Scientific Museum.

For the Scientific American.

Bituminous Shale.

In addition to the notice you have taken in the Scientific American of the manufacture of bituminous shale, in England, to great advantage, I have observed the following notice of the same subject, by the London correspondent of the National Intelligencer:

"In England a company has been formed for the conversion, by distillation, of the Kimmeridge coal, or bituminous shale of Dorsetshire, into mineral oil or spirit, asphalt, and manure, so as to leave a profit of 100 per cent. on the expenditure. The manure, which is sold at £2 10s. per ton, has been tried on various crops with the most satisfactory results, and is said to be equal in its effects to guano, phosphate of lime, or any other artificial manure now in use. We may mention, in connection with these marvels of modern chemistry, that a company of gentlemen is now engaged in the neighborhood of Liverpool, is making experiments for the purpose of reducing the price of gas. These gentlemen speak with the utmost confidence of being able to procure from coal a much larger amount of gas than has hitherto been obtained, and also to get from the residuum products of very considerable value, so as, in fact, to enable them, if they chose, when the necessary apparatus was erected, to light a large town for nothing, and yet realize a profit. However, if they should succeed in reducing the price of gas 50 per cent. we shall be much indebted to them."

The principal object I have in view is to inform you that there is on the Miami River, of Lake Erie, inexhaustible quantities of Kimmeridge coal or bituminous shale, and lying in the most convenient situation for excavation and transportation. The bed of the Miami River passes some 30 or 40 miles over it, and in many places lies bare. The Wabash and Erie Canal also pass over it, parallel to the Miami River. The Anglaise River, a branch of the Miami, comes in at Defiance over this bituminous shale—the shale crops out in the bed of this for many miles. There are some places on the latter river where the shale has imbedded in it a large proportion of sulphuret of copper, in a pyramidial form—from the size of a pea, to that of a man's fist. It is principally *in situ*, although there is considerable lying loose on the surface. It is well known to mineralogists that the residuum, after burning, is clay. In some places the clay is a perfect white, this we think would make fine pottery. In general the clay appears to be stained by some iron contained in the stone.

B. F. Stickney.

For the Scientific American.

Crystalization.

The word crystal originally signified ice, but it was afterwards applied by the ancients to crystalized silica or rock crystal; because they considered that body as nothing else than water solidified by extreme cold. Chemists afterwards applied the name to all natural transparent bodies of a regular shape; and it is at present employed by them to designate the regular forms which solid bodies assume when their particles have full liberty to combine according to the laws of cohesion. These regular bodies occur very frequently in the mineral kingdom, and have long attracted attention on account of their great regularity and beauty.

Of all mineral bodies, the substances known as salts, most frequently take the crystaline form; and as they are mostly soluble in water, the chemist can, by solution and evaporation obtain crystals at his pleasure.

It has long been observed by chemists that each individual salt, or other crystalizable substance, affects a determinate form, which it will always take, if free to do so, on evaporation from solution, or cooling from fusion.

A few of the most common forms of crystalization are here given: common salt forms regular cubes; alum octahedrons; saltpetre, six-sided prisms; sulphate of magnesia (epsom salts), four sided prisms; this last contains upwards of fifty per cent. of the water of crystalization, which causes it to undergo the aqueous fusion when heated. Common salt contains no water of crystalization, properly so called, but some water is always mechanically included in its crystals. Dry salts, when heated, undergo the igneous fusion. Many ingenious theories have, at various times, been proposed by men of science to explain the phenomena of crystalization; the most satisfactory of which assumes that the minute invisible atoms of all substance have a particular form, and that, when forced to unite by the force of cohesion, this aggregation makes up the regular form which we call a crystal; and that this form is that which is possessed by its component atoms.

H. W. H.

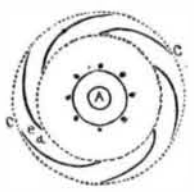
Claremont, N. H.

For the Scientific American.

Hydraulics.

