Correspondence

The Growth of Copper Vegetation.

MESSRS. EDITORS:—If in these days resounding with the rumbling of the drum and the clangor of the musket, there should be left a few men willing to listen to the soft and quiet teachings of nature and science, I should like to draw their attention to a natural phenomenon, a chemico-physical curiosity which I had a chance to observe the other day, and which, though small in its compass and unpretending in its appearance, may be the starting point of important discoveries, and therefore seems to me to call for a public record and the close attention of scientific men.

A few days ago I paid a visit to friend, Mr. Aug. Partz, at his laboratory, No. 25 Howard street, New York. He is a chemist of rare knowledge and experience and an inventive genius of high order. He has been for some time busily engaged in experiments on the galvanic reduction of different metals and their alloys, and claims to have been perfectly successful in reducing the latter to an extent hitherto unknown. In one of these experiments he met with the curious fact which I am about to relate. Having had a couple of plates, one of them of steel with a thick coat of copper, hanging in a solution of copper, through which a galvanic current of considerable quantity was passed for about twenty-four hours for the purpose of reducing that metal on the plates, he observed a singular deposit of the same material outside of the solution, bearing vegetable forms.

But in order to make the description as instructive as possible, I will first refer to all the external conditions of the phenomenon. The solution of copper was contained in a flat capsular vessel, standing upright on its narrow side, and the plates on which the reduction was to be made, were suspended in the solution perpendicularly, and fastened to the conducting wires which passed through two oblong wooden borders forming in this way the cover of the vessel. Between the upper margin of the plates and these covers was an empty space of about half an inch, the copper solution only reaching to the margin of the plates. Now, when Mr. Partz removed the plates, they having been exposed to galvanic action as above stated, he observed that a singular vegetation of copper had grown between the upper margin of the one plate (the steel one with the copper coat) and the wooden cover. It was fastened with its roots on the inside of that margin (within the copper solution) and rising from there and outside of the solution in the empty space above mentioned, in the shape of a little tree, consisting of a stem and a crown which seemed to owe its formation to the circumstance that the upward growth had been checked by the inside of the cover, and forced to spread along this. By detaching the plate from the cover and wires the little tree broke into three parts, the roots remaining attached to the plate, the stem and the crown. The two latter parts I saw myself, and on examination through a magnifying lens, found the stem to consist of a collection of smaller stems slightly curved and bent, and in their formation and outlines reminding one very much of the branches of the grape vine, while the crown proved to be a conglomerate system of fine spiral threads or fibers, bearing a close resemblance to the tendrils of the grape and other vines—a mass of spirals of different size and length, the larger ones three-eighths of an inch long, but all of the most regular form and elaborate elegance.

Beside this principal growth there were a few smaller ones, some consisting of mere spirals rising from the margin of the plate. Repeated experiments had the same result, but it became evident that a certain quantity of the electric fluid was required, for when the tangent-galvanometer showed a current of half this quantity only, the phenomenon would not make its appearance.

Now here it struck me we have something entirely new—some new hint at the mysterious connection between organic and inorganic matter, some new fact which may perhaps lead to the discovery of hitherto unknown laws of nature concerning the formative principle of life. We see here the product of a chemical process consisting of an elementary substance pure metal, but bearing forms—the spiral—which we believed to exclusively belong to organic nature, especially the vegetable kingdom; and the whole growth not deposited within the metallic solution but outside of it, two circumstances decidedly excluding the assumption of the process of crystallization which must necessarily go on in the mother liquid, and is never known to take organic forms. Moreover—and this, as the crowning fact of all, we reserve to the last—Mr. Partz asserts that the principal acid used for the solution of the copper was an organic acid, the tartaric, the acid of grapes and other fruits! This phenomenon, therefore, presents the highly interesting fact of a fibrous structure, purely metallic in substances and vegetable in form, grown out of a solution half organic and half inorganic, not by crystallization, but probably by capillary attraction (the mechanic law of the growth of plants) and imitating in its outlines and features those of parts of the very same plant, the acid principle of which is the same acid which acted as the chief solvent part in the mother solution of the metallic growth! Very curious and striking coincidences indeed! That the way by which the arrangement of the particles of this metallic vegetable provided was that of capillary attraction, is so far not based on actual observation, but may be inferred from the vegetable forms and fibrous structure, and the fact that the top of the little plants was found to be moist.

