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MANUFACTURE OF OIL OF VITRIOL.

BY J. F. GESNER, M. A.

SOME one has said that the world knows least of its greatest men. If this be so with reference to individuals who shape, for weal or for woe, the destinies of their kind, with how much more truth may it be asserted of the great material products, that minister so vastly to man's comfort and enjoyment! Few have any adequate idea of the importance in our arts and manufactures of the corrosive liquid, known in commerce as the oil of vitriol. So important is the subject of our article, and so various and numberless the products, necessary almost to our daily existence, depending upon its manufacture, that it has been said that the material prosperity of a country may be judged of very accurately by the amount of oil of vitriol it produces.

The chemist knows oil of vitriol as sulphuric acid, and writes it, in characters rather cabalistic to the uninitiated, as $H_2 SO_4$. The characters, however, are easily understood. The capitals are merely the initials of the elements composing the compound, and the figures under them (1 being understood when no figure is written) denote the number of times each element enters into combination.

And here comes in one of those great and comprehensive laws which it is the glory of science to discover and apply. We have written sulphuric acid $H_2 SO_4$, and we have not done so at haphazard. Our hydrogen, oxygen, and sulphur behave, contrary often to our experience in the case of individuals, with unvarying decision and consistency. For the sake of simplicity we may write our compound SO_3, H_2O, bearing in mind that the second half of the symbol, H_2O, indicates 1 part of water, H_2O always meaning water in chemical language. The elements in the first part of the compound, SO_3, are sulphur and oxygen, and SO_3 means 1 part of sulphur and 3 parts of oxygen. Now we cannot change these relative proportions of sulphur and oxygen and retain the same compound. The instant we do so, a new chemical compound springs into existence. If we make, for instance, two parts of oxygen combine with one of sulphur, we have no longer sulphuric acid, but the pungent suffocating odor of a burning sulphur match, due to sulphurous acid gas, a definite compound that cannot be formed with any other different proportions of the combining elements.

By investigation, chemists have discovered that the different elements have certain and unfailing combining weights. For instance, the combining weight of sulphur is 32, that of oxygen 16, that is, in the case of sulphurous acid, 32 grains, ounces, or pounds, etc., of sulphur, have combined with twice 16 grains, ounces, pounds, etc. (not twice any other number of grains, ounces, pounds, etc.) of oxygen to form $32 + (16 \times 2) = 64$ grains, ounces, or pounds of sulphurous acid. So that, in any number of grains, ounces, or pounds of sulphurous acid, we know that $\frac{32}{64} = \frac{1}{2}$ is sulphur and $\frac{32}{64} = \frac{1}{2}$ is oxygen; in the same way SO_3 denote that 32 grains, ounces, or pounds of sulphur, have combined with three times 16 grains, ounces, or pounds of oxygen, making up $32 + (3 \times 16) = 80$ grains, ounces, or pounds of anhydrous sulphuric acid. In any number of equal parts, by weight, then, of SO_3, we know that $\frac{32}{80} = \frac{2}{5}$ parts are sulphur and $\frac{48}{80} = \frac{3}{5}$, parts are oxygen. In the case of SO_3, we have a striking example of the change a new entering element or compound can effect in a given substance. SO_3, without its equivalent of water, which we have called anhydrous sulphuric acid, is a white, solid substance, and may be molded in the fingers like wax, without danger if not pressed too hard. It has neither acid nor corrosive properties. Drop a quantity, however, into a little water, and there is a hissing noise, and an evolution of steam, as when you quench a red hot iron. So strong is the affinity of this inert harmless wax for the equally bland water, and so violently do they combine, that no amount of heat will serve afterwards to separate, without decomposition, the two, which make up the intensely acid liquid, oil of vitriol.

Although sulphur was well known to the ancients, they were not acquainted with its compound with oxygen, the subject of our article. Paracelsus, who died in 1541, seems to have been the first who understood its composition. That sulphur, or brimstone, should have been known, centuries before its compound, sulphuric acid, was recognized or applied to any use, is due not only to the limited knowledge possessed by the old alchemists, but to the fact that the acid rarely occurs in the free state. The affinities of sulphuric acid are so strong that, not content to exist alone, it must, as it were, have some intimate chemical companion with which to form a chemical alliance. And how different the compound from the elements and compounds composing it! Glauber's and Epsom salts are familiar in our mouth as household words; but who would recognize sulphuric acid and soda in the one, or oil of vitriol and magnesia in the other? Plaster of Paris is a familiar substance, inert and harmless, with no trace of our corrosive acid and the caustic lime composing it. But notwithstanding this strong tendency to combine with other bodies, sulphuric acid has been found in the free state. It is sometimes discovered free in the water which drains from coal mines, evidently produced by the decomposition of the iron pyrites contained in the coal, as will be seen further on. Boussingault found it in a mountain stream, called the *Rio Vinagre*, in the Andes, and calculated that the waters of this torrent annually carried down to the sea 15,000 tuns of sulphuric acid. In the island of Java, it exists in the waters of a stream which has its source in the crater of an extinct volcano. In all of these instances, it has evidently been produced in the way in which we shall presently see that it is now manufactured on the large scale, namely, from the oxidation of sulphur.