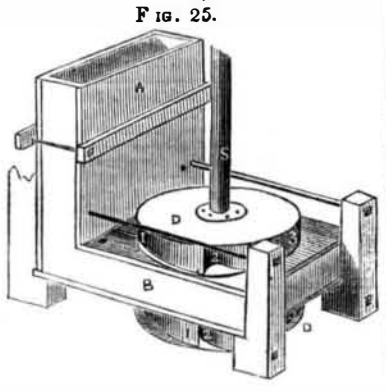
(Continued from page 160.)

Fig. 24.



Re-action Water Wheels.—About 300 patents have been granted for different kinds of water-wheels and improvements on the same. Owing to the loose way in which the Patent Office business was conducted previous to 1836, there is but too little known of the earlier American inventions. There can be no doubt but the same things have been patented over and over again. The first patent granted for a "Re-action Water-Wheel" was to Jas. McComb, of Princeton, N. J., in Aug., 26, 1791; the next to Joel Farnam, of Oswego, N. Y., in 1808; the next for wheels in the same class was to Zebulon Parker and Robert McKelvey, of Ohio, heirs at law of Austin Parker. This was in October, 1829, for a "Re-action and Percussion Wheel." All our American authors, with too little personal examination into the subject give Calvin Wing, of N. H., the credit of being the first American patentee, but his patent dates exactly a year after Parker's and 22 years after Farnam's. European authors have followed in their wake and copied the same mistake. The difference between the Barker Mill and the re-action wheel commences at the outset in the form of the wheel, as exhibited in the annexed figures, 24 and 25, of which the first is a horizontal section, and the second (25) a perspective view. A is the vertical shaft; C C are the curved buckets; these buckets are

Fig. 25.



narrower at the exit than inlet, as shown at *e d*. The water has free ingress on the face within, and rushes outwards to the circumference through the curved openings, impelling the wheel in a contrary direction to that of the water—hence the term *re-action*. The perspective view shows two wheels placed on one shaft. A patent was granted to Luke C. Hinman, L. Bissel, and Moses Barnes, of Otsego, N. Y., in June 11th, 1811, for employing two wheels at once. With the patents previous to Parker's and Wings, we can say nothing, but there is every reason to believe that the form of this double wheel was well known and in use, before the last war of 1812. In this perspective view, A is the water fiume, or penstock; S is the vertical shaft; B is the feeding flume, D D are two water wheels; 1, 2, 3 are the buckets. The general and first opinions respecting this class of wheels was, that they were equal in effect to the under-shot wheels. As this wheel was driven by re-action and the under-shot by direct action, it was philosophically set down, that as *action and re-action were equal*, there could possibly be no difference in the effect, although there might be in the price, and the convenience of the re-action over the under-shot. This was an easy way to philosophise, and, as a whole, they were set down by Elwood Morriss, in 1833, as being only superior to undershot, for *running* in back water. In an experiment made by him, in that year, on a grist mill driven by a re-action water-wheel, and published in the Franklin Journal, he states, "the amount of water required was considerably larger than would have been needed by a breast-wheel to do the same work, and he was induced, upon the spot, to declare an opinion unfavorable to the economy of the re-action wheel under trial." He also states, that, although the proprietor was new-fangled with the wheel, yet he afterwards discarded it, and restored the old breast-wheel to favor and duty. This wheel nearly resembled the one in the above figure, and it took 1600 cubic feet of water, falling 1 foot per minute, for 60 minutes to grind and dress one bushel of wheat, he found that an under-shot required only 1576 cubic feet of water to do the same work. These were the conclusions set forth by Mr. Morris in 1842. They were condemnatory of American Re-action Wheels, consuming, ashe stated, 24 cubic feet of water more than an under-shot wheel, in grinding one bushel of wheat; yea, in one instance, it is stated that they consumed nearly the double amount of water to produce the same effect, as an under-shot.

The Lead Mines of Iowa.