It may not be superfluous to refer, in this instance, to the interesting experiments made of late by Prof. Wiedemann, in Germany, on the magnetization of iron and steel wires twisted during or after the passage of a voltaic current, by which the poles change or are reversed according to the side to which the wires are twisted. This discovery may throw a new light upon the tendency of certain plants to spiral action, some to the right and some to the left side.

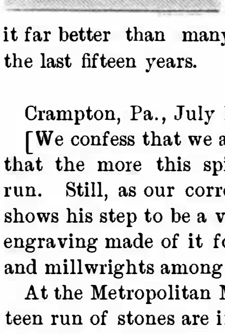
The observations we have communicated here of spirals of inorganic matter appearing under the action of the galvanic current, look exactly as if they had some close relation to the facts ascertained by Prof. Wiedemann. Let our scientific experimentors collect as many facts as possible, and there is strong hope that we shall soon see another piece of the mysterious veil of nature lifted before our mortal eyes!

DR. G. BLOEDE.

Brooklyn, July, 1861.

Steps for Mill Spindles.

MESSRS. EDITORS:—My plan for the lower point of upright shafts in mill spindles, &c., is this, which I think you will understand at a glance: The distance from 2 to 3 and 4 to 5 is to be greater than from 1 to 2 and 5 to 6, and the straight part of the spindle point, A, does not quite fill the box, B, leaving room for the expansion by heat; you will perceive that the hotter it gets, the looser it runs. I have used this kind for three years, and find it far better than many other kinds I have used for the last fifteen years.



E. B. BARNS.

Crampton, Pa., July 10, 1861.

[We confess that we are unable to "see at a glance" that the more this spindle heats, the looser it will run. Still, as our correspondent says that long trial shows his step to be a very superior one, we have an engraving made of it for the benefit of the millers and millwrights among our subscribers.

At the Metropolitan Mills, in this city, where fourteen run of stones are in constant operation day and night, the engineers, after numerous experiments, have settled upon the following plan for mill steps: The lower end of the spindle, for a foot or more, is turned down to about two and a half inches in diameter, and a steel rod about an inch in diameter is inserted into its axis. The hole in the box is about ten inches in depth, the spindle fitting into it so as to run easily. Beneath the lower end of the spindle, which is perfectly flat, are placed two or three flat pieces or disks of steel, the diameters of which are the same as that of the spindle. These disks revolve one upon another, but with a motion less rapid than that of the spindle, the spindle's motion being divided among them. Thus, the wear of each of the rubbing surfaces is diminished, and the danger of heating avoided.—EDS.

Saving of Fuel in Steam Navigation.

The London *Mining Magazine* contains the following on this important subject:—

The Peninsular and Oriental Company pay annually nearly £1,000,000 for coals; and their efforts, therefore, are constantly directed to the development of machinery that will do the most work with the least consumption of fuel. Speed in ships with great power is always attainable; but the cost of an extra knot on a sea-going steamer is sometimes enormous, and companies have found that, like other things, speed may be bought too dear.

By the application of the superheating apparatus to their vessels, the company have already effected a considerable saving of fuel. With one applied by Mr. Penn to the *Valetta*, the consumtion has been reduced from 60 to 40 tuns per day. With a new ship—the *Mooltan*—however, the company are trying to achieve still greater results, and by certain modifications in the plan of the machinery, hope, with only four small boilers, engines of 400 horse-power, and a consumption of one tun of coal per hour, to make this vessel average a speed of 10½ knots per hour. To average this upon all her runs, she must be able to do 12½ or 13 knots in anything like fair weather. In a preliminary trip, she averaged a little over 9 knots, and in a run of 24 hours only consumed 20 tuns 10 cwts. of coal. This was an almost astonishing success. The fuel used was patent, so that a count tally of every block put on could be kept. For nearly 7 hours, only 4½ tuns were used; and while the screw was going at 59 revolutions, and the engines indicating between 1,100 and 1,200 horse-power, the vessel going through the water at nearly 10 knots, not a complete tun, it is stated, was used in any single hour. A saving of 30 or even 25 per cent on the consumption of fuel in sea-going steamers means an equal saving in the number of men required for stoking and in stowage space for cargo.

