SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a patent for a mode of applying Steam for Extracting Tannin and other ingredients, from the bark, and other substances used in tanning. Granted to WILLIAM COBURN, Gardiner, Maine, November 1, 1828.

"This improvement consists in applying *steam* to the substance from which tannin is to be obtained, in the following manner. The steam is conveyed from the boiler by a tube, into the lower part of a *cistern, or tub*. The tub, or vessel, used for the purpose, is furnished with a false bottom, perforated with holes, and raised a few inches from the true bottom. The tub is filled with the substance to be acted upon by the steam, which is suffered to pass into the tub between the two bottoms. Cold water, or bark liquor, is then, occasionally, poured into the top of the tub, and the liquor thus obtained is drawn off by means of a cock placed between the bottoms of the tub. The advantages of this mode, are, 1st, the simplicity of the apparatus necessary for the application of the steam; no pressure is required to confine the steam in the tub, other than the weight of the materials acted upon. 2nd. By the application of cold bark water, or liquor, or cold water, the steam is found to penetrate the substance much more easily, and a greater quantity of tannin is obtained. This form of apparatus, and the method, is very useful and convenient for extracting glue from the substances which contain it; also for lixiviating wood, or other ashes, either for *potash*, or *soda*; for the colouring ingredients of dye stuffs, the active principles of medicines, &c.

WILLIAM COBURN.

Remarks by the Editor.—We are at a loss to perceive any advantage to be derived from the separate boiler, from which the steam must be conducted through a tube, down between the two bottoms. Why would not the boiler itself answer all the purposes required? There might be a false bottom, or grating, upon which the bark or other materials might rest, with the fire under the true bottom; there would, in this way, be less loss of heat, and more steam generated and applied to use, than by the plan proposed. "Wood, or other ashes," would soon find their way between the two bottoms; and even if they did not, the solubility of the alkalies is such as not to need the aid of steam; and if they did, the steam, applied in this way, is no more than boiling water.

Steam has been repeatedly applied to the heating of water in vats and coppers, by carrying tubes to the lower parts of these vessels. The principal advantages proposed have been, the obviating the risk of injuring the contained materials by the direct action of the fire, the preservation of the vessels themselves, and the heating of several by attending to a single fire.

Specification of an improvement in the mode of drawing and corking Sparkling Liquors, with a view to the preservation of their clearness and sparkling quality (previously acquired,) notwithstanding the drawing and corking of the same. Issued to STEEN ANDERSON BILLE, New York, November 8, 1828.

THIS invention consists in performing the operation of drawing any sparkling liquor, as malt-liquor, or cider, from one or more vessels, and filling one or more other vessels with it, as also of closing it firmly in such one or more other vessels, by corks, plugs, or stoppers of any kind, the whole under an artificial pressure, by means of compressed air, corresponding with, or in some measure exceeding, the sparkling power of the liquor in question; thereby preserving unimpaired, such sparkling power of the liquor, as well as its clearness, (both being the result of repose and pressure,) notwithstanding the drawing and corking of the same.

To effect this, an air chamber is constructed, sufficiently strong to retain the air, compressed to any degree required, and sufficiently spacious to allow the whole operation above stated, to be performed within its walls.

It having been fully ascertained, by the use of diving bells, that the lungs of man are not effected, in any manner injurious to health, by breathing air, for a limited time, under an artificial pressure of one or two atmospheres in addition to the common atmospheric pressure, there can, of course, be no reasonable objection to one or more persons, as the work may require, closing themselves up in an air chamber of the above description, similar in its operation on the human frame, to a diving bell, descending in the water to a depth producing a similar compression of the air within. The air in both vessels, viz. in the diving bell and in the air chamber for the drawing and corking of sparkling liquors, is maintained in its purity for animal breathing, by the application of an air-pump; and while the pressure in the diving bell is produced by, or depending upon, the depth to which the bell shall be sunk, the pressure in the air chamber for the drawing and corking of sparkling liquors will be produced by the air-pump, and will be depending upon a relieving valve, not admitting the pressure within to exceed the weight by which the valve shall have been previously regulated, with a view to the contemplated operation; or if a column of water be substituted for a valve, then the weight of such a column of water, which latter medium possesses the additional advantage of counteracting any little variation which change of temperature may occasion in the expansion of the air within, by either receding from, or filling up, the space of any vessel into which the end of the tube shall be immersed.

If the fermented liquor to be operated upon, be placed in an air chamber of this description, in open vessels, it is evident that the development of carbonic acid, or rather the escape of it in the shape of gas, will, by the pressure of the compressed air, contained in the

air chamber, be as effectually checked, to the extent of such pressure, as if the liquor were kept within corked bottles. On the contrary, as far as the chemical energy of the fermented liquor in forming carbonic acid, and emitting it in the shape of gas, exceeds the pressure of the compressed air intended for its suppression, the fixed air will naturally escape; this, however, is so far from being a disadvantage, that it actually is a most desirable circumstance, affording the means of relieving the liquor from any excess of expansive force, which, otherwise, might endanger the vessels intended for its keeping. Thus the sparkling power of the liquor may be governed and controlled at pleasure, as well with a view to its safety in keeping, as its fitness for a beverage.

