### Fire Clay and Iron Gas Retorts.

On page 291 of the present volume of the SCIENTIFIC AMERICAN we described the operations and mode of making fire brick, condensed from Mr. Stephenson's lecture on the subject, published in the London *Engineer*. We now give in substance the concluding part of his paper relating to the manufacture of fire clay retorts.

MOLDING.

The clay for making retorts is not ground so fine as for bricks. It is passed through a riddle or screen having about four meshes to the inch, and to render the retorts porous, about 20 per cent of sawdust or fine coke is mixed with the clay and put in the pug mill with it. The retorts are molded by hand by pressing small lumps of the clay against the side of the mold, which is set vertically, until the length, form and thickness are secured. Each retort is built slowly, about nine inches of clay being put on the mold at intervals of several hours to insure soundness, as the clay is liable to crack in drying. The process of building a retort is continued every day, or as often as necessary, till any length of retort is obtained, the top end always being kept perfectly moist, to guarantee perfect adhesion throughout the whole. The sheds in which these retorts are made are constructed like brick sheds, excepting that more hight is allowed from the level of the floor to the joists. Fires are constantly kept burning under the floor on which the retorts are being built, and this process of drying is perhaps one of the most important of the manufacture. If not carefully and properly dried, cracks will show all over the surface.

In order to make the mass of clay porous, and yet prevent this porosity causing a leakage when distilling coal in making gas, a mixture, composed of about equal parts of unburnt and calcined fire clay finely pulverized, with the addition of as much water as renders it of a consistency of thick paste, is applied day by day to the internal and external surfaces of the retorts, and well worked in by the hand; thus an even, smooth and unbroken surface, free from cracks and flaws, is produced, and the retort presents a uniform appearance throughout.

BURNING.

The burning of the retorts requires much care and attention, and generally continues for a period of ten or twelve days. The retorts being placed vertically on rows of bricks on the bottom of the kiln, the great desideratum is to procure a steady draft, the exclusion of atmospheric air, and a gradually progressive heat. Opinions differ very widely as to the best shape of clay retorts, the circular, oval or elliptical, and ⊂, being those commonly advocated and in use. In the leading works the 15-inch round, and 21-inch × 15-inch oval, in settings of five and seven retorts in a bench, appear to be in favor; these retorts being from 18 feet 6 inches to 20 feet in length, open throughout, and charged at each end. They are constructed in three or four pieces to suit convenience.

HISTORY OF CLAY RETORTS.

The introduction of clay retorts seems to be due to Mr. Grafton, who, as early as the year 1820, took out a patent in England for their use. His retorts were at first square, but soon after were altered, and were constructed in sections of about 16 inches in length. These retorts were 5 feet wide and 18 inches high, being 7 feet long, resembling an oven in their general contour. This shape was used for many years in some of the provincial works of Great Britain, and are perhaps still employed to some extent, although they have been generally replaced by the oval, circular and common ⊂ shaped retort.

The gasworks of Scotland were among the first to apply clay retorts, and their use is now almost universal in that country. They were there employed for a considerable period before their general introduction into England.

MERITS OF CLAY AND OF IRON RETORTS.

The comparative merits of clay and of iron retorts is a subject which has attracted much attention from the gas engineering profession during the past few years.

The superior qualities claimed for clay retorts over those made of iron are as follows:—Their cost is less than iron; they are more durable; they have more carbonizing power; they produce a greater quantity and a better quality of gas. There are some parties who still advocate the use of iron retorts, and who, of course, will not admit these claims. At the South Metropolitan Works, in London, seventeen months have been considered a fair duration for clay retorts, each one having produced 1,800,000 feet of gas; the expenditure of coal being no greater than that of iron retorts. Mr. Barlow, the editor of the *Journal of Gas Lighting*, estimates 700,000 cubic feet of gas as the average yield of iron retorts. In the report of the chairman of the City of London Gas Company, January, 1859, the strongest testimony is adduced in favor of clay over iron retorts.

Out of 468 clay retorts in constant use by the above company, 196 had been in operation for four years.

The advocates of iron retorts have contended that a much greater amount of fuel is required for carbonizing with clay retorts. It is true that the heat deemed most suitable for generating gas from them is several hundred degrees higher than that used with iron, but with this intensity they are efficient in producing a larger amount of gas than would be generated at the lower degree of heat required by iron retorts.