To economize such an amount of fuel would give the Peninsular and Oriental Company a clear gain of more than £200,000 a year on their expenditure for coal alone, setting aside the gain in reduced labor and increased stowage. Altogether, the *Mooltan* will go to sea with a greater amount of modern improvements in her than any vessel which has ever left our shores; and her success, if success it be, will open up quite an era for steam navigation.

Purifying Oils.

The *Photographic News* (London) states that sulphide of carbon has lately been applied to the purification of oils with much success. It has a great affinity for fatty bodies, as may be shown from the fact that when the bones of which ivory black is made are treated in the usual manner, only five per cent of fat is obtained; treated with sulphide of carbon, they yield twelve per cent. Immense quantities of soap are wasted in extracting grease from wool; treated with the sulphide, the operation is more efficacious, economical and expeditious. Oily seeds treated with the sulphide yield 10 to 22 per cent more oil than by the old processes; besides, the oil is purer and entirely free from glutinous matters, and requires no purification; besides, the oil contains more stearine and margarine, and consequently yields a harder and better soap.

The mode of operating is very simple; the fatty matters and the sulphide are mixed together in a closed vessel, and the sulphide allowed to filter off, carrying with it the oil; the receiver is converted into a distilling apparatus; steam is introduced, the sulphide passes off, leaving the pure oil behind. The sulphide can be employed over again.

M. PELOUZE, of Paris, has made known a curious reaction with chloride of calcium. Acted upon by steam at a sufficiently high temperature, chloride of calcium is decomposed, producing a considerable quantity of hydrochloric acid. The transformation is so quick that he was first tempted to believe that it offered a new process for the manufacturr of hydrochloric acid on a large scale; but further experiments go to show that the production of acid was only abundant at the beginning of the reaction; that to maintain it required the expenditure of a considerable quantity of steam, and consequently, of fuel, so that the manufacture ceases to be economical.

CATHEDRAL OF MEXICO.—The gorgeous Cathedral in the city of Mexico is the largest religious structure on the American continent. It is 500 feet long, 420 feet wide, and capable of holding 30,000 persons. The high altar, raised from the floor on an elevated platform, exhibits a profusion of candlesticks, crosses, and other ornaments of solid gold or silver, and is crowned by an image of the Virgin decked in jewels, estimated at the value of more than $2,500,000; and all other parts of the church are a perfect wilderness of columns, statues, shrines, fonts, &c.

Who Invented Gunpowder?

BY JOHN TIMBS

"From the earliest dawnings of policy to this day," says Burke, "the invention of man has been sharpening and improving the mystery of murder, from the first rude essay of clubs and stones to the present perfection of gunnery, cannoneering, bombarding, mining" The imputed universality of the class of invention may account for the difficulty of tracing the special practice of it in the composition of gun powder with certainty to any period or nation. The evidence is conflicting, and it ranges from several centuries before the commencement of our era to the claim of the German monk of the fourteenth century, of whom a commemorative statue was erected so lately as the year 1853.

The earliest account extant on the subject of gunpowder exists in a code of Gentoo laws, where it is mentioned as applied to firearms; this document, being of some fifteen centuries before Christ, is thought by many to have been coeval with the time of Moses! The notice occurs in the Sanscrit preface, translated by Halhed, and is as follows :—"The magistrate shall not make war with any deceitful machine, nor with poisoned weapons, nor with cannon and guns, nor any kind of firearms." Halhed observes :—"The reader, no doubt, will wonder to find the prohibition of firearms in records of such remote antiquity; and he will probably hence renew the suspicion which has long been deemed absurd, that Alexander the Great did absolutely meet with some weapons of this kind in India, as a passage of Quintius Curtius seems to ascertain. Gunpowder has been known in China as well as Hindostan far beyond all period of investigation. The word 'firearm' is literally translated by the Sanscrit *agnee-aster* (*agnyastra*), a weapon of fire In their earliest form they are described to have been a kind of dart tipped with fire, and discharged by some sort of explosive compound from a bamboo. Among several extraordinary properties of this weapon, one was, that after it had taken its flight, it divided into several separate streams of flame, each of which took effect, and which, when once kindled, could not be extinguished; but this kind of *agnee-aster* is now lost."