A correspondent of the Detroit Daily Advertiser, writing from Dubuque, Iowa, under date of the 12th inst., speaking of the lead mines near the city, says:—"I would give you a description of one of the heaviest lodes that has ever been struck in the mining country. The shaft enters a large cave, from twelve to fifteen feet high, and almost completely covered with mineral. There is one piece lying along the north wall, forty-eight feet long, and three feet square. On the north side, at the top, there is one of the finest sights I ever saw. There is an immense body, in square blocks, eight or nine inches square. This cave is eighteen hundred feet long, but the mineral does not show in the entire length. There is one more place which I must speak of. There are two sheets hanging down from the cap, about six feet ten or twelve inches thick, and sixty feet long. They are as white as snow. The cave is about fifteen feet wide, and, in most places, is completely covered, bottom and top. I think we can take out one thousand dollars worth a day, for twenty days in succession."

Stereoscopes.

Sir David Brewster, invented a new instrument about two years ago, of which the Abbe Moigno (the author of a good work on the telegraph) thus speaks in an article in *La Presse*.

"In his last journey to Paris, Sir David Brewster entrusted a model of his stereoscope to M. Jules Duboscq, a son in-law and successor of M. Soliel, and whose intelligence, activity, and affability will add to the already high reputation of the distinguished workman in the Rue de l'Odeon, No. 35. M. Jules Duboscq has set himself to work on the stereoscope with indefatigable ardour: without requiring the aid of a binocular camera, and by means of the ordinary daguerreotype apparatus, he has produced a great number of dissimilar (binocular) pictures, of statues, bas-reliefs, &c., &c.

His stereoscopes are constructed with more elegance, and even with greater perfection, than the original English ones; and while he is showing their almost miraculous effects to natural philosophers and amateurs who have already flocked to him in crowds, they are witnessed with a spontaneous and unanimous burst of admiration.

A number of these instruments are now being constructed in Scotland, but have not yet been introduced into America.

Durability of Vellum.

There are, in some of the public libraries of Europe, books composed of vellum, upwards of a thousand years old, which give no evidences of decay, and which may, unless destroyed by some accident, withstand the ravages of time for another thousand years with equal freedom from decay. Whatever might have been the process employed in preparing vellum during the earlier ages, it is certain, to say the least, that it has not since been improved. The ink of that period, too, is less liable to fade or decay.

LITERARY NOTICES.

Thomson's Mercantile and Professional Directory, for the States of Delaware, Maryland, Virginia, North Carolina, and the District of Columbia,—contains the name, location, post office address, and style of business of all mercantile firms, manufacturing establishments, attorneys, physicians, bankers, hotel keepers, etc., in the States named above; to which is appended an advertising register. Published by Wm. Thomson, No. 6 Carroll Hall, Baltimore; for sale in this city at Phelp's Map Store, 189 Broadway; Wm. H. Fagan, agent for New York. This valuable directory embraces over 300 pages of well printed matter, the character of which is given above. It has been compiled with great care and expense, and the publisher deserves success. We doubt not but that the work will have an immense sale, as it should, among our business community. Price $2.

The International Magazine, for February, contains a sterling variety of literary matter, original and selected, besides a portrait of Thomas Chatterton, and several scenes connected with his career. The accompanying article is highly interesting and instructive. This Magazine is one of the first in the world, and deserves a wide circulation. Published by Stringer & Townsend, at $3 per annum. Single numbers 25 cents.

The February number of Sartain's Magazine is most beautifully embellished with fine steel and wood engravings. The contributions are thirty-five in number, from our most able literary characters, and embrace 72 pages, finely printed. The general arrangement of this serial is highly creditable to the publishers, and deserves a liberal patronage from American ladies, to whose interests it is mainly devoted.

The February number of Harper's New Monthly Magazine contains Oliver Goldsmith's celebrated poem, "The Traveller," illustrated superbly by clever scenes, admirably drawn, to correspond with the description. This feature in the New Magazine is most excellent, and we trust the enterprizing publishers will continue it. We have several times thought how finely Burn's "Cotter's Saturday Night" could be represented—as a descriptive poem it has no superior. In genuine interest and merit, this number is superb, the selections being of the first class of literature.—Price 25 cents per single number; Harper & Brothers, publishers, 82 Cliff st.

No. 5 of "The Daguerrean Journal," by S. D. Humphrey, N. Y., is received, and contains several valuable articles upon the subject to which it is devoted. Published semi-monthly at $3 per annum.