When the liquor shall have been kept a sufficient time under pressure in the air chamber, to have acquired the sparkling quality desired, either by fermentation or by some other chemical process, it may be drawn off into bottles, and corked perfectly clear (leaving the sediment in the vat,) and perfectly sparkling, ready for immediate use, as though it had been kept all the while within bottles; provided such drawing and corking of the liquor be performed in the air chamber, that is to say, under the pressure to which the liquor till then shall have been subject. The best proof of this fact is, the flat appearance of any sparkling liquor while under pressure in the bottle, notwithstanding the motion given to the liquor by turning or upsetting the bottle in which it is contained. It may, therefore, in a similar manner, be handled without any loss whatever of its acquired qualities, in pouring it from one vessel into another, provided only as above stated, the pressure be preserved during the operation.

The fermented liquor to be operated upon, is introduced into the air chamber by means of a cylinder, without the air chamber, placed horizontally, or nearly so, above the height of the vats within, intended for the reception of the liquor. This cylinder is furnished with four tubes and cocks, two communicating with the air chamber, viz. one on the top of the cylinder, communicating with the air in the air chamber, the other at the bottom of the cylinder, communicating with the spout leading to the vat within, intended for the reception of the liquor; and two communicating with the atmosphere, the one at top with the air, the other at bottom with the liquor to be introduced; thus, by alternately shutting and opening the respective cocks, the liquor may successively be supplied to the cylinder, and emptied into the vats in the air chamber.

For the admission of the person to perform the operations of drawing and corking the liquor, a manhole is formed in the top of the air chamber, having a lid inside, which closes hermetically, by the pressure of the air within. A moveable cylinder, closed at top, covers the person who is to enter; this cylinder is screwed air-tight to the rim or flanch of the manhole. On opening a communication between the air chamber and the cylinder by means of a cock, the state of the air in both will be equalized, and the entrance through the manhole thereby rendered perfectly free. On leaving the chamber the same way, the manhole is shut, and a communication opened

between the cylinder and the atmospheric air, which will relieve the cylinder from the compressed air within, and thus allow the cylinder to be removed to let out the person shut up in it.

The bottles are introduced into the air chamber, and again delivered out from the air chamber, through one or more boxes attached to the chamber, having a door at each end; the one opening into the air chamber, and the other communicating with the atmosphere. The bottles are placed upon a moveable shelf, and thus introduced into the box; closing the door and opening the cock of a tube connected with the box and the air chamber, the air in both will be equalized, and thus the entrance into the air chamber rendered free. By reversing the operation, the shelf with its bottles may, in a similar manner, be let out. If two boxes be made use of, some saving may be made in the expenditure of compressed air at this operation, by equalizing the air in both the boxes, the one for letting in, the other for letting out, before any new communication is opened, either with the air chamber or the atmosphere, as the case may be.

The application of four boxes will be still better, with a view to despatch in receiving, filling, corking, and again delivering out the bottles, agreeably to a new plan, invented by the undersigned for performing these operations. If the liquor is to be drawn off in vessels larger than bottles, as barrels or casks, such vessels, being necessarily perfectly tight and strong, are placed near the air chamber, from which two pipes are made to communicate with the top of the vessel, by two corresponding holes and sockets, or flanches, in the vessel; the one for equalizing the air in both, the other for drawing the liquor from the vats in the air chamber: thus, by turning the respective cocks, the above operation may be performed at pleasure.

To prevent any mustiness forming on the top of the liquor in the vats in the air chamber, in consideration of a more extended surface of the liquor being in contact with the air in this way, than when closed up in bottles, but still more so with a view to the air in the air chamber being constantly renewed for the sake of respiration, the surface of the liquor ought to be covered with a floating lid, or top piece, having only a trifling space open round its edge to prevent it from sticking to the vat, and this little space may still further be closed up by some liquid, lighter than the liquor in the vat, as water, spirit, or sweet oil, not easily affected by the air, nor affecting itself the liquor.

With a view to the safety of the person entering the air chamber, a pliable tube may be attached to the opening inside, through which the air is forced into the air chamber by the air-pump, necessarily at work when any person is engaged in the chamber, which tube, when taken up by such a person, or placed near to him only, will infallibly secure to him a current of air, abundantly sufficient for respiration; besides which, the whole air in the chamber may, occasionally, be renewed for the same purpose as above stated, and even before entering the chamber, the actual state of the air may be fully ascertained by cocks, communicating with the interior, and, if required, a general purification then be effected by the air-pump. If

an additional air-pump be applied for the emission of air from the lower part of the chamber, the carbonic acid gas being the heaviest, while, by the other pump, air is forced into the upper part at the same ratio; the connexion of both with a common fly wheel, will counter-balance the power required for the latter operation, leaving only the friction to be overcome, which will facilitate the purification of the air within to such a degree as to admit of keeping it constantly as pure as the air without, whatever the size of the chamber may be, by the mere overcoming the friction of the air-pumps thus applied. Light is best admitted by reflection from without, to avoid any inconvenience from the direct application of lamps within.