Dutens has selected many passages from Greek and Latin authors favorable to the opinion that gunpowder was known to the ancients. He mentions the attempt of Salmoneus to imitate thunder, and of the Brahmins to do t e same thing; but his most remarkable quotation is from the life of Apollonius of Tyana, written by Philostratus, showing that Alexander was prevented from extending his conquests in India because of the use of gunpowder by a people called Oxydracæ, who repulsed the enemy "with storms of lightning and thunderbolts, hurled upon them from above." Philostratus is not remarkable for veracity; but taking into consideration the records of Oriental history, and the fact of pyrotechny having been cultivated from time immemorial in India and China, his assertion does not seem improbable. In India and many other parts of Asia, niter occurs in great quantity, spread over the surface of the earth. Dr. Scoffern, the experienced writer on this subject, supposes a fire lighted on such a spot; the most careless observer must have noticed the effect of the saltpeter in augmenting the flame; if then, attention having been directed to this phenomenon, charcoal and saltpeter had been mixed together purposely, gunpowder would have been formed The third ingredient, sulphur, is not absolutely necessary; indeed, very good gunpowder, chemically speaking, can be made without it. Sulphur tends to increase the plasticity of the mass, and better enables it to be made into and retain the form of grains.

It has been said that gunpowder was used in China as early as the year A. D. 85. Sir George Staunton observes that "the knowledge of gunpowder in China and India seemed coeval with the most distant historic events. Among the Chinese it has at all times been applied to useful purposes, as blasting rocks, &c., and in the making of fireworks; although it has not been directed through strong metallic tubes, as the Europeans did soon after they discovered it." In short, there can be no doubt but that a sort of gunpowder was at an early period used in China, and in other parts of Asia; and Barrow's statement that the Chinese soldiery make their gunpowder, and every soldier prepares his own, is highly characteristic of the people. Against the claim of the Chinese to the invention, it is urged that the silence of Marco Polo respecting gunpowder may be considered as at least a negative proof that it was unknown to the Chinese in the time of Kublai-Khan.

There is nothing in the history of these people, nor in their "Dictionary of Arts and Sciences," that bears any allusion to their knowledge of cannon before the invasion of Ghengis-Khan, when (in the year 1219) mention is made of *ho-pao*, or fire-tubes, the name of cannon, which are said to have killed men, and to set fire to inflammable substances; they are said, too, to have been used by the Tartars, not by the Chinese, and were probably nothing more than the enormous rockets known in India at the time of the Mohammed in invasion, (*Quarterly Review*, No. 41).

Numerous documents, however, show that gunpowder was known in the East at periods of great antiquity; whence it might have been introduced into Europe, either through the medium of the Byzantine Greeks, or by the Saracens into Spain. In a paper read about fifty-five years since, before the French Institute, M. Langles maintained that the use of gunpowder was conveyed to us by the Crusaders, who are stated to have employed it at the siege of Mecca in 690: he contended they had derived it from the Indians.

Mr. Hallam considers it nearly certain that gunpowder was brought by the Saracens into Europe. Its use in engines of war, though they may seem to have been rather like our fireworks than artillery, is mentioned by an Arabic writer in the Escurial collection, about the year 1249. The words that are thought to mean gunpowder are translated *pulvis nitratus* The Moors or Arabs, in Spain, appear to have used gunpowder and cannon as early as 1312; and in 1331, when the King of Granada laid siege to Alicant, he battered its walls with iron bullets, discharged by fire from machines; which novel mode of warfare (says the the chronicle) inspired great terror. And when Alonzo XI., king of Castile, besieged Algesiras in 1342–3, the Moorish garrison, in defending the place, employed *truenos* (literally *thunders*); which a passage in the chronicle proves to have been a species of cannon, fired with powder. And Petrarch, in a passage written before 1344, and quoted by Muratori, speaks of the art of making gunpowder as *nuper rara, nunc communis* (recently rare, now common).

