VISIT TO A PETROLEUM REFINERY.

THE GENERAL PROCESS.

Petroleum as it is raised from its caverns in the rocks is a dark and dirty liquid, so disagreeable in its appearance that for forty years after its existence in this country was known it failed to come into general use. But, fortunately, an easy and simple process of purifying it has been discovered, which leaves it the most transparent, beautiful and perfect of all illuminating materials. Petroleum is refined by first distilling it, then agitating it with sulphuric acid, then adding caustic soda to remove the acid, and finally washing the oil perfectly with water. Some refiners also use certain other chemical agents to more thoroughly bleach and deodorize the oil, and in consequence of these delicacies in the manipulations, there is a difference in the quality of the oil turned out by the various establishments, the product of some being so much clearer and purer that it sells in market at three or four cents per gallon more than others.

THE OLEOPHENE OIL WORKS.

The best quality in market is produced at the Oleophene Oil Works, situated at Hunter's Point, Long Island, opposite the upper portion of this city; this is also one of the largest refineries in the country. We recently had an opportunity of going over these works in company with Mr. Leserman, the manager, who explained to us the several operations.

SOME PROPERTIES OF PETROLEUM.

It is known that petroleum is composed of two elements, hydrogen and carbon. These two elements combine together chemically to form a large number of chemical compounds, which are mechanically mixed together to constitute petroleum. These hydro-carbons have one property in common, they are all combustible. But their other properties vary very widely; some are gases, others are liquids, and one at least is a solid almost as hard as lead. As the solids, and to some extent the gases, are soluble in the liquids, the whole mass is liquid. The volatility of the several hydro-carbons which constitute petroleum is the first property which is considered in the effort to separate them. An oil can be obtained which will boil at 90°, another which will boil at 91°, and another at 92°; even these are found, however, to be not single chemical compounds but several hydro carbons mechanically mingled. Their boiling points differ from each other by gradations so small that it is impossible to effect their separation by the process of fractional distillation or indeed by any other process yet known.

THE BOILERS.

The boilers are simple cylinders of wrought iron, five feet in diameter and ten feet in length, and holding fifty barrels each. They are set in brick work with furnaces under them for anthracite coal, and each is provided with a pipe from its upper part to lead the vapor to—

THE CONDENSERS.

These are worms of copper pipe set in tubs or vats of cold water. The pipe of each condenser is 100 feet in length and 2½ inches in diameter at the larger end near the boiler. The vats are six feet in diameter and nine feet in hight, being of sufficient depth to allow three or four feet of water above the worm.

DISTILLING.

As petroleum, like most other substances expands by heat, care must be taken not to fill the boilers quite full. About 45 barrels are introduced into the boiler, and a bright fire is started in the furnace. The more volatile of the hydro-carbons are first evaporated, and as the vapor is driven into the coil of cold pipe it is condensed, and flows out at the lower end. Then follow the less volatile portions; and in the course of from 40 to 48 hours the whole charge is driven over with the exception of four or five per cent of the non-volatile matter, which remains in the form of a dirty tar. The fire is now drawn, and when the boiler is sufficiently cooled the workmen enter it through a man-hole provided for the purpose, and scrape out the residuum.

As the oil flows from the condenser it is divided into three portions for different uses. The lightest, that comes over first, is called gasolene. This cannot be used in lamps with safety, as it rises in vapor so freely that it mixes with the atmospheric air to form an explosive compound. It is employed to some extent for making an illuminating gas by mixing its vapor with air. Its specific gravity ranges from 80° to 90° of Beaume's scale.

The next that comes over, ranging from 60° to 80° is separated and sold under the name of benzine. This is used in mixing paints and varnishes, and for purposes generally for which camphene was formerly employed.

The last of the distillation, constituting the principal portion of the petroleum, is illuminating oil. This ranges in density from 35° to 60°. As the stream of oil flows out from the lower end of the condenser its color is a light, delicate blue. The tar is sold for making illuminating gas, and considerable quantities are sent to Europe, where it is said to be employed in manufacturing dyes.

THE AGITATORS.

The vessels in which the oil is treated with sulphuric acid are upright wooden casks some 8 feet in diameter and 9 or 10 feet in hight; they are lined with sheet lead, and provided in the interior with revolving fans which are driven by steam power. After being thoroughly mixed with sulphuric acid, caustic soda is added to remove the acid, and then the oil is thoroughly washed with water.

Nearly all the hydro-carbons of petroleum are neutral—neither acid nor alkaline—but a few have alkaline or basic properties, and it is from these that the crude oil derives its offensive odor. Sulphuric acid enters into combination with these basic oils, forming salts which can be completely removed by washing. The acid also oxydizes a portion of the heavier hydro-carbons, converting them into asphaltum, which settles out of the oil with the water.

The dimensions and materials of the boilers, condensers and other portions of the apparatus vary in different establishments, but those given here are considered the best by Mr. Leserman.