Sulphuric acid was first prepared by submitting, to an intense heat, the salt known as green vitriol or copperas. The substance does not, as the term copperas would seem to imply, contain any copper, but is simply a sulphate of iron, known to the chemist as ferrous sulphate. For some centuries, this was the only known mode of making the acid, and its manufacture in this way is still carried on in Nordhausen, in Saxony, whence the name of the product, Nordhausen acid or fuming oil of vitriol.

The distillation of the ferrous sulphate is made in earthenware vessels, called, from their shape, long necks. These are set in a reverberatory furnace, with an earthenware receiver luted to each with clay. The product is a very strong fuming acid. From its oily appearance, and the fact of its being first derived from green vitriol, we have the ordinary commercial term oil of vitriol. This mode of manufacture was found to be too expensive, and inadequate to supply the increasing demand. To the French is due the next important step in the manufacture of sulphuric acid, namely, by the oxidation of sulphurous acid, which, as has been already remarked, contains one atom less of oxygen than sulphuric acid.

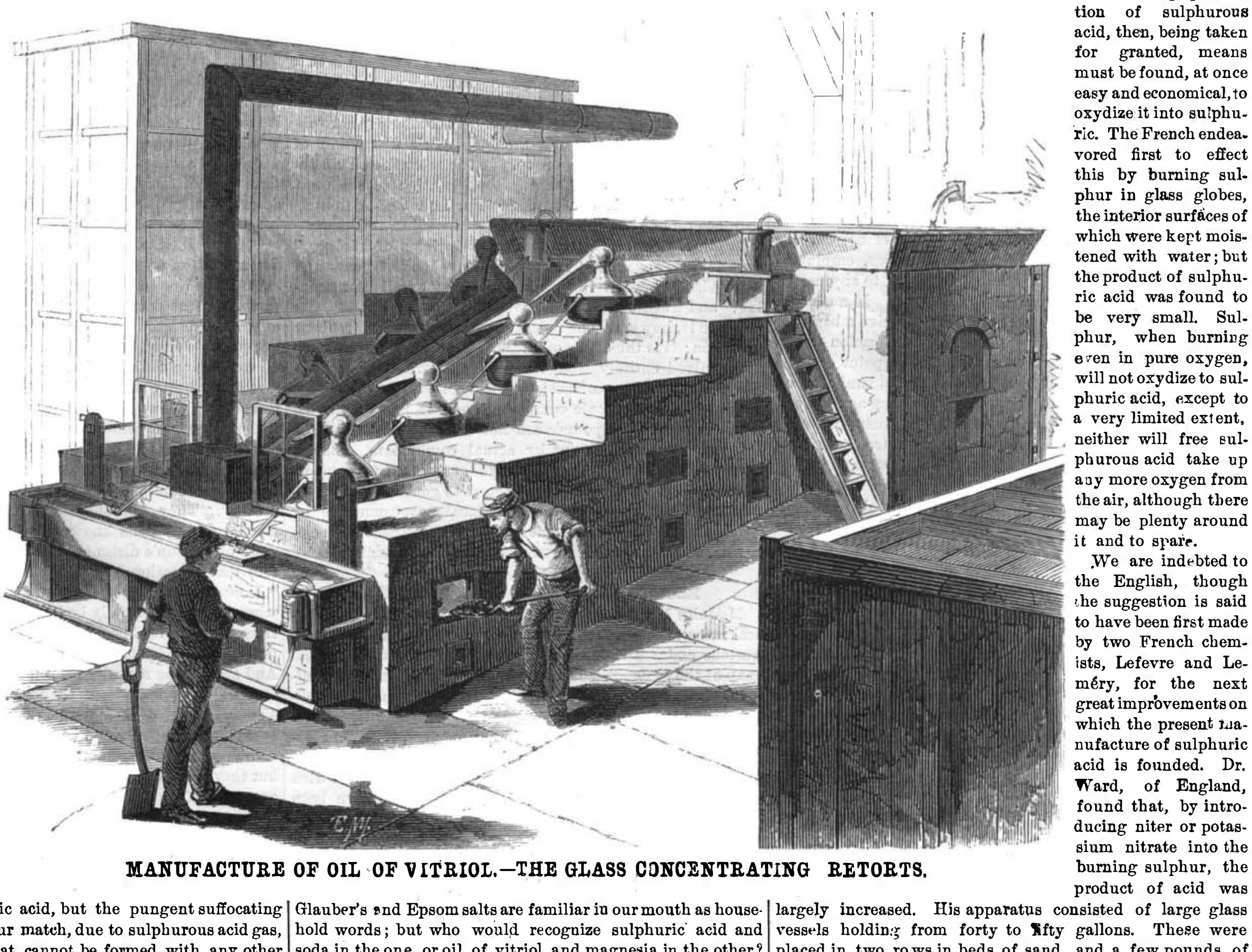
Now the production of sulphurous acid is a very cheap and easy matter. All we have to do is to burn sulphur in the air; and there are few of us in the habit of using the ordinary sulphur match who are not fairly acquainted with its production on a small scale, and also with one of its properties when it has reached the nostrils.

The cheap production of sulphurous acid, then, being taken for granted, means must be found, at once easy and economical, to oxydize it into sulphuric. The French endeavored first to effect this by burning sulphur in glass globes, the interior surfaces of which were kept moistened with water; but the product of sulphuric acid was found to be very small. Sulphur, when burning even in pure oxygen, will not oxydize to sulphuric acid, except to a very limited extent, neither will free sulphurous acid take up any more oxygen from the air, although there may be plenty around it and to spare.