Another authority traces gunpowder to the Arabs, but at an earlier date than hitherto mentioned; and seeks to identify it with an invention of much earlier antiquity. The celebrated Oriental scholar, M. Reinaud, has discovered an Arabic MS. of the thirteenth century, which proves that compositions identical with gunpowder in all but the granulations were, and had been previously, in the possession of the Arabs; and that there is every probability they had obtained them from the Chinese, in the ninth century. Many of these were called "Greek fire;" and comparing the account of Joinville, of the wars on the Nile in the time of St. Louis, with the Arabic recipes, there can be little doubt that we are now in possession of what was then termed "Greek fire." Mr. Grove, F.R.S., who has investigated the subject experimentally as well as historically, concludes that the main element of "Greek fire," as contradistinguished from other inflammable substances, was niter, or a salt containing much oxygen; that "Greek fire" and gunpowder were substantially the same thing; and that the development of the invention had been very slow and gradual, and had taken place long antecedent to the date of Schwartz, the monk of Cologne, A. D. 1320, to whom the invention of gunpowder is generally attributed: thus adding to the innumerable if not unexceptionable cases in which discoveries commonly attributed to accident, and to a single mind, are found upon investigation to have been progressive, and the result of the continually-improving knowledge of successive generations.

It was long the custom to attribute the invention of gunpowder to our philosopher, Roger Bacon; but a passage in his *Opus Majus*, written in 1267, proves that instead of claiming the merit of the discovery, he mentions gunpowder as a substance well known in his time, and even employed by the makers of fireworks; and he minutely describes a common cracker. In his treatise *De Secretis Operibus Artis et Naturæ*, he says, that from "saltpeter *and other* ingredients we are able to make a fire that shall burn at any distance." In another passage he indicates two ingredients, saltpeter and sulphur, and "Lura nope cum ubre," which is a transposition of the words "carbonum pulvere" (charcoal in powder). At the period when Bacon lived Spain was the favorite seat of literature and art. Bacon is known to have traveled through Spain, and to have been conversant with Arabic, so that he might have seen the manuscript in the Escurial collection, which is as least as probable a supposition as that he saw the treatise of Marcus Græcus. Some fifty years later, 1320, is the date claimed by the Germans for the invention due to their monks, Bartholdus Schwartz, in whose honor a stone statue has been erected in the town of Freiburg, where he was born; and in reply to earlier claims to the invention, it is maintained that to Schwartz is due the merit, because he did not learn the secret from any one else.

Nearly two hundred years before this date, Humboldt states that a species of gunpowder was used to blast the rock in the Rammelsberg, in the Hartz mountains.

Authorized statements negative the assertions by Camden, Kennett, and other writers, that no gunpowder was manufactured in England until the reign of Elizabeth. Its first application to the firing of artillery has been commonly ascribed to the English at the battle of Cressy, in August 1346; but hitherto the fact has depended almost solely on the evidence of a single Italian writer, and the word "gunners" having been met with in some public accounts of the reign of Edward III. The Rev. Joseph Hunter has, however, from records of the period, shown the names of the persons employed in the manufacture of gunpowder (out of saltpeter and "quick sulphur," without any mention of charcoal), with the quantities supplied to the king just previously to his expedition to France in June or July, 1346. In the records it is termed *pulvis pro ingeniis;* and they establish that a considerable weight had been supplied to the English army subsequently to its landing at La Hogue, and previously to the battle of Cressy; and that before Edward III. engaged in the siege of Calais, he issued an order to the proper officers in England, requiring them to purchase as much saltpeter and sulphur as they could procure. Sharon Turner, in his History of England, has also shown, from an order of Richard III. in the Harleian MSS., that gunpowder was made in England in 1483; and Mr. Eccleston (*English Antiquities*) stated that the English both made and exported it as early as 1411. Nevertheless, gunpowder long remained a costly article; and even in the reign of Charles I., on account of its dearness, "the trained bands are much discouraged in their exercising." In 1686, it appears from the *Clarendon Correspondence*, that the wholesale price ranged from about 2*l.* 10*s.* to 3*l.* per barrel.