To shorten the time necessary for any person to stay in the air chamber, it is desirable that such improvements in the drawing and corking of liquors should be adopted, as will facilitate this operation; such improvements, however, forming no part of the present invention, it is unnecessary here to enlarge upon the subject any further.

With regard to the construction of the air chamber, strength and tightness constitute the qualities indispensably required; these may be obtained in different ways, but it is presumed to be the cheapest plan to give to the air chamber a circular shape, by which the two sides are made to form, as it were, one cylinder within another, kept together by square frames of beams, placed vertically at suitable distances, radiating as it were from a common centre, and enclosing at the same time both top and bottom, while the whole is lined with planks, forming an entire box, to be covered internally, with some substance fit to render the chamber air-tight, as zinc, or lead in sheets. If the width, or height, be too great for the frames to sustain the pressure from within, bars of iron may be applied in support of the middle of the beams; by thus connecting the cross beams of the opposite sides, as well as those of the top and bottom, which will not materially interfere with the application of the space within, to the purposes intended.

When the air chamber shall be duly protected against the variations of the temperature of the external air, the temperature of the air within may be kept pretty uniform, or at any degree required, by suffering the air, in entering the chamber, to pass through a cooling, or a heating vessel, as the case may require.

Although several advantages, as above stated, will result from the application of an air chamber, in keeping quantities of liquor under pressure for the purpose of rendering them clear and sparkling, the subscriber does not claim such advantages, generally, as his invention; but he confines himself, in his claim of invention, to the mere drawing and corking of sparkling liquors *under pressure*, by means of an air chamber, containing air compressed to any degree required, whereby the clearness and sparkling quality of the liquor, previously acquired, either in the air chamber or elsewhere, will be preserved unimpaired, notwithstanding the drawing and corking of the same.

STEEN A. BILLE.

The Patent Thomsonian Practice of Physic.

THE above dignified title is used to designate the administration of certain vegetable preparations, and the employment of the steam bath, in the cure of a number of disorders. To these medicines, and the mode of administering them, an exclusive privilege is claimed, under a patent from the United States. Several instances have been narrated in the public papers, of the fatal effects of this practice, whilst those interested in its favour, assert that these accounts have been falsely represented by the medical faculty, who, they aver, have risen in arms against it, because it is destroying their practice. The support of a number of intelligent and disinterested persons, has given currency to the claims of these Thomsonian practitioners; and, under this sanction, their business has become very extensive, particularly in some of the western states. Without intending to express an opinion upon the subject, we will observe that it is the fate of every popular medicine, to obtain the kind of support which the practice in question has received. Such preparations are usually active, and, when properly administered, they are beneficial; their indiscriminate employment, therefore, will insure their occasional usefulness. Whenever they are successful, the cured, and their friends, naturally enough, praise the medicine; whilst the patient, the disease, or the physician, bears the blame, when their effects are injurious.

Numerous applications have been recently made for copies of Mr. Thomson's specifications, as questions have arisen which will call the merits of the practice, and of the practitioners, before a court and jury. Under these circumstances, we think that the publication of both the patents which have been obtained by Mr. Thomson, may subserve the cause of science, and of humanity. The first patent expired on the 2d of March, 1827, the second having been issued upwards of four years before the termination of the period of the first. In some parts they appear to be identical, as in No. 2, in both specifications, and in other parts also. Under these circumstances, the question may arise, whether the claim under the second patent is not, in fact, an attempt to prolong the first, as it does not specify the particular improvements claimed, but appears, broadly, to include the whole practice recommended.

Specification of a patent granted for "Fever Medicine." To SAMUEL THOMSON, of Surrey, county of Cheshire, New Hampshire, March 2, 1813.

A SPECIFICATION for preparing and using certain medicines in fevers, colics, dysenteries, and rheumatisms.

No. 1. The emetic herb, or Lowbela (Lobelia?) medica, a plant that grows about twelve or fifteen inches high, with leaves of the size of mint leaves, bearing a pod the size of a white bean, of a

sharp taste, like that of tobacco, creating nausea. It must be gathered when the leaves and pods are a little yellow; dried, pounded fine, and sifted, when it forms a powerful emetic. Dose, in powder, from 4 to 12 grains, with or without an equal quantity of No. 2.

No. 2. Cayenne, or red pepper, pulverized.