We are indebted to the English, though the suggestion is said to have been first made by two French chemists, Lefevre and Lemery, for the next great improvements on which the present manufacture of sulphuric acid is founded. Dr. Ward, of England, found that, by introducing niter or potassium nitrate into the burning sulphur, the product of acid was largely increased. His apparatus consisted of large glass vessels holding from forty to fifty gallons. These were placed in two rows in beds of sand, and a few pounds of water poured into each. Stoneware pots were first introduced into the necks of these glass vessels, and afterwards a red hot ladle, into which was thrown a mixture of sulphur and niter, placed in each pot. The necks were then closed with wooden stoppers. The sulphurous acid from the burning sulphur was found to be oxydized by the nitrous fumes from the ignited saltpeter, and the resultant, sulphuric acid, was absorbed by the contained water at the bottom of each glass vessel. Sulphuric acid made in this way sold for from 30 to 50 cents per pound in our currency. Its price is now about one penny per pound in England, and with us ranges from 2¼ to 2 cents. The great cost of the acid made by Ward's process, as compared with the price at the present time, was owing to the necessarily limited size of the apparatus, being made of glass, and the high price of the niter used.

It was not until Dr. Roebuck, of Birmingham, England,

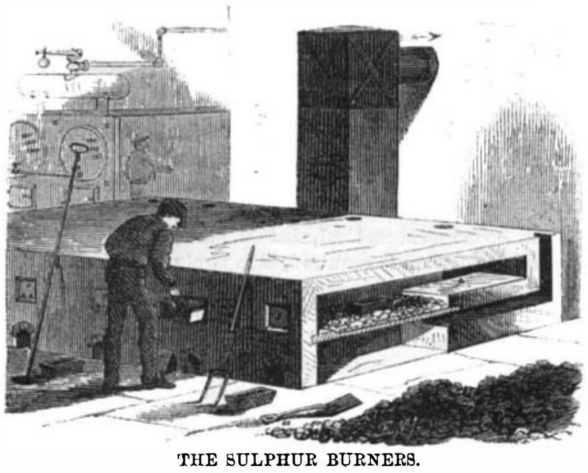
(*Continued on page* 114.)



MANUFACTURE OF OIL OF VITRIOL.—THE GLASS CONCENTRATING RETORTS.

[*Continued from first page.*]

in 1786, substituted large chambers of lead for the glass vessels used by Ward, that the manufacture of sulphuric acid on the large scale, and at a greatly reduced price, became an established fact. It was found that, in working these chambers, a comparatively small quantity of niter could convert a very large amount of sulphurous acid into sulphuric, and chemists consequently set themselves to study the reactions that took place.



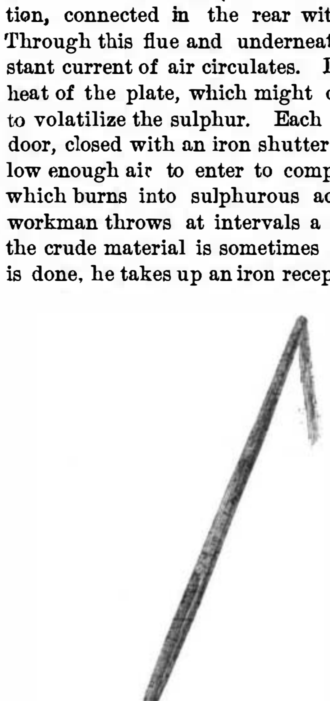
THE SULPHUR BURNERS.

There is a compound of nitrogen, known as nitrogen trioxide, N_2O_3, that is, 2 atoms of nitrogen combined with 3 atoms of oxygen, which will yield up at once, to sulphurous acid, one atom or equivalent of oxygen, just sufficient to oxidize the sulphurous into sulphuric acid. This nitrogen tri-oxide, having lost one atom or equivalent of oxygen, will take up its lost oxygen from the air, if mingled with it, and again deliver up its oxygen to another portion of sulphurous acid, and so on *ad infinitum*, acting as a carrier of oxygen from the air to the sulphurous acid. All that we have to do, then, is to mix sulphurous acid gas, air, and nitrogen tri-oxide with some steam, the water of which is an essential ingredient in sulphuric acid, in a suitable vessel, to obtain all the oil of vitriol needed. On the large scale this is one of the most complete and interesting operations of practical chemistry.

On entering chemical works, where oil of vitriol is made, our attention is first directed to the

SULPHUR BURNERS.

These consist of small furnaces built of brick, a section of one of which is shown in the illustration above. Their sizes and number are regulated by the amount of sulphur proposed to be burned in a given time. The bed of each burner consists of an iron plate, termed a burner plate, on which the combustion of the sulphur takes place, and underneath which there is a flue (as seen in the illustration, connected in the rear with the chimney or shaft). Through this flue and underneath the burner plate, a constant current of air circulates. Its object is to regulate the heat of the plate, which might otherwise become so hot as to volatilize the sulphur. Each furnace is provided with a door, closed with an iron shutter but sufficiently loose to allow enough air to enter to completely oxidize the sulphur which burns into sulphurous acid. Into each burner the workman throws at intervals a shovelful of brimstone, as the crude material is sometimes termed. The moment this is done, he takes up an iron receptacle about a foot long, and 4 or 5 inches wide and deep, termed a niter pot. This is rapidly filled about half full of nit ate of soda, and covered to the depth of an inch or two with oil of vitriol from an earthenware pitcher at his side. The niter pot being charged at the mouth of the burner, the workman pushes it with a two pronged iron fork into the now glowing sulphur to about the middle of the furnace. The door is closed, and the same operation repeated with each burner until all are charged.



