PETROLEUM—ITS SOURCES—VARIOUS THEORIES.

Number II.

Different opinions exist respecting the source of petroleum. Prof. Silliman states that it is of vegetable origin, and was produced by the agency of subterranean heat. This is a very general but unsatisfactory opinion. Geologists most generally believe it to be derived from bituminous shales situated below the coal formations. It is commonly found in the American rocks called the Portage and Chemung Group. This group of rocks is of immense thickness on some parts of our continent, being no less than 4,900 feet thick in Michigan. The bituminous shales called Utica Slates have yielded large quantities of oil in Canada by distillation, and the spouting petroleum wells of Enniskillen are in this formation. But petroleum is not always found in this class of rocks, as no oil has been found in various parts of New York State, where these rocks have been bored to a great depth.

Many practical men in the Alleghany and Ohio valleys believe that petroleum has its origin in coal beds. They assert that a low heat in the coal seams drives off hydrocarbon vapor, which is condensed in the pores of the rocks and the soil, and is washed by rains into subterranean recesses, situated at various depths in the rocky strata. Coal is found in all the hills adjacent to the petroleum wells in Pennsylvania, Ohio and Virginia. Cannel coal is abundant in the hills within one mile of Oil Creek, Pa. Is it not reasonable to suppose that reservoirs of petroleum must be situated at a considerable hight above the level of the ground where all the overflowing wells are pouring out their oily fluids? In all artesian wells the water rises to the hight of the fountain head, and the same law must prevail in petroleum wells. May not the reservoirs of the petroleum spouting wells be situated far above the level of the rocks where the oil is tapped in boring? The proprietor of a petroleum well near Parkersburg, Va., has assured us that the oil obtained in his well is of the very same character as that derived from the coal in its vicinity by distillation. It is a heavy oil, more unctuous than the common petroleum of Pennsylvania, and it is chiefly used for lubricating machinery. It is well known that oil of different qualities is obtained from different coal beds, and the petroleum of the United States differs in several characteristics from that of Canada.

Facts would appear to favor the theory that petroleum wells have two sources of supply, namely, coal beds and bituminous shales. In western Pennsylvania, Ohio, Michigan, Virginia and Kentucky, petroleum is usually found in the vicinity of coal seams, and it was a petroleum well in England, situated close to a coal bed, which suggested to James Young the idea of distilling coal at a low heat and obtaining oil therefrom. The commercial success of his efforts led to the very extended use of such oil, and finally to the very general application of petroleum for light.

This much may be accepted in favor of coal beds in certain localities being the sources of petroleum. On the other hand petroleum wells are found in Italy, Sicily, Syria, the Crimea, Persia, Siberia and Canada, very far removed from coal beds, but where there are bituminous shales, and this kind of petroleum differs frequently in several essential features from that which is found in coal regions. The Canadian crude petroleum far surpasses that of Pennsylvania for concentrated stench, and we can easily credit it with a lower, older and different origin.

Geologists who adhere to the idea that bituminous shales are exclusively the source of petroleum will be pleased to make a distinction between the source of the decent, clear oil obtained at Smith's Ferry, on the Ohio river, and that found north of the upper lakes. But whatever may be the source of petroleum and whatever theory may be the most plausible, it must be admitted that we are unacquainted with most of the operations of nature in the interior of the earth. The most important question is, will not our present sources of petroleum soon become exhausted? In answer to this it may be stated that petroleum springs have been known, and the petroleum used to some extent, for thousands of years. Thus, in the island, of Zante, in the Mediterranean, there are two springs which have been open many thousand years, and the more rapidly the substance is removed from the wells, the more powerful and prolific the springs become. If this has been the case with the petroleum springs of Zante, may it not be so with those on our continent?

Petroleum, or rock oil, may not always be a proper name for this peculiar substance. It is found in swamps and peat bogs as well as rocky strata. In the swampy forests of Borneo the Dyoks collect petroleum from the surface of ponds, but all the flowing wells in America have been sunk to a considerable depth in rocky strata.

VALUABLE RECEIPTS.

Case Hardening Iron.—The hardness and polish of steel may be united, in a certain degree, with the firmness and cheapness of malleable iron; by case hardening, it is a superficial conversion of iron into steel.

The articles intended to be case hardened, being previously finished, with the exception of polishing, are stratified with animal carbon, and the box containing them luted with equal parts of sand and clay. They are then placed in the fire, and kept at a light red heat for half an hour, when the contents of the box are emptied into water. Delicate articles may be preserved by a saturated solution of common salt, with any vegetable mucilage, to give it a pulpy consistence. The animal carbon is nothing more than any animal matter, such as horns, hoofs, skins or leather, sufficiently burned to admit of being reduced to powder. The box is commonly made of iron, but the use of it, for occasional case hardening upon a small scale, may easily be dispensed with, as it will answer the same end to envelope the articles with the composition above directed to be used as a lute; dry it gradually before it is exposed to a red heat; otherwise it will probably crack. The depth of the steel induced by case hardening, will vary with the time the operation is continued.