There is quite a difference of opinion among gas engineers respecting the merits of iron and clay retorts, and as this is a question of great importance to communities where gas is burned, we will give both sides of the question.

In the last annual report of the engineer of the Philadelphia Gas Works, he says:—

Prominent among the many questions that engage the attention of the gas engineer, are those of the material and form of retorts. Iron, both cast and wrought, and fire clay, either made into bricks or molded, are the materials in common use. Experiments on these materials were begun at our works in 1838, and have been repeated from time to time, whenever some alleged improvement made such trials expedient. Recently the growing interest in the subject has led to a more extensive series of trials than any before attempted. The number of retorts used in these experiments is nearly one hundred, supplied by different makers, both American and foreign. Thus far they have not yielded results as economical as we usually obtain from plain cast iron, but the trials are not considered to be entirely conclusive, and they will therefore be continued with other retorts of different forms of American manufacture, some of which appear to be of better quality than those before used.

In London it is held that fire clay retorts have enabled the gas companies to reduce the price of gas; in Philadelphia, such retorts have not yielded such good results as those made of iron. How is this to be explained?

### THE PATENT OFFICE—PATENT CLAIMS.

Business is being conducted at the Patent Office as usual, and a good list of cases was passed for issue last week and the week previous, but owing to the some derangement in the Recording rooms, the copyists have not been able to get the documents engrossed and mailed as punctually as usual. For the same reason we had not received our official list of claims at the time of going to press, but we are assured that all these delays will be remedied hereafter. Our next issue will probaoly contain the claims of all the patents issued since April 23d.

## Notes and Queries

E. W., of Pa.—A series of experiments made a few years since by one of the officers of our army, at Washington, demonstrated conclusively that a gun is less liable to burst if the wad is not driven down upon the powder, and the harder it is driven, the greater is the danger of bursting.

W. L., of Pa.—Mr. Downing recommended for live fences, the osage orange for the Southern States, and the buckthorn for the Northern. We have tried the buckthorn. If it is cultivated in very rich ground, kept clear of weeds, and very thoroughly pruned down, while young, it will make a good hedge in four or five years. Put a little glue in common whitewash, to make it adhere.

R. J. E., of England.—Copies of the drawings desired by you would cost $4; each of the specifications, $7.

C. B. B., of Pa.—We will furnish you one stereotype of the map for $3.

R. J., of Ohio.—On page 129, Vol. VI. (old series) of our journal, you will find an illustrated description of machinery for making and baking bread, raised by water impregnated with carbonic acid gas. There is no patent in force, so far as we know, claiming the use of carbonic acid gas for raising bread. No such patent, if granted, would be valid.

W. N. C., of Cal.—I. Arnaboldi, No. 69 Fulton-street, this city, will furnish you with the curved glass tube which you desire to obtain

H. M., of Col. Ter.—You can make a most excellent writing ink by boiling 4 lbs. of logwood and 2 lbs. of sumac in 5 gallons of water for two hours; then adding 6 ounces of copperas and 2 ounces of gum-arabic. Of course you must strain the liquid, and use only the free, flowing fluid.

C. F., of N. Y.—You can obtain all the books necessary for you to learn the art of military engineering at Van Nostrand's, No. 192 Broadway, this city.

R. A. K., of La.—We regret that we are unable to supply the information you seek in reference to the frigate *Pennsylvania*, recently burned at Norfolk. She was the largest ship of the line ever built by our government; she mounted 120 guns; tunnage, 3,241.

J. F. P., of N. Y.—The peat which you send us is a very good article, and will make both gas and oil. Peat, however, never has been found to compete with coal in making oil. It is cheaper than coal for gas in situations where coal costs more than about $10 per ton. The formation under the peat is marl, a very valuable manure. The peat, too, makes good manure.

W. S. G., of N. Y.—Giffard's Injector has been patented in this country.

A VOLUNTEER, Ill.—Your wrought iron cup attached to a ball is an old thing, and not patentable. The patent records show several examples of it.

T. S., of Pa.—A wheel 40 feet in diameter is double the power of one 20 feet in diameter, using the same quantity of water, if the fall is in proportion to the diameter of each wheel—20 feet in one case, and 40 in the other. There is no power in the wheel itself; the power is in proportion to the quantity of water and perpendicular hight of the fall.