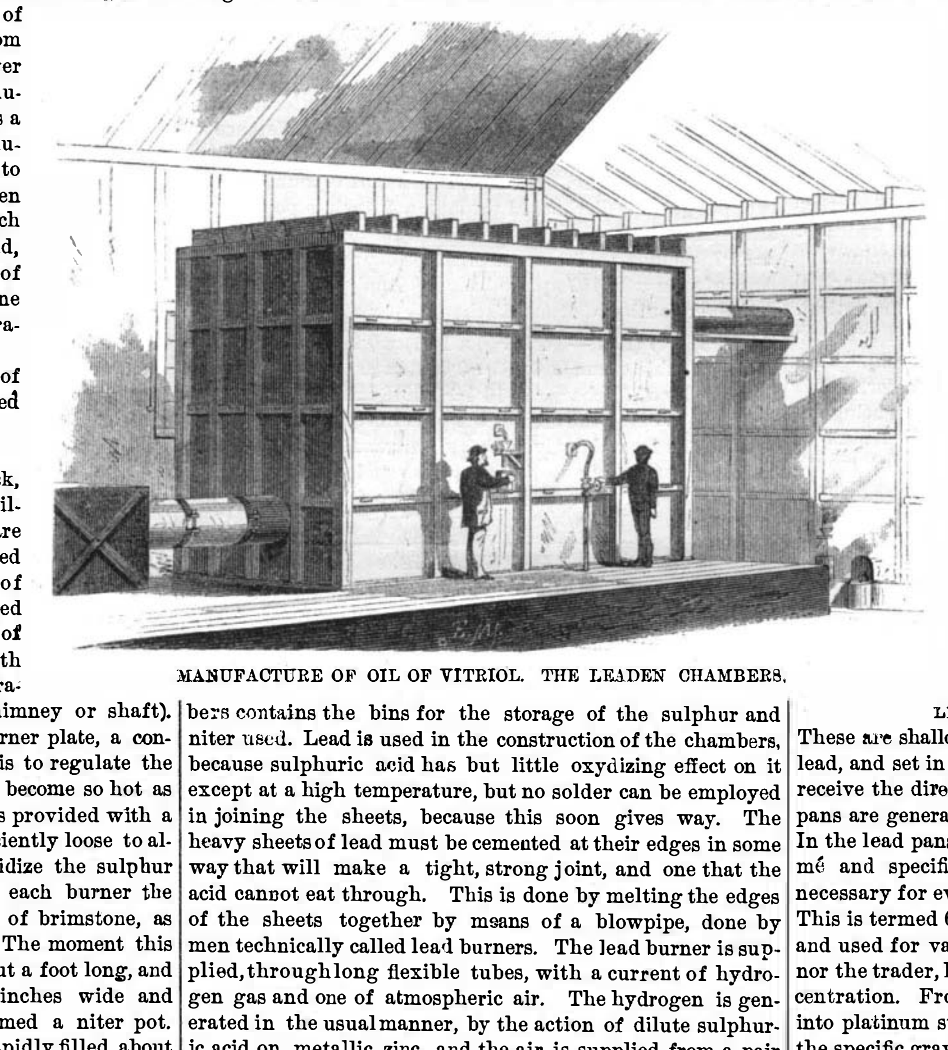
NITER POT AND FORK.

We have seen how necessary nitrogen tri-oxide is in the oxidation of sulphurous into sulphuric acid. This nitrogen tri-oxide, however, is not at once produced. The fumes from the niter pot, from the action of the oil of vitriol upon the nitrate of soda, consist of nitric acid, NO_5. But in the chamber this nitric acid yields up nearly all its oxygen to the sulphurous acid, becoming reduced to NO, or nitric oxide. This nitric oxide, meeting with the air in the chamber, abstracts oxygen, becoming nitrogen tri-oxide, N_2O_3, which we have considered as the carrier of oxygen from the air to the sulphurous acid.

Although sulphur is almost exclusively employed in this country as the source of sulphurous acid, in England very large quantities of iron bisulphide, known as iron pyrites, are used. The mineral being often a bright, brassy looking ore, is sometimes termed fool's gold, from the fact that many inexperienced persons are deceived by its appearance. Where it occurs in large beds or veins, and especially when it contains a small percentage of copper, it may be economically utilized as a source of sulphurous acid. This is the case at Anthony's Nose, on the Hudson river, where chemical works were erected a few years ago by Mr G. W. Gesner, a manufacturing chemist of New York, for the purpose of utilizing an extensive bed of pyrites that occurs in the hills close by. This deposit of ore was originally developed in the hopes of finding copper, but the great mass of the ore is hard, compact iron pyrites. In the production of sulphurous acid, it is burned in high, narrow furnaces. When once kindled, the mineral contains sufficient sulphur to support its own combustion. The workman has only to keep the ore well stirred up or "tickled" at intervals, the ore being supplied to the furnace by a door at the top, and the residue, when the burning is completed, carefully raked out from the bottom. From the sulphur burners, then, or from the pyrites kiln, let us follow the mixed sulphurous and nitrous fumes, through a flue, seen on the left in the illustration, to the

LEADEN CHAMBERS.