John Evelyn, of Wotton, Surrey, asserts that his ancestors were the first who manufactured gunpowder in England; but this must be regarded as the reintroduction. His grandfather transferred the patent to Sir John Evelyn's grandfather, of Godstone, in whose family it continued till the civil wars. As we stroll along the valley in which lies Wotton Place, we are reminded that upon the rivulet which winds through this peaceful region was once made the "warlike contrivance." Evelyn, in a letter to John Aubrey, dated Feb. 8, 1675, says that on this stream, near his house, formerly stood many powder-mills, erected by his ancestors, who were the very first that brought that invention into England; before which we had all our powder from Flanders. He also describes the blowing up of one of these mills, when a beam fifteen inches in diameter, at Wotton Place, was broken; and on the blowing up of another mill lower down, towards Sheire, there was shot through a cottage a piece of timber, "which took off a poor woman's head as she was spinning."

THE MANUFACTURE OF GUNPOWDER AS CARRIED ON AT WALTHAM, ENGLAND, IN THE ESSEX MARSHES.—First, as to the ingredients. The saltpeter (principally imported from Bengal) is boiled in large pans, evaporized, and crystallized; and the charcoal is prepared from the alder and willow, which abound in the neighborhood. These processes are conduced in buildings at some distance from the gunpowder mills, whither the materials are carried, by water, in covered boats, to the works. There the saltpeter, brimstone and charcoal are ground separately in mills, each consisting of large circular stones slowly revolving on a stone bed. Next the ingredients are conveyed to the "mixing-house," where visitors wear overshoes. Here, in bins, are the saltpeter, brimstone and charcoal, weighed in the exact proportions; saltpeter 75, brimstone 10, and charcoal 15, in every 100 parts. Of the three ingredients, 42 lbs. are placed in a hollow drum, which revolves rapidly, and contains a fly-fan, which rotates in an opposite direction; in about five minutes a complete mixture is effected, and the charge is received in a bag tied over the lower orifice of the drum.

The "composition" is next taken to "the incorporating mills," and is now a combustible compound, to obtain its explosive power by the ingredients being thoroughly incorporated. The mill consists of a pair of circular stones ("runners"), weighing about 3½ tons each, and slowly rolling over the powder which is placed on the stone bed of the mill, surrounded by a huge wooden basin. The powder is previously damped, as it could not be safely ground dry; about seven pints of water ("liquor") being added to the charge of 32 lbs. of powder, during 3½ hours, the time of grinding. To insure this with precision, and to obviate the chance of any irregularity in a clock, the water-wheel, which works two of these mills in one house, also marks its revolutions on a dial, so that the attendant can never be mistaken in the time the charge has been "on"—a most important point, where the over-grinding of the too-dry powder might cause it to explode. Sometimes, a portion of the wood-work of the roof, or mill, becoming detached—such as a cog of the wheel—and falling into the pan, acts as a skid on one of the runners, and by friction produces heat enough to cause a mass of powder to explode. As a protection, over each house containing a pair of mills is suspended a flat board, which, in case of an explosion, is first blown upward, and being connected by wires with a cistern of water over the fellow mill, upsets the same, and drowns the gunpowder. The attendants are as little as possible in these mills, and only work by daylight.

More hazardous processes, however, follow. The powder thus incorporated is in hard flat lumps, and has again to be reduced to dust in the "breaking-down house," by conveying it down an inclined plane, through rollers, which crush nearly 500 lbs. in the hour. The powder is then taken to the "press-house," and there, between gun metal plates, is pressed in thin cakes to one-third its bulk, by a power of 700 tons in a hydraulic press. The cakes are roughly broken up, and sent in baskets to the "granulating mill," where the powder is again broken down into grains, the size being regulated by sieves. The floor is covered with hides fastened down with copper nails, and the mill can be started or stopped by a rope passing through the wall, which is bomb-proof. The powder is then dried by heat, in the "stoving-room," which is flanked externally by "traversers" (mounds of earth 30 feet thick), to confine explosion, should it happen, as much as possible to one house. Lastly, the powder is sifted in the "dusting house," where the sieves revolve with great velocity; the dust escapes through the meshes, and the gunpowder is drawn off through a short tap, into barrels, for packing. The finest powder is "glazed" by black-lead being shaken up with it; but cannon-powder has not this finish.

