SILVER MINING IN THE GREAT BASIN.

We have been favored, through the politeness of the author, with a copy of a paper read by Richard Williams, Esq., before the Buffalo Historical Society, on the Great Basin, with its Agricultural and Mineral Wealth. These personal observations of an experienced and practical eye, are interesting and instructive on whatever they touch. We reproduce a few leading points in a condensed abstract.

STRUCTURE OF THE BASIN.

The great chain of the Andes, extending the whole length of South America and the Isthmus of Darien, branches at the Isthmus of Tehuantepec, sending one of its arms up on the western side, very near the Pacific coast, under the name of the Sierra Nevada, in California, and the other to the eastward, under the name of the Rocky Mountains. These branches diverge to a distance of nearly 800 miles apart, and come nearly together again where they are lost in the Arctic Ocean. Thus they form an intramontane Basin of vast extent, nearly one-fifth of the whole continent, 5,500 feet above the sea, and having only three fluvial outlets—that of the Rio Grande on the south-east, that of the Colorado on the South-west, and that of the Columbia on the north-west. This basin is broken up by transverse ranges, like bulkheads or girders from rim to rim, forming inferior basins, two of which—that of the city of Mexico, and that of Great Salt Lake—have no visible outlets whatever. The latter is the great mineral basin, 400 miles square, mainly occupied by the State of Nevada, where the chief interest of these remarks centers. Here the rivers find their outlets in "sinks," and go down into the unexplored bowels of the earth. The lakes are "salt," and the flats are impregnated with alkali, which Mr. Williams attributes to the settling of the rivers, leaving their suspended soluble contents filtered out in the earth or deposited by evaporation. The soil is not silicious—a sandy desert—but contains within it every element of fertility except water, and produces abundantly wherever irrigated by nature or art.

THE GOLD AND SILVER MINES.

In this basin, above all, occur those districts in which, throughout a square of ten to twenty miles, the rocky crust of the earth has been cracked in numerous fissures of unmeasured depth which the underlying volcanic ocean has injected and gorged with mineral treasure. These fissures are either entire, extending great lengths and to impracticable depths, and filled with silver-ore-bearing quartz; or they are but gashes in the surface, broken up by past convulsions which destroyed their continuity, and they cannot be followed to any considerable length or depth, or with continued profit. Appearances are very deceptive, being sometimes extremely flattering at an outcropping point, while the rest of the vein is barren. A true vein is not always rich; a rich vein is not always true, *i. e.* continuous. A fissure, both rich and true, is not always practically valuable for mining at the present day, from its remoteness or other difficulty of access, from the want of water, fuel, salt, or other supplies, from the neighborhood of hostile Indians, or the distance of any civilized community or from being covered with snow for two-thirds of the year. Difficulties from conflicting claims, crossing one another, sometimes occur. All these things, and more, have to be considered, and there is, in fact, but one way of getting at the certainty of any vein, and that is by personal examination of all the circumstances, and, regardless of representations from interested parties, mining engineers, or even eminent geologists, actually going down on the lead far enough to ascertain its true character, and by large assays determining the general productiveness of the ore. So great is the uncertainty attending these ventures at the best, that Mr. Williams thinks it the true policy for all who engage in silver mining to take up a sufficient number of lodes together to be morally certain by the average of chances that some one or other will pay.

SWINDLING OPERATIONS.

Everything, good, bad or indifferent, is recorded among the mining claims of a district, and upward of 4,500 such recorded locations are referred to by Mr. Williams in a single district where not a dozen of them at present would pay the expense of working. All the good claims are sold readily in the state: the rest are sent east and jobbed off by mining agents and organizers of mining companies of mammoth nominal capital. Mr. Williams lays it down as a rule, that no one can make a purchase of these unscrupulous speculators in mining property without being swindled every time. This can be done, according to the common ethics of trade, in a perfectly fair manner. No man is held bound to reveal the disadvantages of his property: if he states only the truth, he sells "fairly," when the whole truth (which the buyer does not usually undertake the difficult task of ascertaining) if told, would be fatal to the bargain. Scientific opinions, however honest and eminent, as to what is to be found in the bowels of the earth under a particular spot, are treated as of no value: and just as little worth is attributed to the advice of the so-called "experienced men." They never agree as to a uniform law, and their deductions are from a narrow and unscientific range of observation. Above all, our lecturer is severe upon a class of self-styled mining engineers, professors, etc., who infest the country, whose names are found in every yellow-covered prospectus, and whose favorable opinions can always be had for a consideration. Of all the mammoth millionaire prospectuses he has seen, not one but was filled with the grossest misrepresentations. Beware of all such enterprises as are associated with the names of distinguished military and scientific men, governors, politicians, bishops and doctors of divinity. These names are generally connected with a present of stock, which the recipient perhaps may value highly. But "good wine needs no bush." The few, very few really valuable mines are owned by quiet unpretending men, and carried on, financially and practically, without public proclamation and parade. You never see their prospectuses and their stock in the market, are bored with the one, or importuned to buy the other.