Here we have an immense room or series of rooms, whose top, bottom, and sides, are constructed of 5 lbs. sheet lead, or lead that weighs 5 lbs. per square foot. The walls and top are sustained by a framework of wood, to which they are fastened at intervals by leaden straps, fixed to the chamber, and overlapping the wooden frame, while heavy columns of wood or iron beneath serve to support the great weight of the structure above. The room under the chambers contains the bins for the storage of the sulphur and niter used. Lead is used in the construction of the chambers, because sulphuric acid has but little oxydizing effect on it except at a high temperature, but no solder can be employed in joining the sheets, because this soon gives way. The heavy sheets of lead must be cemented at their edges in some way that will make a tight, strong joint, and one that the acid cannot eat through. This is done by melting the edges of the sheets together by means of a blowpipe, done by men technically called lead burners. The lead burner is supplied, through long flexible tubes, with a current of hydrogen gas and one of atmospheric air. The hydrogen is generated in the usual manner, by the action of dilute sulphuric acid on metallic zinc, and the air is supplied from a pair of bellows, operated by an attendant. To avoid any risk of explosion, the gases are mixed just before combustion in the blowpipe itself. The combustion of the mixed hydrogen and atmospheric air gives rise to a very hot flame, by means of which the lead burner melts the clean edges of the soft metal together, making a joint that will last as long, of course, as the lead itself. Considerable practice and skill are required in the operation, and a horizontal joint is made more easily than a vertical one.

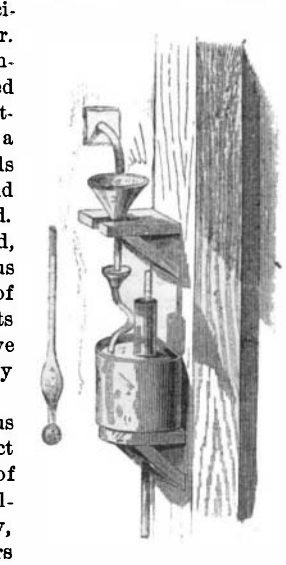


MANUFACTURE OF OIL OF VITRIOL. THE LEADEN CHAMBERS.

Steam is admitted into the chamber, by a small pipe, fitted with a stopcock, as seen with the attendant in the illustration. Finally, we have a vast space inclosed on all sides with lead, and filled with dense suffocating fumes of sulphurous acid and nitrogen tri-oxide, mingled with the more harmless vapor of water and atmospheric air. Here take place the chemical transformations previously shown, and here the production of sulphuric acid goes on uninterruptedly night and day, to the extent, in the largest works, of thousands of gallons daily.

The capacity of some of these chambers, the largest of which are found in England, is worth noting. Mr. Scholefield, of Bradford, near Manchester, has a chamber 70 feet long, 35 feet wide, and 35 feet high, with a capacity of 85,750 cubic feet. At Spence's chemical works, Newton Heath, England, there is a chamber 75 feet long, 40 feet high, 50 feet wide, containing, consequently, 120,000 cubic feet, or room enough to inclose two or three good sized houses. Muspratt Brothers and Huntley, at Flint, North Wales, have a chamber 140 feet long, 24½ feet wide, and 19½ feet high.

Fixed to the side of the chamber, and shown in detail in the illustration, we have a drip for testing gravity. This consists of a leaden receptacle, into which the acid formed in the chamber trickles or drips, through a pipe perforating it. The acid is caught by means of a trough or spout running along the interior side of the chamber, and is tested, when received, as to its specific gravity by a hydrometer. The acid formed in the chambers falls with the condensed steam, and collects on the bottom or floor. This liquid has a specific gravity of 1·55, stands at 45° Baumé's hydrometer, and is known as 45 or chamber acid. Containing 50 per cent real acid, it is frequently used for various purposes, as the manufacture of superphosphate of lime. Its concentration, however, as we shall presently see, is generally carried much further.



DRIP FOR TESTING GRAVITY

We have seen how the nitrous fumes, or nitrogen tri-oxide, act the part, simply, of a carrier of oxygen from the air to the sulphurous acid. Theoretically, then, when once the chambers contained the requisite amount of nitrogen tri-oxide, this should suffice for the oxidation of an unlimited amount of sulphurous acid. Practically, however, from 6 to 10 per cent of niter, in proportion to the sulphur, is ordinarily required. This is owing to the fact of so much nitrogen tri-oxide being carried up the chimney, or stack, with which the chambers are necessarily connected to maintain a draft through them. To save these fumes we have what are called