No. 3. Marsh rosemary, two parts, the bark of bayberry, or candleberry (the myrtle from which wax is obtained from the berry) roots, one part, pulverized, or sumach bark, leaves, or berries, or raspberry leaves, may be substituted. A tea made with one ounce of the above powder (No. 3,) in a pint of boiling water. Dose, a wine-glassful, occasionally, sweetened.

No. 4. Bitters for correcting the bile; take the bitter herb, or *balmony*, barberry bark, and poplar bark, equal parts, pulverized. One ounce to half a pound of wine, or spirit, and hot water. Dose, half a wine-glassful, and for hot bitters, add half a drachm to the ounce.

No. 5. A sirop. Take one ounce of peach kernels, or cherry stones; half an ounce of gum myrrh, made fine; add three half pints of hot water, two ounces of white sugar, half a pint of brandy. Half a wine-glassful to be used three times a day.

Rheumatic drops. Take one gallon high wines, one pound gum myrrh, put into a stone jug, and boil it in a kettle of water for half an hour; when settled, pour it off; add four ounces camphor, half an ounce of cayenne pepper in powder, one quart of spirits of turpentine, then bottle it, and it is prepared for bathing in rheumatism, any swellings, or external pains.

No. 1, is used to cleanse the stomach, overpower the cold, and promote a free perspiration. No. 2, to raise the inward heat. No. 3, to scour the stomach, promote perspiration, and repel the cold. No. 4, to correct the bile, and quicken the appetite. No. 5, to strengthen the stomach, and restore the digestive powers, after cases of dysentery, or other weakening disorders. The three first numbers may be used in any other case, to promote perspiration, or as an emetic.

SAMUEL THOMSON.

Specification of a patent granted for a mode of preparing, mixing, compounding, administering, and using, the medicine therein described, to SAMUEL THOMSON, of Boston, Suffolk county, Massachusetts, January 28, 1823.

First. The mode of preparing and compounding medicine for an emetic, to be administered in diseases caused by cold and obstructed perspiration, such as fevers, colic, rheumatism, dysentery, asthma, numb-palsy, dropsy, and consumption, and various others.

Take the emetic herb *Lobelia Inflata* of Linnæus, dry the pods and leaves, or the leaves only, and reduce them to a fine powder in a mortar; sift and keep it from the air. For a dose, take from ten to twenty grains, steeped in warm water, sweetened. This emetic is called by the patentee, *number one*, in his system of practice in medicine.

The emetic herb, or *Lobelia*, above-mentioned, is a biennial plant, grows about twelve or fifteen inches high, with leaves of the size of mint leaves, and pods about the size of a white bean, containing very small seeds; is of a sharp taste, like tobacco, exciting the glands of the throat, and producing nausea. It should be gathered when the leaves and pods are turned a little yellow, but is good in any stage of its growth: when perfectly dry, the seeds should be shaken from the pods, and preserved separate.

Another mode of preparing the emetic, *number one*, from this herb, is as follows, to wit: take the green herb, pound it in a mortar, and put it in an equal quantity of spirit; after being well steeped, strain off the liquor, and keep it, close stopped, in a bottle for use. Prepared in this manner, and adding *cayenne*, as hereinafter mentioned in *number two*, two drachms to a pint of the liquor. Dose, one tea-spoonful. This is an effectual remedy in removing the effects caused by poison, either taken internally, or by bathing the part affected. The seeds of this plant are more powerful than the leaves, and one half the quantity pounded fine, and steeped as above described, is of sufficient power for an emetic.

Secondly. To retain the internal vital heat of the system, and cause a free perspiration. Take cayenne, (*capsicum*) or red pepper, ground fine; dose, from ten to twenty grains, in hot water, sweetened, or to be combined with the other medicine hereinafter described. This is called by the patentee, *number two*.

Thirdly. To scour the stomach and bowels, and remove the canker. Take bayberry, or candle berry, (*myrica cerifera* L.) (the myrtle from which wax is obtained from the berries) the bark of the root dried and pulverized; the inner bark of the hemlock tree (*pinus canadensis*, L.) pulverized, equal parts of each, steep one ounce of the powder in a pint of boiling water, and give, for a dose, a common wine-glassful, sweetened.

When the above cannot be had, take, as a substitute, red sumach bark, leaves, or berries, (*rhus glabrum*, L.) red raspberries (*rubus streorsus* of Michaux) or witch.hazel leaves (*hamamelis virginica*, L.) marsh rosemary, (*statice lemonium*, L.) and white pond lily roots (*nymphæa odorata* Ait) or either of them: let them be dried, pounded, and steeped, as above mentioned. This is called by the patentee, *number three*.

When the violence of the disease requires a course of medicine, take an ounce of the foregoing medicine, *number three*, steeped in a pint of hot water, strain off a wine-glassful when hot, and add ten or twenty grains of *number two*, and one tea-spoonful of sugar; when cool enough to be taken, add from ten to twenty grains of *number one*, and an equal quantity of *nerve powder*, hereafter described, to quiet the nerves. Let this compound be administered three times, at intervals of fifteen minutes, and let the same compound be given by injection once, and, if the case requires it, again repeated.

