mixture is inclosed in a gas retort in a proportion of from 8 to 20 per cent the weight of the iron to be converted, and according to the quality of the latter, which is also placed in another vessel or chamber (also closed) in immediate communication with the gas retort, and at the same time with a gasometer, in order to cause an equal and regular pressure of the gas contained in the apparatus. The gas retort and the vessel containing the iron are placed over two furnaces, and the latter is to be heated to nearly a cherry redness, and the former to a less elevated degree. The gas thus produced (which the inventor calls cyanhydrate of ammonia) penetrates the pores of the metal expanded by the heat, and cementation takes place with a rapidity hitherto unknown, and steel is produced very superior in quality to that made from the same iron even by the ordinary process.

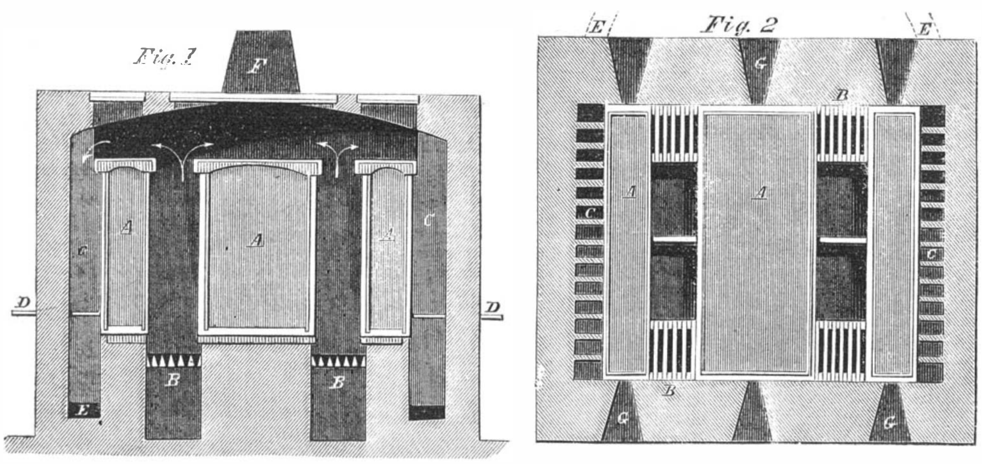
For cast-iron a mixture has to be formed composed of about 90 per cent of calcareous matter, either mineral or animal, especially common lime, lime obtained from the calcined bones of animals, or oyster shells, or even iron ore. To either of these ingredients previously triturated, is to be added about 10 per cent of the mixture already mentioned for the cementation of wrought-iron. The pieces of cast-iron are then placed in alternate layers with this mixture in a closed crucible, and in a few hours, according to the thickness, the cast-iron (whether molded or not) is converted into fine hard steel, without the least alteration in form or otherwise.

For partial cementation of wrought-iron articles, the part which it is desired to remain intact is to be covered with mineral or animal calcareous matter, and the cementation penetrates regularly over all the rest of the piece, which is in contact with the gas or cementing mixture. For the partial cementation of cast-iron articles this process must be reversed, that is to say, the parts required to remain intact must be covered with the cementing mixture for wrought-iron, and the part to be converted must be covered with the mixture above described for cast-iron.

For softening brittle iron the mixture above named for cast-iron, namely, calcareous matters or iron ore, is to be used. By these means, in a very few hours, the most brittle iron is made so pliable and malleable, that it may be bent and straightened again cold without the least cracking, and is easily filed. In this manner, and according to the principles of this invention, iron of very inferior quality can be softened, so as to be easily worked, and when finished as desired, may be brought again to any required degree of hardness.

In making cylinders by a combination of these processes, several longitudinal strips of wrought-iron or steel are bound together by hoops or bands, placed at suitable distances apart. The open cylinder thus formed is to be placed in the mould, into which the cast-iron is then to be poured or run, and when cold, the article is to be submitted to the operation above described for cast iron. Other articles requiring strength, hardness, and malleability, may also be thus formed by placing suitable pieces of heated wrought-iron in the mould previously to running in the cast-iron, and then submitting the same to the operation of cementation.

For the cementation of wrought or cast-iron, especially for railway purposes the furnaces which the inventor proposes to employ are composed of hermetically closed chambers or crucibles, the sides of which are vertical, and formed of cast or sheet-iron, covered on the exterior with a coating of fire-clay, to prevent the too great action of the fire thereon. The bottom and cover of each crucible is made of fire-clay, so formed as to make a close joint, and to be capable of being sealed hermetically by means of clay at the time of the operation. The covers of the chambers are movable, and the crucibles are charged and discharged from above by means of a crane, or other suitable apparatus. When the crucibles are charged and closed, the whole of the upper part of the furnace is covered in.