[Our Foreign Correspondence.]

WATER SUPPLY OF TOWNS.

London, Dec. 29, 1866.

A variety of causes render the obtaining a good supply of water for the large cities here a more difficult problem than with us. Although the amount of annual rainfall is large, yet, as the drainage area is in no case large, the rivers are all small, and the water is made use of for manufacturing purposes. Then again, as the population is everywhere dense, the water-courses are all unavoidably contaminated with sewage, and though by acts of parliament towns and villages situated on rivers from which water is taken for city use have been prohibited from discharging their sewage into the streams, yet the impurities that will in any case, even with the strictest regulations, find their way into rivers flowing through such a country as that in which the Thames, for instance, lies, make it impossible to obtain potable water from such a source.

THE ISLAND TOO SMALL—WATER SUPPLY LIMITED.

As these rivers also are mere brooks, and the cities large and numerous, and as the water is claimed by the many manufacturing establishments situated on their banks, it follows that the amount which the water companies are able to supply to the towns is very inadequate for all the purposes to which it would be applied were the supply more abundant. This is strikingly shown in the relative amounts consumed daily per head of population in London and New York, being at the rate of about 33 gallons per head in the former city against 60 gallons in the latter. No doubt in New York, where the supply is so copious, a large proportion is wasted, but it is a luxury to feel that it may be wasted to some extent with impunity. To guard against waste, the water is not kept at constant service in the mains, but a certain quantity is supplied each day to the houses by "turncocks," who allow the water to run for a few minutes from the main into the service pipes of the dwellings, the water being received into tanks, and the supply is then shut off for the day. Although these tanks may contain enough for a day's use, it is evident that the knowledge that the amount is limited will enforce economy in its use. But as stated in my last, this is a serious inconvenience in case of fire, as it is often necessary to hunt up the turncock at a time when every moment is precious. On Sundays some companies do not supply water to their customers.

EXCEPTIONS—MANCHESTER AND GLASGOW.

There are some cities, however, which are more highly favored in their water supply and present a pleasing contrast to London and the majority of the large cities. Such are Manchester and Glasgow, in the latter of which especially the water is excellent in quality and very abundant. The works for the supply of this city are, I think, the most extended of any in Great Britain. The water is drawn from Loch Katrine, and those who have visited that charming lake as tourists will not have failed to be struck with the remarkable clearness of the water, objects being plainly visible on the bottom at a great depth. It is conducted a distance of forty miles to the city through two cast-iron mains.

NEW SCHEMES FOR LONDON.

There are at present several plans being brought forward with considerable earnestness for procuring a better supply for London, and no doubt some of them will eventually be adopted. One plan is to build an aqueduct more than two hundred miles in length, or rather a succession of aqueducts connecting together some of the lakes of Westmoreland (or as we commonly call them in America, "the English lakes") and conducting the surplus water to the metropolis. Another seeks an adequate supply in Wales: but while there will be great discussion in Parliament as to what plan shall be finally decided upon, there is no difference of opinion that some other source must be found than those now depended upon.

PRESENT LONDON SYSTEM—FILTRATION.

At present London is supplied with water by eight private companies, each supplying a certain district and drawing their water from the Thames and the sea. In all cases it is necessary to employ pumping engines, as there is no natural head, and many of the companies pump their water twice over. The drainage area of the Thames above Staines is 3,086 square miles, and its mean annual discharge is 900,000,000 per day. Five of the companies take their water from the Thames, and are authorized to withdraw altogether 100,000,000 gallons per day, the minimum flow of the river being estimated at 362,000,000 gallons per day. In most cases the water is taken from the river directly into subsiding reservoirs constructed directly on the river side, but in some works it goes immediately to the filter beds. The necessity for the use of these is quite imperative, as was clearly shown last summer, when some of the severest ravages of the cholera followed the delivery by one of the companies of unfiltrated water to its consumers.