When mortification is apprehended, a tea-spoonful of medicine, *number six*, as hereinafter described, may be added to each dose, and, also, to the injection. After the patient has recovered suffi-

ciently from these applications, which is usually within two or three hours, let the mode of raising perspiration by steam, as hereinafter described, be applied.

Fourthly. To make bitters for correcting the bile.

Take the bitter herb, (*balmony*) Barberry bark (*Barberis vulgaris*, L.) and poplar bark, (*populus trepida*) in equal parts, pulverized. One ounce to a pint of hot water, and half a pint of spirit. For a dose, take half a wine-glassful; for hot bitters, add a tea-spoonful of *number two*: this is called, by the patentee, *number four*.

Fifthly. To make a sirop for dysentery, to promote digestion, and strengthen weak patients.

Take poplar bark, the bark of the root of the bayberry, each one pound, boil them in two gallons of water, strain it off, and add seven pounds of good sugar, then scald and skim it, and add half a pound of peach meats, or cherry stone meats, pounded fine; when cool, add a gallon of good brandy. Bottle it up, and keep it for use. Take half a wine-glassful, two or three times a day. This is called by the patentee, *number five*.

Sixthly. To make rheumatic drops, to be used to remove pain, and to prevent mortification, given inwardly, or to be added to the injections, or to be applied externally.

Take one gallon of any kind of high wines, one pound of gum myrrh, one ounce of cayenne, *number two*, put into a stone jug, the jug being unstopped; boil it a few minutes in a kettle of water; when settled, bottle it up for use. Or it may be prepared without boiling, by letting it stand for five or six days, shaking it well every day, when it will be fit for use.

For bathing, in rheumatism, itch, or other humours, or in angry swelling or external pain, add one-quarter pint of spirits of turpentine. One or two tea-spoonsful of these drops, without the spirits of turpentine, may be given alone, and, also, may be used to bathe with; or, one tea spoonful may be added to a dose of either of the medicines before mentioned. This is called by the patentee, *number six*.

In the earlier stages, and in less violent attacks of disease, a composition or vegetable powder may be administered, prepared as follows, to wit; take two pounds of the bark of the root of bayberry, one pound of the inner bark of the *hemlock tree*, one pound of ginger, two ounces of cayenne, *number two*, two ounces of cloves, all pounded fine, sifted through a fine sieve, and well mixed together. For a dose, take one tea-spoonful of this powder with a tea-spoonful of sugar, in a wine-glassful of boiling water, as soon as sufficiently cool, the patient being in bed, or covered with a blanket by the fire.

The medicine, *number one*, and, also, the nerve powder, hereinafter described, may be used with this compound, and will be proper in more violent cases.

In all cases of symptoms of nervous affection, a nerve powder must be used, which is prepared as follows, to wit. Take ladies slipper, (*cypripedium pubescens*,) dig the roots when done growing, wash them clean, dry and reduce them to a fine powder. For a

dose, take half a tea-spoonful in hot water, sweetened, or the same quantity may be given mixed with either of the other medicines, in all nervous cases.

When the above described medicine, or such part thereof as may be deemed proper to administer, shall have produced the intended effect, a copious perspiration should be produced by applying heat to the body, by the aid of steam, in the following manner, to wit. Let several stones of different sizes be made hot, then put one (the smallest first) into a pan, or kettle, of hot water about half immersed; place the patient over it undressed, covered with a blanket to shield him from the cold air; change the stones as often as they grow cool, and keep the patient in this situation as long as he can conveniently bear it; then he may be rubbed all over with a cloth wet with spirits, or cold water, and either dress or go to bed.

When the patient is too weak to sit, or stand, over the steam, take three hot stones, quench them a little in water, and wrap them in several thicknesses of cloths well wet with water, place one at his feet, and one on each side as he lies in bed, which will produce a lively steam, and with a dose of medicine, *number two*, taken inwardly, will cause a free perspiration.

The preparing and compounding the foregoing vegetable medicines, in the manner herein described, and the administering them, to cure diseases, as herein mentioned, together with the use of steam to produce perspiration, the said Samuel Thomson claims as his own invention.

SAMUEL THOMSON.

Specification of a patent for the construction of a Furnace for Generating Steam by Anthracite Coal, and for the use of various Manufactures requiring intense heat. Granted to BENJAMIN B. HOWELL, Philadelphia, October 14, 1828.

THE improvement claimed, consists in the form and principle of the interior of the furnace, and in its being a separate structure from the boiler or other body to be heated, by the means of which the heat is generated without bringing the fuel in contact with the boiler or other body; and in the application of an artificial blast upon anthracite coal, increasing, in a great degree, the intensity of the heat, and giving it the necessary direction through the communicating flues of the furnace, upon the bodies to be heated.

The drawings exhibit a front elevation, a ground plan, and a section; all upon a scale of six feet to an inch.