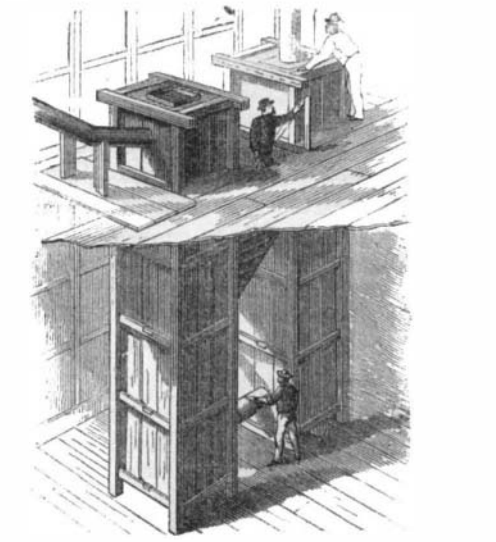
COKE COLUMNS,

or "Gay Lussac's Towers," from the name of the illustrious chemist and inventor. These consist of high narrow chambers lined with lead, and filled with pieces of coke, down through which oil of vitriol is caused to drip from the top. The towers are connected, as seen in the illustration, the first at the top with the end of the chamber, the second joined to the first at the bottom by a leaden flue, and finally the top of the second tower connected with the stack. The waste gases of the chamber, containing the nitrous fumes, are thus compelled to pass down the first tower and up the second, before escaping. In their passage, the oil of vitriol, trickling through the coke, largely absorbs the nitrous fumes, so that by this method the amount of niter used is reduced 50 per cent; the acid containing the nitrous compounds is then returned to the front of the chamber, where the heat is sufficient to liberate the nitrous fumes again.

To effect the first concentration of the chamber acid, it is run off into

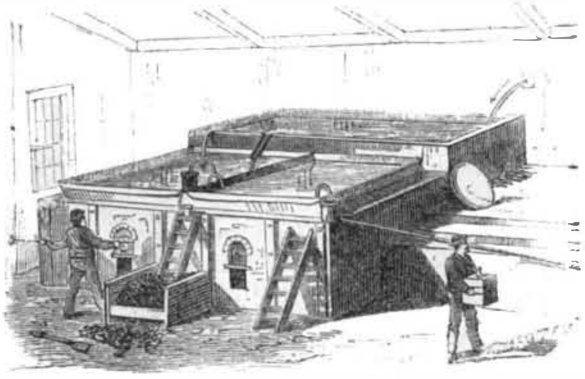
LEADEN CONCENTRATING PANS.

These are shallow leaden vessels, made of very stout sheet lead, and set in a furnace upon wrought iron plates, which receive the direct flame of the fu... Three, four, or more pans are generally used, and connected together by siphons. In the lead pans, the concentration is carried up to 60° Baumé and specific gravity 1·75, at which point, at the heat necessary for evaporation, the acid begins to attack the lead. This is termed 60 acid or pan acid, and is sometimes sold and used for various purposes. Neither the manufacturer nor the trader, however, is satisfied with this degree of concentration. From the lead pans, the acid is usually run off into platinum stills, where it is concentrated until it attains the specific gravity of 1·842 and stands at 66 Baumé, when



THE COKE COLUMNS.

it is called 66 acid or oil of vitriol. These beautiful white platinum stills are very expensive. A still capable of making 100 carboys, or 16,000 pounds, a day will weigh only 200 pounds, yet cost $20,000, or at the rate of $100 per pound. And yet platinum is the only available metal which will withstand the action of sulphuric acid, at the high degree of heat, 600° Fah., necessary for the manufacture of oil of vitriol, or 66 acid. Even this metal, in the course of time, becomes so thin at the bottom of the still that it must be, patched or renewed. When a break occurs, it is sometimes soldered with gold. To avoid the large outlay of capital for a platinum still, various suggestions have been made as to the use of other materials, and various forms of apparatus have been devised for the final concentration of sulphuric acid.



LEADEN CONCENTRATING PANS.

Although glass has been tried, and used in England, we know of no apparatus more ingenious and effective than the

PATENT GLASS CONCENTRATING RETORTS

shown in the large illustration (frontpage), and now in successful use at the Phœnix Chemical Works, South Brooklyn, N. Y. Here we have eight glass retorts, each holding about five gallons, and each set in a separate sand bath, in furnaces charged from the side. The acid from the leaden pans enters by a siphon, the upper retorts of each set or series, and flows out, after attaining a certain hight, by a glass tube, into the next lower vessel. By the time the acid has reached the lower retort,it is concentrated up to strength, that is, 66° Baumé. It then flows out into a leaden pipe set in a trough of running water, where it is cooled to some extent, and whence it flows into shallow leaden pans to undergo a further reduction of temperature before it is packed for the trade. The goose neck of each retort is connected with a leaden pipe, seen in the illustration between the two series. This pipe joins a flue (seen on the left, rising from the lower end of the furnace) which conveys the mixed vapors of acid and water, evolved during the concentration, to a condensing chamber, also of lead, where the acid, which would be otherwise lost, is recovered.

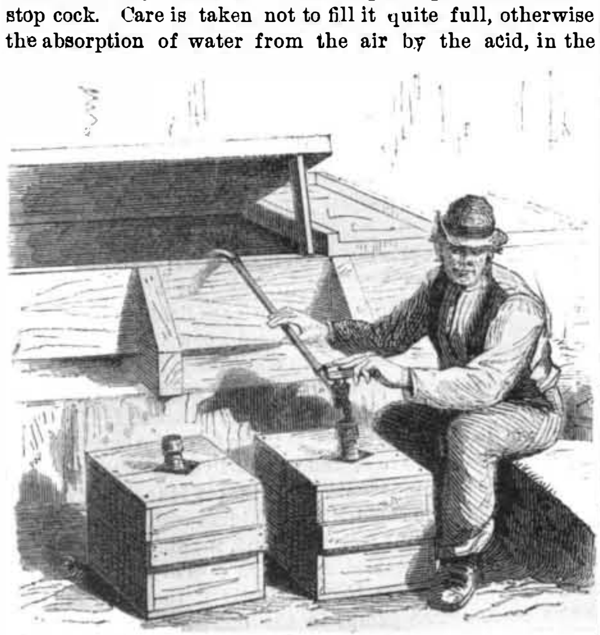
Although of so fragile a nature, the inventor informs us that, with care and attention, it is not very often a retort breaks; he had not lost one during the last six months. When this does happen, however, means are provided in the shape of a channel, which runs under and communicates with each sand bath containing the retorts for the purpose of re covering all the acid possible and delivering it into a receptacle in front of the furnaces.