A very speedy and most excellent method of case hardening, is effected by reducing some of the prussiate of potash to powder, and making it into paste, rubbing over the finished iron while it is at a red heat, and then putting it in the fire again, and plunging it into water when the iron is at a blood red heat. Another method consists in covering the polished iron with a paste of the prussiate of potash and flour, allowing it to dry, then placing it in a clear fire until it becomes red hot, when it is plunged into cold water. This may be repeated, to insure a greater depth of hardening.

Enamelling Cast-Iron Vessels.—Reduce into fine powder and grind together nine parts of red lead, six parts of flint glass, two parts of purified pearlash, two parts of purified saltpeter and one part of borax. This is put into a large crucible about half full and melted until a clear glass is obtained. This glass is then ground with water and the cast iron vessel is covered with a coating of it and then heated in a muffle in a furnace. This will melt in a very short time if the furnace is at a good heat, and the cast-iron vessel will be covered with a very fine black enamel of a shining appearance. To make it tough, it should be put into an annealing oven.

Another very fine enamel for iron vessels is made as follows: Twelve parts of flint glass, four parts of pearlash, four parts of saltpeter, two parts of borax and three parts of the oxide of tin calcined with common salt. This is treated the same as described above and makes a white enamel.

The cast-iron articles to be enameled are scoured bright with sand and dilute sulphuric acid, then dried and the enamel paste put on with a brush, or poured on the surface, and the excess dripped off. This paste is dried slowly in the air, and the articles baked in a hot oven until the paste fuses. The heat is gradually raised to the melting point.

The *Desert News* states that a cotton mill has been built at Parowan, in that Territory, and that some of the machinery has been put up and is now running. A considerable quantity of cotton is now raised in southern Utah, and it is for its manufacture into cloth that this factory has been constructed.

The *Lake Superior Miner* states that the National Copper Mine, at Ontonagon, produced 51 tuns 1,375 lbs., during the month of May last.

Correspondence

OUR SPECIAL CORRESPONDENCE.

The Van Nest Gap Tunnel—The beauty of New Jersey Scenery—A Subterranean Tour and an Awful Report.

Oxford Furnace, N. J., June 15, 1862.

Messrs. Editors:—At 8 o'clock yesterday morning I left Jersey City, for a trip to this delightful region, to examine that great engineering work, the Van Nest Gap Tunnel, and to see some practical experiments with Wiestling's new blasting powder. Taking the cars of the New Jersey Central Railroad, I proceeded to Hampton Junction and thence by the Warren Railroad to this place. I have traveled all over the United States, from Maine to California, and from Michigan to Texas, and I know of no finer region than this portion of New Jersey through which I have just passed. Beginning quite level in the eastern portion, it gradually becomes more rolling, and in the Western part of the State the road winds among high hills and mountains. All the way the land is well cultivated, and the country shows that it is inhabited by an industrious, thrifty and prosperous people.

At this station I found Mr. Wiestling, the managing partner of the firm, who have cut the Van Nest Gap Tunnel, waiting for me with his carriage, and we were soon whirled up the side of the mountain to his head quarters at the work. The Warren Railroad is the New Jersey portion of the Delaware, Lackawana and Western Railroad, which was built for the purpose of bringing coal from the Lackawana mines in Pennsylvania to the New York Market. Near the western edge of New Jersey it passes over a chain of high hills, at the Van Nest Gap, and as it was desired to carry the road 165 feet below the surface, it was necessary to cut a tunnel. The contract for the tunnel was taken by McAlister and Wiestling, the former now a Colonel in the army, and the latter a young civil engineer, who has had the principal charge of the work.

After a good dinner, ending with a feast of delicious strawberries and cream, Mr. Wiestling and myself prepared for an inspection of the tunnel. You are probably aware that Philadelphians always call india rubber *gum*, and Mr. Wiestling arrayed me in a gum coat, gum boots and gum overalls; while he put on his dress, made expressly to wear in the tunnel. Riding down to the west end of the tunnel, the carriage was sent round to the eastern end to take us home, when we should emerge. Mr. Wiestling lighted the miners' lamp on the front of his hat, and wading in the shallow water between the high sides of the open cut, we passed beneath the rocky arch into the darkness of the tunnel. There is a short curve at the west end, and as soon as we had passed this, we saw far before us lights dancing about, and heard the click of hammers from the workmen who were giving the finishing blows to their labor of eight years. At the same time we could see a glimmer of light coming through from the east end, and looking back, the vapor about the mouth of the tunnel was illuminated with a soft radiance by the declining sun; the whole forming an impressive and novel scene.

The whole tunnel is cut through scienitic granite, but while the rock in the east half is exceedingly hard and solid, that in the west half is in process of disintegration; making it necessary to protect this portion by an arch of masonry. Springs of water are oozing through cracks and seams in the rock, keeping the tunnel constantly wet, and down one of the shafts a stream is pouring as large as a man's arm. It has been not only a great, but a very damp and dirty job. The excavation is now completed, and besides the workmen employed on the masonry arch, only one gang is at work, and they are cutting a support for an arch which is to be turned in one of the shafts to prevent any thing from falling down the shaft into the tunnel. We climbed up the long ladder to the platform on which this gang were at work. They are all English miners, and each one had a miner's lamp hung on the front of his hat. They were busy drilling holes in the rock for blasting out