The exterior shape and proportions may be varied at pleasure, provided the principle of generating and applying the heat, be retained.

With a furnace of this construction, and a moderate blast, the flame and the heat may be carried to almost any required extent under the boiler of a steam engine or other body, using anthracite

coal as fuel. The blast may be obtained by attaching a small pair of tub, or other, bellows, to the engine, and the machinery may be put in motion by using, in the first place, a small quantity of wood. Power enough being thus obtained, to start the bellows, no more wood will be required until after the fire has been suffered to go down and is to be again renewed.

The coal should always be kept, while in full operation, at about the line E, or, at least, so much above the flue B, that it may become perfectly ignited before it sinks to that level. Attention to this is important in preserving a uniform temperature.

The additional power required to propel the bellows, beyond that necessary for the ordinary work to be performed by the engine, will be very small, it is believed not more than a single horse to an engine, of what is called forty horse power, or about two and one-half per cent.; but should it exceed that estimate in a triple proportion, and experience justifies the conclusion that it will not, the economy of room on board of steam boats, where room is so valuable, with other advantages hereafter mentioned, and the saving, in all places, of expense in fuel, will much more than compensate this disadvantage.

But in addition to the economy effected by the introduction into general use for this object, of a fuel existing in inexhaustible quantities in our country, to the exclusion, in many situations at least, of one daily becoming more scarce and costly, a further and important saving will result in the construction of boilers adapted to this furnace; nearly all the space now occupied by the wood, that is, the furnace part of the boiler, may be dispensed with, and in its place be substituted a narrow flue for the passage of the heat under that part of the boiler containing the water. The part that may be dispensed with, forms an expensive part of the whole, while the furnace in which the heat is to be generated, being of a less expensive material, will be much less costly. The great objection to the use of anthracite coal in generating steam, arising from the necessity heretofore supposed to exist, of bringing the fuel in actual contact with, or near approach to, the boiler along its entire surface, is, by this plan, entirely obviated, as the coal is here never in contact with the iron, which, of course, will be much more durable than if constantly acted upon by the direct heat of the fuel.

The principle in the construction of furnaces, and the generation and application of heat by means of anthracite coal and an artificial blast, may be applied with equal advantage to the manufacture of glass, earthenware, pottery, the burning of brick, and all manufactures admitting a like application of heat.

B. B. HOWELL.

Notes and references for the improved Furnace for using Anthracite Coal in Generating Steam, and for various manufactures requiring intense heat.

The drawings, Figs. 1, 2, and 3, represent an elevation, a vertical section, and a ground plan, all upon a scale of six feet to an inch; and the same letters refer to the corresponding parts of each.*

* The following errors of the engraver must be corrected. The letter A at

- A, A. Tuyeres for introducing blast.
- B, B. Line of flue for the passage of flame and heat under the boiler, or other vessel, or body, to be heated.
- C, C. Charging doors for coal.
- D, D. Cleaning-out doors, occasionally used as draught doors.
- E. Line of upper surface of coal.
- F, F. Grate bars. Where it is inconvenient to use these, the bottom of the furnace may be closed, as the blast will sufficiently ignite the coal; and the wood first used may be ignited by throwing open the cleaning-out doors, at D, D.
- G, G. Openings to promote draught, before applying blast. These may be omitted, in like manner with the bars.

The furnace should be lined with fire brick, and cased with cast-iron plates, secured by strong bolts, screws, and keys; and between these, common brick may be used. If a thin packing, or lining of sand, be also interposed, it will be found useful in preventing injury from expansion.

B. B. HOWELL.

Remarks by the Editor.—But a very few years have elapsed since the general impression in Philadelphia, and other places where attempts had been made to use anthracite as fuel, was, that we might as well attempt to burn bricks and stones; yet it is now known to require less management than any other fuel, and those only experience difficulty, who take too much trouble to succeed. After the coals are once placed in our grates, and ignited, their motto seems to be "*Laissez nous faire*," and observing this, every thing proceeds with the utmost facility. When it was admitted, not merely to answer well, but absolutely to be the best fire for our parlours, it was still thought by many, that it would never descend into the kitchen, as it was, from its *very nature*, inapplicable to culinary purposes; but here again it was destined to obtain a triumph. The fireman of the steam engine, and the iron master, however, yet remained unconvinced; these averred that they had given it a fair and perfect trial, and that it would never do; there was still something in its *very nature*, which, in their occupations, forbade its use. You might as well have attempted to convince them that it was fit to be made into candles, as that it might be employed for their purposes, if their furnaces were suitably constructed, and the fuel properly managed. It appears likely, however, that it will soon assert its claims to superior excellence, in these applications also, and triumph over the prejudices of the managers of furnaces, as it has over those of the householder, the cook, and the blacksmith.