They consist of a series of layers of gravel and sand of about five or six feet thickness in all, the arrangement being about as follows:—First, coarse gravel about twelve inches in depth is laid on the concrete bottom of the bed, and upon this nine inches of rough screened gravel, followed by nine inches of fine gravel, or in some cases six inches of cockle and other shells: upon this again is a layer of coarse sand twelve inches thick, and lastly fine sand two or three feet thick on top of all. The water is admitted by a main passing through the bed and having a vertical branch rising above the filtering material, the water welling over the top of this delivery pipe upon the filter. In the coarse gravel at the bottom are imbedded perforated pipes laid with open joints arranged as lateral branches of a central main, and these receive the water as it percolates through the gravel, and deliver it to the pump wells. The amount of impurity removed from the water by these filters varies largely with the season of the year. In summer the surface of the water in the reservoirs previous to filtering is often thickly covered with green vegetable matter, which forms with great rapidity. The upper film of sand requires cleaning on an average once a week. For this purpose the bed is emptied of water by a centrifugal pump, or otherwise and a layer of sand about three eighths of an inch in thickness scraped off and taken to be washed. Once a year the whole bed is made up anew. The washing is effected in a number of ways, one being by placing the sand in an iron cylinder seven feet six inches in diameter and three feet deep, having a perforated false bottom under which water is admitted under some pressure, and flowing up through the sand, stirs it up thoroughly and carries off the impurities as it flows over the top of the cylinder, the sand by its gravity remaining. When the water flows over clear the process is stopped and the remaining water drawn off by a cock. Another plan is to allow the sand to flow with a current of water down a flight of steps, the sand being caught in shallow ditches at the bottom while the water flows on with the impurities. Or again, a revolving cylindrical screen slightly inclined may be employed, a stream of water being admitted through the central shaft under pressure and allowed to play upon the sand, which is gradually washed through the meshes, while any lumps or stones are retained and fall out at the lower end of the screen.

PUMPING.

The pumping engines in use are of two classes, viz: Cornish and compound cylinder rotative engines. The advocates of each claim the superiority for their favorite style, and practically there is very little difference in the economy with which they work. On elaborate trials to ascertain their duty, they have raised from eighty to eighty-four million pounds of water one foot per hundred weight of Welsh coal, but with the ordinary Newcastle slack commonly used the duty is not seventy millions. The largest of the Cornish engines is at Battersea, being 112 inches diameter of cylinder with 10 feet stroke: it raises a weight of 75 tuns on a plunger 50 inches diameter. The steam is cut off at ·45 of the stroke. There are five other engines in the same building, with cylinders from 55 to 70 inches diameter, the latter being a "bull," or engine with the pump directly under the steam cylinder, and worked directly by the piston rod. Steam is furnished by 19 boilers, from 28 feet to 32 feet long and 5 feet to 6 feet diameter. The cylinders are all steam jacketed.

The rotative engines have the high and low pressure cylinders close together and connected to the same end of the beam, the high pressure piston taking hold nearer the center, and hence the strokes are unequal. The expansion in these engines is eightfold, the steam being cut off at half stroke in the smaller cylinder. A number of this class are of the following dimensions:—High pressure, cylinder 28 inches diameter, 5 feet 3 inches stroke; low pressure, cylinder 46 inches by 8 feet stroke. The pumps are of the bucket and plunger type, with a stroke of 7 feet, the buckets being 24 inches diameter, and the plungers 17 inches, or half the area of the bucket. The pressure of steam is 40 lbs. The pump valves are of the double beat construction, with brass and soft metal bearings. In other cases wooden seatings are used. The steam pistons are packed with steel rings three quarters of an inch square, on Ramsbottom's plan: these are used in cylinders up to 60 inches diameter.

The engines pump the water through mains to reservoirs near the city. These are almost invariably covered, brick arches being used for this purpose. Some of the works also pump a supply of unfiltered water to be used for street watering in summer. The water works show a good deal of first-rate engineering, but the supply is intrinsically only passable.

Slade.

[For the Scientific American.]

HOW SHALL WE BURN COAL MOST ECONOMICALLY?

The smoke burning apparatus of Messrs. Roby, illustrated in the last number of the Scientific American, has caused some comment in English mechanical journals. The results are declared incredible and the principle paradoxical. It does not seem so to me, for reasons which I shall state presently. The invention is simply, as may be seen by the engraving, a device to reduce the tube area at the smoke-box end, by contracting the orifices of the tubes, thereby choking the draft apparently, and, as it would seem, retarding the combustion in the fire-box. That this result does not follow we have the public statement of Messrs. Roby; and from my own convictions I have no doubt of great economy from the use of it. It is generally conceded that but a tenth part of the heating power of fuel is utilized, the rest being dissipated in various ways: it is lost, at all events, to the pocket of the manufacturer. To save a portion of the missing nine tenths has been the object of inventors for many years, but in my opinion more attention has been given to devising peculiar shapes and motions for the steam engine to cut off the steam at any desired point of the stroke than in seeking greater economy by more perfect combustion in the boiler.

While such inventions are both desirable and necessary, it seems to me that in this respect the steam engine is as near perfect as possible, and that the proper place to save the fuel is in the boiler, a good steam engine with a good variable automatic cut-off being assumed in all cases. This is only another way of saying that fuel is improperly burned, or burned to waste, which is just what I desire to say.