H. B., of Mass.—The composition employed by blacksmiths for welding cast steel consists of five ounces of borax and half an ounce of salammonia pounded together, then fused in an iron vessel, and poured out in a cake and cooled. It is now ground to powder, and in this condition used for welding. The steel is now raised to a yellow heat in a clear fire, then rubbed with some of the powder, which should be kept upon a stone on the hearth; then the steel is again treated as before, and is fit to be placed under the hammer. Iron and steel may be welded together with this powder by carefully managing the heat of each.

S. H. C., of N. J.—The stone which you have sent us is composed of black and white mica and some silica. It came originally from the rocks in the highlands of New York.

F. H. C., of N. Y.—If you can obtain a classical education before commencing to learn the trade of a machinist, we advise you to go to college as soon as possible.

A. B. G., of Conn.—There are several instruments for army use by which distances of objects can be ascertained. They are generally complicated and expensive. Yours may be patentable; if we saw a model, we could give you more definite information.

### Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, May 11, 1861:—

F. R., of Ind., $15; A. B. C., of N. Y., $25; E. S., of Mass., $25; J. C. B., of N. Y., $15; N. H. B., of Mass., $15; J. B., of Ind., $25; A. S. W., of N. Y., $15; T. S. & T. W. R., of N. Y., $15; S. J. M., of Ohio, $25; F. & M., of N. Y., $15; J. K., of Scotland, $15; J. B., of Ohio, $15; S. M. & Co., of Vt., $225; U. B. V., of Pa., $15; R. K., of Mass., $40; W. W. H., of N. Y., $30; J. G., of N. Y., $25; A. H. J., of Cal., $30; J. A., of Conn., $15; C. Van N., of N. Y., $25; J. & G. B., of Wis., $25; J. A. T., of N. Y., $35; R. W., of Pa., $10; T. G. E., of Mo., $30; M. J. K., of N. Y., $25; M. & K., of N. J., $15; F. L. H., of Vt., $25; A. M. O., of Wis., $15; P. & B., of Mich., $15; S. J. P., of Conn., $15; F. N., of Conn., $10; S. D. C., of Conn., $15; A. S., Jr., of N. Y., $40; E. D. C., of Vt., $20; S. R. W., of N. Y., $25; J. A. B., of Mich., $10; C. & C., of N. Y., $30; H. C., of Cal., $30; A. C. C., of R. I., $10; L. H. D., of Iowa, $25; M. N., of Mass., $25; J. N. H., of N. Y., $25; J. H. & H. J., of N. Y., $25; W. B. S., of N. Y., $25; I. F., of Ky., $15; W. H. M., of R. I., $15; T. & R., of N. J., $200; T. P., of N. Y., $12; T. A., of N. Y., $10; J. B. D., of N. Y., $20; G. S., of Iowa, $25; C. H. M., of Pa., $40; A. B., of N. J., $20; G. B., of N. Y., $20; N. R. M., of N. Y., $20; G. & C., of N. Y., $25; A. D., of N. J., $25; W. C. C. of Wis., $20; T. S., of N. J., $40; R. B., of Iowa, $25; C. H., of La. $25; J. R. A., of Ill., $25; S. & A., of Iowa, $25; G. R. D., of N. Y., $25; E. & H., of N. J., $25; A. M., of Maine, $25; J. J. H., of Ky., $25; C. F. V., of Ill., $15; G. S. R., of Ill., $25; J. J. H., of Ky., $20; S. S. H., of Mass., $15.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending May 11, 1861:—

C. H. M., of Pa.; T. S., of N. J.; J. H. J., of Cal.; J. B., of N. Y., J. N. H., of N. Y.; A. B. C., of N. Y.; E. S., of Mass.; M. N., of Mass.; S. J. M., of Ohio; C. & C., of N. Y.; G. S., of Iowa; R. K., of Mass.; S. R. W., of N. Y.; J. A. B., of Mich.; G. & C., of N. Y.; M. J. K., of N. Y.; L. H. D., of Iowa; J. G. B., of Wis.; J. G., of N. Y.; T. P., of N. Y.; A. D., of N. J.; E. D. C., of Vt.; W. W. H., of N. Y.; T. H. & H. J., of N. Y.; W. B. S., of N. Y.; C. H. B., of Pa.; C. Van N., of N. Y.; F. L. H., of Vt.; J. A. T., of N. Y.; N. B., of N. Y.; G. S. R., of Ill.

### TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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