CASE-HARDENING METAL ARTICLES.

Fig. 1 represents a vertical section, taken through about the middle of the furnace ; Fig. 2 is a horizontal section. The furnace is composed of three chambers or crucibles, A A A, the center one being about three times as large as the outside ones. There are four fire-places, B B B B, and the draught is obtained by a series of small flues, C C C C, placed at the sides of the furnace, and each furnished with a separate damper, D, to regulate the draught. These flues descend in the thickness of the walls of the furnace, as shown, and communicate with two main flues, E E, which lead to the chimney, F F. Sight holes, G G, are so arranged as to allow of the inspection of the process going on in the crucibles. The length of the crucibles, and consequently that of the furnace, is determined by the length of the pieces to be operated on.

The matters of ingredients used to produce the cementation as above mentioned, are refuse matters merely dried ; they are employed alone without any other mixture, and are placed in contact with the iron (to be converted into steel) in the crucibles, A A A, above named, which are to be intensely heated, the first gas which is evolved, and which is merely hydrogen, being allowed to escape by a cock or valve. This gas may be employed in the fire-places as a means of heating, or it may be used for illuminating purposes. As soon as it is perceived that this gas is no longer formed, the cock or valve must be closed, and the action of the cyanhydrate which is then produced effects the cementation in a rapid manner, and gives a fine grain to any description of iron. The steel thus produced when melted may be greatly improved in quality by adding a certain quantity of resin thereto in the melting pot.

When the cementation is produced (whether entire or partial) it is necessary to temper the articles to give them the requisite hardness, especially for rails, or railway tyres or wheels, at the same time preserving their primitive form. For this purpose the inventor proposes to use strong boxes of cast-iron, pierced with numerous holes, in order to facilitate the contact of the water, and the pieces to be tempered are placed therein and solidly stayed or secured in every direction. These boxes, as soon as they are charged with the pieces, are instantly plunged into water.

Black Currant Wine.

The very finest wines are now being manufactured from our fruits. We have red currant wine, blackberry wine, raspberry wine, and also cherry wine, cordial and brandy, besides peach and apple brandy, a liquor from the pear ; and thus far no use has been made of the *black currant*, to any extent, save as a jelly or a jam. We learn that in France there is now being made the *liquer de cassis* in large quantities, from the black currant, and millions of plants are cultivated for this purpose. It is said that it is so extensive near Dijon, where there is made in that town about two thousand gallons of wine annually, and so great an interest is felt in this fruit as almost to supersede the cultivation of the vine.

[We have seen the above in several of our cotemporaries, and consider the subject of no small importance. Black currants are very hardy and prolific, and last fall we tasted some wine made by Mr. Bement of Poughkeepsie, N. Y., Superintendent of the Springvale estate of M. Vassar, Esq., which was as good as any imported port wine.—Ed.]

A Cure for Diarrhea.

The Philadelphia *Inquirer* says :—"Numerous requests having been made to republish the recipe for diarrhea and cholera symptoms which we gave in our paper some weeks ago, and which was used by the troops during the Mexican war with great success, we give it below, with a very important correction of an error made in the first formula as to the size of the dose to be given:—

Laudanum, ounces	2
Spirits of camphor, ounces	2
Essence of peppermint, ounces	2
Hoffman's Anodyne, ounces	2
Tincture of Cayenne pepper, drachms	2
Tincture of ginger, ounces	1

Mix all together. Dose : a teaspoonful in a little water, or a half teaspoonful repeated in an hour afterward in a tablespoonful of brandy. This preparation will check diarrhea in ten minutes, and abate other premonitory symptoms of cholera immediately. In cases of cholera, it has been used with great success to restore reaction by outward application."

British Steam Shipping.—The London *Engineer* of June 14th contains some statistics of the progress of steam shipping in Great Britain from 1843. It states that during the past 18 years, 2,306 steamers, of a total burthen of 600,071 tuns, have been built. In 1860, there were 482 steamers engaged in the home trade, and 447 in the foreign trade ; making a total of 929. The total burthen of these vessels amounts in the aggregate to 399,494 tuns, nominally. This does not include the river steamers. No less than 26,105 persons are engaged as crews on these vessels. The size of steamers has been constantly increasing. About nine out of every ten new merchant vessels built in England have iron hulls.

Novel Blockade.—Charleston harbor, it is said, may be blockaded very effectually, and vessels loaded with stone will be sunk across the entrance of the port, so as to prevent the egress or ingress of vessels.

We find the above paragraph floating about in several papers. It is not at all likely that the Federal government will resort to any such system of closing a port of entry. The blockade will be maintained in the usual manner—by ships of war.