This apparatus of concentrating retorts is far cheaper than a platinum still. The glass retorts, with their furnaces and connections, capable of concentrating 100 carboys daily, will cost about $2,000, while a platinum still, capable of doing the same work, will cost $20,000.

We now follow the acid from the concentrating retorts to the cooling cisterns, where our illustration shows the workman

FILLING THE CARBOYS.

This is done by means of a leaden siphon, provided with a stop cock. Care is taken not to fill it quite full, otherwise the absorption of water from the air by the acid, in the



FILLING THE CARBOYS.

course of time, will cause an overflow. A carboy is a large blown glass bottle containing eight or ten gallons, packed in hay or straw and set in a square wooden box. The mouth is closed when full, to prevent spilling and access of air, as far as practicable, by a stopper of clay, which is covered with a common canvas rag, and the whole smeared outside with tar. This makes a primitive rough-looking package, and one extremely liable to accident and breakage; but the trade seems to be satisfied with it. An opportunity is here afforded for some ingenious inventor to make an improvement.

When once the glass is cracked or broken at the bottom, there is a sudden end of the carboy, as both straw and wood soon become converted into soft charcoal. These carboys are transported all over the country, and, when emptied, returned to the manufacturer, if not too distant, to be replenished.

The quantity of oil of vitriol annually manufactured in Great Britain amounts to about 200,000 tuns, that made in the South Lancashire district alone exceeding 3,000 tuns per week.

We are indebted to Messrs. Gridley & Coffin, proprietors of the Phœnix Chemical Works, and to Mr. Saunders, the superintendent, for facilities afforded in making the illustrations connected with our article.

NORWAY AND SWEDEN.

An esteemed correspondent, now traveling in Northern Europe, remarks as follows:

"Never could more dissimilar nations be united under one government than Norway and Sweden. Norway clings with the most absurd tenacity to old things and old ways of doing them, while Sweden is ready to advance with the rest of the world. The difference appears strikingly on the line of railroad between Christiania and Stockholm. The road is about 400 miles long, of which, say, 100 are in Norway and 300 in Sweden. The time for express trains is about 20 hours. Of this, something like 8 hours is taken for the Norwegian 100 miles, leaving 12 hours—really, only 11 hours—for the Swedish 300 miles, or 12 miles against 25 miles per hour. But most of the travel in Norway is by the very old fashion of carrioles and post horses, the principal roads—under government care—being in good order and the speed averaging, with push, six or seven miles per hour.

The American Consul in Christiania—which is the only live part of Norway—is trying hard to get our mowers and reapers into use there, though thus far with indifferent success. In Sweden, these things are being taken hold of with something like freedom. The Swedes are, evidently, a contriving and mechanical people, and in such things very much in advance of their neighbors. They are just the kind of people to be at home in America, and the very best kind of people America could have. In both countries, as well as in Great Britain, I heard the loudest kind of lamentation over the great emigration to America. Lack of laborers causes strikes and high prices, they say, and reduces the means of the old countries and the values at the same time. Land, generally, seems to have touched its highest point everywhere on this side the ocean, and to be falling with no little rapidity, and with an ever diminishing number of purchasers. Of course, I speak generally and not particularly. What shall we do about it? seems to be an absorbing question, in each of the countries through which I have passed. The story of success in America flows back from every pen; and those who remain, having friends who have gone before, are in nearly every case anxious only to get away themselves."

Origin of Plagues.

Dr. Tholozan, physician in chief to the Shah of Persia recently read a paper before the French Academy of Sciences on the origin of pestilence. It has been generally believed, he said, that the plague or eruptive fever was exclusively engendered in low, warm, and marshy regions, especially in the north of Africa and in Asia Minor. This opinion is, however, without foundation, and a large number of facts as well as the evidence of past inflictions, prove that the disease may originate in any latitude, under all climates and in all countries,however elevated. It is not a consequence of climate or meteorologic influence,nor even the necessary concomitant of unhygienic causes, however energetic. Famine, for instance, breeds typhus fever rather than the plague. This exclusion of all physical origin leads to the conviction that the malady is due to some animal ferment; the pest, in short, is an organic fermentation.

M. Tholozan added that he considered the deadly forms of pestilence so common in Kurdistan to be principally due to the intimate contact of the inhabitants with their sheep in unhealthy and badly aired cabins.

Shocking Accident.

J. E. E., of Pa., says that Miss Craft, a young lady from Beaver Falls, Pa.,while in a flouring mill,was standing near two upright shafts that were revolving at the rate of fifty revolutions per minute, one of the shafts being covered with sticky corroded oil. Her dress,being of light material, touched and adhered to it; and instantly winding around the shaft, she was drawn between the two (they are only a few inches apart) which caught her flowing hair,then tearing the entire scalp from her head, to the eyebrows. One leg was badly fractured and she was much lacerated and bruised. She lies in a critical condition and her physicians have no hopes of her recovery.