Unfermented Bread.—Take fine flour, six pounds; bicarbonate of soda one and one-eighth of an ounce; pure muriatic acid, one ounce and a quarter; water, three pints; and salt, three-quarters of an ounce; mix the bicarbonate of soda and the salt intimately with the flour, and put the muriatic acid into the water, and then blend the whole in the usual way of making dough. As soon as it is thoroughly kneaded, bake it either in tins or not. Bread thus made has an agreeable natural taste; keeps much longer than fermented or common bread, and is said to be more digestible, and much less liable to turn sour or moldy. We may observe that the chemical action of the acid on the soda disengages gas, which, though it makes the bread "light," disappears in the oven, and that the result of this action is to produce nothing but common table-salt, which can be easily proved by mixing a similar proportion of the acid and the soda in an appropriate vessel, when the well-known taste of common table-salt will be recognized.—*Septimus Piesse.*

Newly-painted Ships Unhealthy.

The carpenter of the American ship *Union*, which sailed last year from London on a voyage to the East Indies, has recovered $100 from the captain in a trial by jury, lately held in London, for injury to his health from sleeping in a bunk which had been newly-painted with white lead. In the course of the voyage he suffered from constipation and an affection of the nervous system, which prevented his hands from being actively engaged in the carpentering business, and he was incapacitated for some time. There was no ventilation in the place, and the paint was represented as very offensive. While at Bombay, the plaintiff states that he asked the defendant to discharge him and pay him off, but defendant refused. On returning to London, the plaintiff consulted a medical man, who stated that he was suffering from the deleterious effects of white lead in paint being absorbed into the system.

Investigations recently made at the naval depots of Chatham, Portsmouth and Plymouth, and the military depot of Woolwich, England, show an amount of peculation, regularly pursued, that beats our republican affairs of the kind "all hollow." No less than $500,000 worth of various articles have annually disappeared, for which no account could be given, from these four places.

CHURCH ORGANS.

We have received several requests from correspondents to give an account of the construction of church organs, and having recently passed through a large manufactory under the guidance of the intelligent proprietor, and having now under our eyes an elaborate illustrated description of the whole process, it would be easy to comply with these requests. We suspect, however, that our readers would not be generally interested in the technical details of the subject, but perhaps an idea of the essential principles of an organ, which we can give in a very few words, may be acceptable.

An organ consists of a series of pipes, which are, in fact, whistles, producing musical notes on the same principle as the whistles made by boys from the bark of chestnut saplings. These pipes have their lower ends inserted into the top of an airtight box, called the "wind chest," into which the air is forced by a bellows, the pressure of the air being regulated by weighting the bellows. This pressure is made sufficient to support a column of water from two to four inches in hight, varying with the size of the church in which the organ is to be used. The openings from the wind chest into the pipes are closed by valves, which are connected by levers with the keys of the finger board, so that any pipe may be blown by pressing its corresponding key.

So simple is the principle of a church organ; but the science, experience and mystery of the art are embraced in the construction of the pipes for producing the several tones required. Some of the pipes are made of wood and the others of metal; zinc and an alloy called "pewter," being the metals usually employed. A few of the metal pipes are generally gilded and placed in the front side of the organ, forming the most conspicuous portion of the instrument. The wooden pipes are cheap and rough-looking things, being made of four strips of board glued together, so as to form a square tube. Each key opens several pipes of different tones, but tuned to the same note; and the pipes are arranged in series, called "stops," in such a manner that, by drawing a slide, all of the pipes of one series or stop may be opened together. The production of the several tones is a complicated study; for instance, a particular tone for one of the heavy bass notes is produced by one pipe of wood and another of zinc tuned in unison. Other tones are formed by making the pipes flaring, like a trumpet; others with vibrating reeds, similar to those of a clarionet: and others by stopping, or partly stopping, the ends of the pipe.