That many abortive attempts would precede its successful use, was to have been expected, as it differs in so many particulars from the fuel we had been in the habit of using; but it was evident that an intense heat was given out in its combustion, and if we could only transfer this to the water in our boilers, we must convert it

the upper end of the flue, Fig. 1, should be B. There should have been a letter E, at the upper surface of the coal in Fig. 2.

into steam; and in like manner, it must reduce the ore, could the heat, and the carbon, be made to operate upon it. That there was nothing in the nature of things to forbid this, we have ever believed, and are now fully persuaded, that, in all cases, excepting where the action of a large volume of flame is necessary, this fuel may be advantageously employed.

When the application was made for the foregoing patent, some of its leading features appeared to us such as to merit particular attention; the more so in consequence of some circumstances mentioned by Mr. Howell, in a letter which accompanied his other papers; in reply to a communication addressed to him, on the subject of his furnace, he says, "I am not surprised that my statement of the effect produced by the flame of anthracite, has somewhat astonished you. That a fuel, which has, heretofore, been supposed incapable of producing any flame, should in truth be so powerful in this respect, is really wonderful. But it has, in reality, been hitherto but little understood, and too much has been taken for granted in relation to it. With regard to this particular property, the error has, I think, been caused by the practice of looking at the upper surface of the coal, the flame from which does not, until the coal is fully ignited, yield much heat, and is liable to great variation of temperature, from the necessity of placing there, new supplies of fuel, which, for a long time, gives no heat whatever. In both my furnaces, you will remark, that the heat is first generated in close vessels, and thence taken from that part where the heat is uniform, and most intense; under this arrangement, the effect is, indeed, really astonishing. The length of one of the furnaces in which my experiments were made, was about six feet, and the height of the chimney, ten; or the length of the flue, horizontal and perpendicular, fifteen. The quantity of coal did not, I think, exceed a bushel, certainly not a bushel and a half; and yet the bricks at the top of the chimney were red hot; and the flame rose full six feet above the top, strong and vigorous."

"I anticipate that the idea of blowing a steam boat fire, with bellows, will be ridiculed; but this, or something like it, will, I am persuaded, be adopted. Perhaps I go too far in thinking that it may be applied to glass-house furnaces, &c. but time will determine."

We think Mr. Howell's remarks highly interesting, and hope soon to hear from him the results of his further important investigations and experiments. For the fact of a flame of six feet in height, from anthracite, we were not prepared; nor are we now of opinion that the flame actually extended from the fire to the top of the chimney, but believe that the flue was filled with heated air, consisting of nitrogen, carbonic acid, and carbonic oxide, and that the latter inflamed on its coming in contact with the oxygen of the atmosphere.

This remark has little to do with the practical utility of Mr. Howell's furnace, and is intended only to apply to the theory of the production of the flame, which issued from the chimney, and which, we apprehend, was not twenty-one feet in length.

Specification of a patent for an improvement in the manufacture of Malleable Iron, and of an improved Bloomery Furnace. Issued to BENJAMIN B. HOWELL, Philadelphia, November 6, 1828.

THE discovery consists of an improvement in the construction of the Bloomery furnace,* by means of which, and the use (in the manner hereinafter described,) of anthracite coal, exclusively, for fuel, iron ore is directly converted into malleable iron.

The drawings exhibit an elevation, and vertical and horizontal sections. By these, and the notes and references appended thereto, it will be seen that this furnace combines within itself, the advantages of both a close furnace and an open fire; in this respect differing, essentially, from any other now in use for similar objects. In the upper or close portion, being all that above the hearth, with anthracite coal excited by a proper blast, a degree of heat is obtained much greater than can possibly be generated in the ordinary fire with charcoal; while the lower portion opening into the hearth, and permitting the free action of blast upon the burthen, performs all the offices of the open fire, or forge. The size of the furnace and the proportions may be varied, if the principle of the close and open fire be retained.

The furnace being first heated up in the manner of a common cupola, the process is thus conducted. The coal having settled sufficiently for that purpose, it is charged with the proper burthen of ore, which will vary according to the quality and kind. The charges are then continued, alternately of coal and ore. The ore soon arrives at the tuyeres in a state of partial fusion, and is then, by the intense heat of that part of the furnace, quickly separated from its earths; and then rapidly descending into, and below the direct action of, the blast, a large part of which is driven out at the open front, first passing over that portion of the ore which has reached the hearth, it is thereby brought, in the language of the workmen, "to nature," or, in other words, into malleable iron.

As it sinks into the region of the blast, the small masses may be driven into one, and a loup shaped by giving a proper direction to the pipes at the different tuyeres, and the loup can be removed with a proper instrument, another instrument, or strong iron bars, being introduced at B, to hold up the burthen while this is doing. The loup may be drawn into a bloom under a forge hammer, or passed through rollers. In either operation it will, of course, be necessary to renew the heats, which may be done in a common chaffery, or in a heating furnace. This process is continued at the pleasure of the workmen, and as soon as a quantity sufficient for a loup accumulates, it is withdrawn, as above described.