Upright running shafts are always dangerous, and owners should have them encased with wood boxing

New Photo-Process.

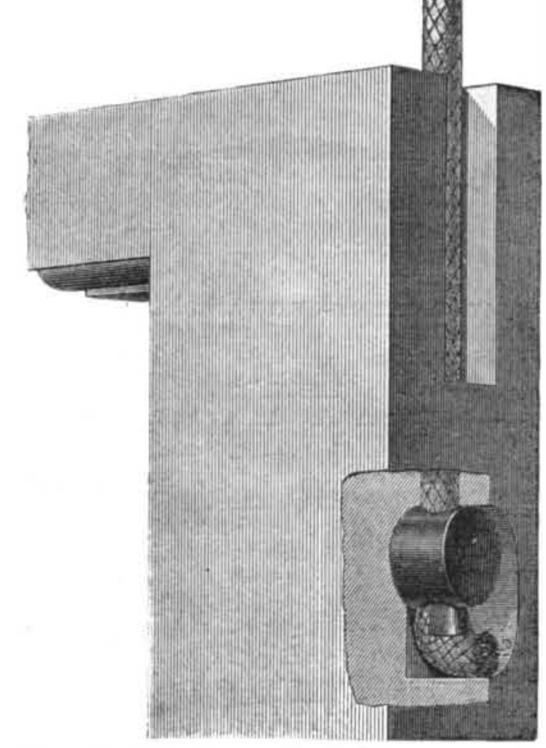
A recent improvement, announced by Mr. Burgess, a photographic artist of Peckham, England, consists in sensitizing gelatin by means of bromide of silver. The mixture is applied warm to the glass plate, and the picture may be taken with the plate either wet or dry. The time of exposure is the same as for the ordinary wet collodion plates. The alkaline-pyro developer is used, the picture making its appearance rapidly, with any required degree of intensity. The new process promises to compete sharply with the ordinary collodion process.

THE reason why common salt sometimes becomes moist when exposed to the atmosphere is because it is not pure Chloride of calcium and chloride of magnesium are impurities generally present in salt, and they absorb moisture from the air.

HARRIS & HEWITT'S PATENT SASH CORD FASTENER.

The object of the invention represented in the accompanying engravings is to dispense with the knot commonly used to fasten window cords to sashes. Any one, who has ever attempted to re-adjust the old fashioned though simple arrangement, will not fail to appreciate the utility of the

Fig. 1



new device. An old knot is very commonly drawn up into the hole through which the cord passes, and requires no small exercise of time and patience to force it out. This only begins the trouble, for the rope has become hard and jammed, and persistently refuses to untie. After breaking off his finger nails and working himself into an uncomfortable perspiration, the operator, probably with a few forcible interjections, settles the difficulty by hacking the obdurate knot off with his knife. Then he pokes the rope carefully through the hole again, triumphantly ties a new knot, and pulls down the sash with a sigh of relief. The window descends nicely until within two inches of the bottom, and declines to move any further. He pulls, and pitches his whole weight on it, and gets mad, and screams short texts not taught in Sunday schools, and finally tries to push it down with his foot, and in doing so breaks a pane of glass. Then he retires for a short distance, and sits down on a tool box and glares. Eventually he discovers that the cord, by cutting off the knot, has become too short, and the weight is jammed against the pulley: and consequently, after briefly communing with the weight and the cord and everything in any wise connected with the window, he puts on his coat, and goes down the street for a new rope, which, after considerable tribulation, he manages to adjust.

All this trouble is obviated by the little fixture herewith illustrated, the cost of which is only nominal, being, at retail, less than six cents to a window. It consists of a short cylindrical casting with a taper hole through it, through which the cord is passed after being threaded through the opening in the edge of the sash in the usual manner. There is also a serrated wedge, which is pressed into the hole in the fixture beside the cord, as shown in the illustration, fastening it very securely. This wedge is so proportioned that it is impossible to draw it through the casting, and no matter how hard it may be dragged up, a slight pull at the short

Fig. 2

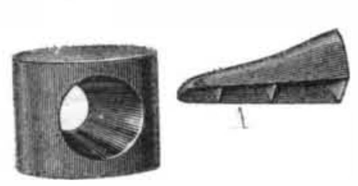


Fig. 3

end of the cord will instantly release it for renewal or re-adjustment. No special preparation of the sash, different from that ordinarily made for the knotted cord, is necessary.

The expense of this fixture, it is claimed, in first hanging, is more than saved in time and cord. It has been tested or examined, and is approved, by the leading builders and architects of Newark, N. J.

Patented July 22, 1873, by Horace Harris and Frederick Hewitt, 788 Broad street, Newark, N. J., from whom further particulars may be obtained.

APPROACHING EXHIBITION AT MONTREAL.—An agricultural and industrial exhibition will be held at Montreal on September 16, 17, 18, and 19, 1873. In all departments, the competition is open to exhibitors from any part of the world. The whole fields of agriculture and manufactures, commercial and domestic, are covered by the long list of premiums. Mr. Georges Leclère is the secretary, who will furnish full particulars if addressed at Montreal, P. Q.