The Best Wine Grapes.—Dr. Mosier, of Cincinnati, the vine grower and wine maker, thus writes to the *Horticulturist*: "Within the last twenty years I have had under cultivation and trial not less than thirty varieties of American grapes, for vineyard culture, and to furnish wine for the million. I think it will be a long time before we find a grape in all respects better adapted to the purpose than the Catawba. When properly cultivated and well ripened it makes a good dry wine, superior to the generality of Rhine wines, and a sparkling wine comparing favorably with the champagne of France. "For making a cheap red wine, to take the place of the clarets of Bordeaux, no grape that has been tried hereabouts is equal to the hardy and prolific Norton's Virginia Seedling. For choice fancy wines, of a superior grade, I would first place the Delaware, the Herbemont, the Venange, or Minor's Seedling, and the Diana, in the order named. Either of these grapes yield a wine for aroma and delicacy of flavor superior to Catawba, and in my humble judgment equal to any of the best wines Europe can produce; but as they have not as yet been tested for extensive vineyard culture, will remain some time in the hands of amateurs only."

Map of the Seat of War.

J. C. & Rae Smith, engravers and publishers, 71 Nassau street, this city, have published a beautiful colored topographical and military map of Virginia and Maryland, showing the mountains and prominent elevations, the rivers, and the railroads, country towns, &c. Also an enlarged map in detail of the country between Manassas Junction and Washington—the region between Fortress Monroe and Richmond.

SIR PETER FAIRBAIRNS' PATENT.

On another page will be found an illustration of an improvement in rollers for preparing hemp and flax, invented and patented by Sir Peter Fairbairn, of Scotland. The whole improvement consists simply in so cutting the leather with which the rollers are covered as to present the cut edges to the fiber instead of the sides of the leather in the method heretofore in use.

It would at first thought seem surprising that a man in Sir Peter Fairbairn's position, with all his important cares, should consider it worth while to be at all the trouble and expense of obtaining a patent in England, costing some $500, for the sake of securing so trifling a modification as this. But he is a man who has had large experience in patent rights, and has not only learned their value, but has learned how to handle them so as to make his money out of them. When he applied for a patent for this invention he probably knew what he was about.

Indeed, we believe that this is the very class of inventions which are the surest to pay for patenting. While the *great* fortunes are made from great inventions, like the sewing machine, the reaper, the electric telegraph, &c., those which are most certain to pay moderate sums of a few hundred or a few thousand dollars, are modifications in the details of mechanism, made by practical mechanics who see the objections to the machinery in use, and who happen to think of some way of overcoming them.

Modern Calico Printing.

It is comparatively but a short time since the production of designs upon calico was effected by means of hand blocks, made of sycamore or pear tree wood, two or three inches thick, nine or ten inches long, and nine broad. The face of the block was either carved into relief in the desired pattern, like ordinary wood cuts, or the figure was formed by the insertion edgewise into the wood of narrow slips of flattened copper wire, and the patterns were finished with small brushes, called "pencilings."

In engraving, the first kind of roller used was made by bending a sheet of copper into a cylinder, soldering the joint with silver, and then engraving upon the continuous surface thus obtained. An improvement on this consisted in producing the pattern on copper cylinders obtained by casting, boring, drawing and hammering. In this case, the pattern is first engraved in entaglio upon a roller of softened steel, of the necessary dimensions. This roller is then hardened and introduced into a press of peculiar construction, where, by rotary pressure, it transfers its designs to a similar roller in a soft state, and the die being intaglio, the latter, called the "mill," is in relief. This is hardened in its turn, and, by proper machinery, is made to convey its pattern to the copper roller.

This improvement alone reduced the cost of engraving on copper many hundred per cent, and, what is of far greater importance, made practical an infinite number of intricate engravings, which could never have been produced by hand labor applied directly to the roller. A further improvement was made by tracing with a diamond on the copper roller, covered with varnish, the most complicated patterns by means of eccentrics, and then etching. The combination of mill engraving with the tracing and etching processes naturally followed, adding immensely to the resources of the engraver and printer in the production of novel designs. Another point of progress is the tracing of patterns on the surface of rollers, effected by machines made on the principle of the pentagraph.

Steel Cannon Burst.—A large steel gun lately made at the Mersey Steel Works, Liverpool, England, burst at the seventh round while being tried at Shoeburyness. It had thrown 128 pound shot six miles, but the material of which it was made is stated to have been so defective, that it surprises almost every person that it did not burst at the first round instead of the seventh.

Two English chemists, named Joseph Lardley and R. Clayton, were lately killed at Richmond, Va., by the explosion of a quantity of fulminating powder which they were preparing in their laboratory for making percussion caps.