In the early stage of the operation it will be necessary to charge the furnace nearly, or quite, to the top; but, as the heat increases, the height of the coal may be gradually diminished, and at a very

* Bloomery is here used in the sense commonly understood in this country.

high temperature, from two to three feet of coal will be found sufficient.

The cinder produced in this way will, in all respects, resemble forge, or bloomery cinder, and will bear working a second time; an appropriate flue facilitates the operation, and, as it is first fused, and sinks, and is thus interposed between the iron at the bottom of the hearth, and the coal, it contributes to prevent a mixture of the two.

Holes may, or may not, be left in the sides of the furnace for the introduction of bars to aid in detaching the iron from the bottom and sides; but this will not often be necessary, if the back of the furnace be thrown sufficiently forward and a proper direction be given to the blast; for which purpose, tuyeres are placed in different positions on three sides of the furnace, and at different elevations. One or two pipes may be used at pleasure.

From the foregoing, it must be obvious that by the rapidity of the process, the saving thereby of time and labour, the substitution of a cheaper, more powerful and abundant fuel, for that now in use, and which is so made applicable to this object, by the peculiar construction of this furnace, that a great and important improvement has been effected in the conversion of iron ore into malleable iron.

B. B. HOWELL.

Notes and References for the improved Bloomery Furnace.

The drawings, Figs. 4, 5 & 6. Plate IV., represent an elevation, and vertical and horizontal sections, all drawn upon a scale of three feet to an inch, and the same letters refer to the corresponding parts of each.

A.—Trundle head where the furnace is charged; to be provided with a cover, which is placed on in the intervals of charging, when the coal is low.

B.—Projecting, open, hollow hearth, for the reception of cinder and iron, with a cinder hole at C, to be opened when it is wished to draw off the cinder.

DD.—Tuyeres, for the introduction of the blast, placed in different positions on three sides of the furnace, and at different elevations, to vary the direction of the blast at different stages of the process.

The back and front in-walls may both, or either, be thrown or inclined somewhat more inward than is represented in the drawing, and as indicated by the dotted lines in the vertical section; and with advantage when the ore is not very pure, and makes much cinder.

The furnace should have over it a brick canopy, or a chimney, to aid in giving a direction to the gas given out by the coal, which is distressing to the workmen if largely diffused immediately around it.

The furnace should be lined with fire brick, and cased with cast iron plates, secured by strong bolts, keys and screws, and, between the casing and lining, common brick with a thin packing of sand; the latter, to prevent injury from expansion.

B. B. HOWELL.

Notes on the foregoing.—In a letter from the patentee, which was received with his application, he observes, "I some time since men-

tioned to you, that I had then completed some further experiments with anthracite coal, the result of which I should soon communicate to you, and which I thought would both interest and surprise you. The papers which I enclose will explain what these experiments were. They relate to an improvement in the Bloomery furnace, and in the conversion of iron ore into malleable iron, with anthracite coal, exclusively. In this, in six different experiments, I completely succeeded, making, in a comparatively short time, perfect bar iron, and, indeed, nails, without suffering it ever to cool. Practical forgemmen, who performed the manual labour, were astonished beyond measure, at the result: it was, indeed, complete in every respect, the iron being as good as that made at the neighbouring forges, in the old way.

"Refining of pig-iron, has been attempted in Pennsylvania, but, I believe, abandoned, from the difficulty of preventing a mixture of coal with the iron, in its soft state; this, in my method, is obviated, almost entirely. The process is rapid, and even here, where the coal is high, is economical; how much more must it be so, where coal, and ore, can be had for digging."

The editor has in his possession, a part of the bar, and a nail, forged directly, and without cooling, from the first bloom made in this way; he will seek for further information upon the progress of this improvement.

Manufacture of Diamonds.

AT a recent meeting of the Academie des Sciences, a letter was read from M. Gannal, stating the result of his inquiries into the action of phosphorus, brought into contact with pure carburet of sulphur.

Having occasion to prepare a large quantity of carburet of sulphur, M. Gannal conceived the idea of endeavouring to separate the sulphur of this product, in order to obtain a pure carbon. Phosphorus was the material which he used; and he found that the phosphorus entering into combination with the sulphur, the carbon was set at liberty in the shape of small crystals, possessing all the properties of the diamond, and especially that of scratching the hardest bodies. The following is a detail of the experiment:—

If several rolls of phosphorus are introduced into a matrass containing carburet of sulphur, covered with a layer of water, the moment the phosphorus finds itself in contact with the carburet, it dissolves, and, becoming liquid, is precipitated to the lower part of the matrass. The whole mass is then divided into three distinct layers; the first formed of pure water, the second of carburet of sulphur, and the third of liquefied phosphorus. Things being in this state, if the matrass be agitated so as to cause the mixture of the different bodies, the liquor grows thick, becomes milky, and, after a little rest, separates anew, but only into two layers; the up-