The washing is effected in the same vessels that are employed in treating the oil with sulphuric acid. The oil is pumped or drawn into the vessels, the sulphuric acid is added, the fans are set in motion till the liquids are thoroughly mixed, and then the oil is allowed to settle to the bottom of the cask. The bottom is of a conical form with a hole in the center closed by a stop cock. The oil and its compounds settle in a dark mass at the bottom, and then the stop cock is opened and this sediment is drawn off, the workman carefully watching the flow so as to stop it before any of the clear oil escapes. Next, soda is put into the cask, the agitators are driven awhile, the mass is allowed to settle, and the sediment is drawn off. Finally, water is pumped in with the oil, and the agitating, settling and drawing off process is repeated.

Physical Effects of Music.

Gottschalk contributes to the *Atlantic Monthly* some notes on music, from which we extract this paragraph:

"It communicates to the body shocks which agitate the members to their base. In churches the flame of the candle oscillates to the quake of the organ. A powerful orchestra near a sheet of water ruffles its surface. A learned traveller speaks of an iron ring which swings to and fro to the sound of the Tivoli Falls. In Switzerland I excited, at will, in a poor child afflicted with a frightful nervous malady, hysterical and cataleptic crises, by playing on the minor key of E flat. The celebrated Dr. Bertier asserts that the sound of a drum gives him the colic. Certain medical men state that the sound of the trumpet quickens the pulse and induces slight perspiration. The sound of the bassoon is cold; the notes of the French horn at a distance, and of the harp are voluptuous. The flute played softly in the middle register calms the nerves. The low notes of the piano frighten children. I once had a dog who would generally sleep on hearing music, but the moment I played in the minor key he would bark piteously. The dog of a celebrated singer whom I knew would moan bitterly, and give signs of violent suffering, the instant his mistress chanted a chromatic gamut. A certain chord produces on my own sense of hearing the same effect as the heliotrope on my sense of smell and the pineapple on my sense of taste. Rachel's voice delighted the ear by its ring before one had time to seize what was said, or appreciate the purity of her diction.

"We may affirm, then, that musical sound, rythmical or not, agitates the whole physical frame—quickens the pulse, incites perspiration, and produces a pleasant momentary irritation of the whole nervous system."

Corn Shellers Wanted.

A correspondent of the *Country Gentleman* says:—

"Living as I do, in the midst of a pretty extensive corn-growing country, in common with many others, I wish to obtain information as to the best hand power corn sheller in use. A good hand sheller is an implement much needed among farmers. Such a machine would meet with a ready sale in this section, if it could be found. What I regard as desirable qualities in such a machine are—1st. Rapidity of shelling—2d. Ease of execution—3d. Shelling clean—4th. Separating the cobs from the corn, depositing the cobs in one basket and the corn in another. Do you know of any machine superior to the old Clinton sheller?"

The editor of the journal says:—

"We do not know of a better hand sheller than the Clinton, although there are some others that we think quite as good. It needs careful experiment for a season or two, with the different kinds to enable one to say positively which is best. But we cannot strongly recommend any hand-sheller, unless it be to furnish an occasional grist for family use, a feeding for chickens, or a small quantity for planting. Now that labor is so high priced, and so many farmers are furnished with horse-power, a good horse-machine ought to be employed by every farmer who raises any considerable amount of corn. It hardly pays to consume the valuable time of laborers to shell corn at the rate of ten or fifteen bushels per day with hard work at that."

Mineral Lands.

A bill has been introduced into Congress in regard to the mineral lands. It provides for vesting the fee in individual proprietors by absolute sales, contemplates their survey and subdivision into small tracts, and fixes a minimum price upon them, graded according to size. locality and mineral value; prohibits combinations among bidders at the public sales, and the purchase of any lands by foreigners, except those who shall have declared their intention to become citizens; provides that actual discoverers and workers of mineral lands shall have the right to purchase at the minimum price; limits the quantity which any single purchaser may buy to forty acres; requires the gold and silver produced to be coined in the mints of the United States; empowers the President to lay off the mining regions into suitable coining districts, and compels miners to have their gold and silver coined in the districts in which they are extracted; provides that purchasers shall first take the oath of loyalty, and that the net proceeds of sales of these lands be applied to the payment of the United States bonds.

A Constant Battery.

A constant battery to be applied to the manufacture of magnesium is described by Arthur Reynolds in the *Chemical News*. It had occurred to him that a constant and cheap battery might be made by employing for an exciting liquid a solution of perchloride of iron, and for the metal to be attached, metallic iron, the copper-plate being replaced by carbon. The most convenient form of the battery would be to have pots made of carbon for holding the liquid. Slits cut in a thick plate of gas retort carbon would do. The action of the battery would be quite constant, as the exciting liquid would always remain in the same condition, the iron dissolving by reducing the solution to protochloride, which, being oxydized by the air, would be deposited, so that the solution would always remain of the same strength. This would be as cheap, or cheaper, than any other form of battery, and perpetually constant, and the same acid would do for a long time. The purpose for which he proposes to employ the battery is to the manufacture of magnesium from sea-water. The sea-water should be evaporated with a little chloride of calcium, and after the main bulk of the common salt and sulphate of lime has crystalized out, the solution should be evaporated to dryness, the dry mass melted, and decomposed by the voltaic battery before described.

The most Profitable Patent ever Obtained.

By an extract in another column it will be seen that the London *Engineer* states Bessemer's receipts from his patent for making steel, at $500,000 a year.