TALK WITH THE BOYS.

No. 6.—Carbonic Acid in the Leaf—The Philosophy of Burning Charcoal—The Way Plants Draw their Solid Substance from the Air.

"What were we going to talk about to-day, boys?"

"You were going to tell us, sir, how carbonic acid gets into the leaves of trees and plants, and what becomes of it there."

"Oh, yes! And of all the operations of this wonderful substance there is none more interesting than this, and none which has been the subject of more delicate and rational investigations. When carbonic acid, floating along in the atmosphere, comes in contact with a growing leaf, it is absorbed by the leaf and decomposed; that is, in each of its atoms the oxygen is separated from the carbon, the former escaping into the air, while the carbon is carried by the sap to all those parts of the plant in which new wood is being formed, and is deposited in the proper places to perform its part in building up the structure of the plant. If you take a piece of wood and heat it in a close oven, or under a covering of turf, so as to keep the oxygen of the air away from it, and thus prevent the carbon from burning, the more volatile constituents of the wood will be driven off in the form of gases and the carbon will be left. Charcoal is almost pure carbon, and if you examine a piece of charcoal you will see the form in which carbon is deposited by the sap in the structure of the tree."

"But, father, how do they know this?"

"A very proper question, and one to be asked in relation to all assertions. It would, however, require volumes to give a full account of all the experiments and observations which have been made in the investigation of vegetable physiology. One of the simplest observations is made by bending a branch of a growing plant under the edge of an inverted jar filled with water, and exposing the jar to the action of light. Little bubbles are seen to collect on the surface of the leaves and float up through the water, in time filling the top of the jar with gas. On examining this gas it is found to be pure oxygen, and if the water contains carbonic acid, or if carbonic acid be put into the jar, just enough of this to yield, the oxygen produced is always found to disappear. If there is no carbonic acid in the jar, no oxygen will come from the leaves. These experiments have been made in the most thorough and careful manner by different men, and not only has the general law been fully established, but the slight modifications of it have been noted and fully discussed. For instance, it is found that, under certain circumstances, the oxygen given off by the leaf is not quite equal to the amount contained in the carbonic acid absorbed, from which it is inferred that the oxygen resulting from the decomposition of the carbonic acid is not always all given off, but that sometimes a portion of it is appropriated to the growth of the plant. On the other hand, if the roots are placed in substances full of oxygen a portion will be absorbed by them, and the leaves will give off a little more oxygen than is contained in the carbonic acid absorbed."

"What did you say about setting the plant in the light?"

"It is found that this decomposition of carbonic acid only goes on when the plant is exposed to the action of light. During the night the process is reversed; the plant absorbs oxy en and gives off carbonic acid. The quantity of carbonic acid given off in the night, however, is not nearly equal to that absorbed during the day. If plants are wholly excluded from the light they will grow for a while; but, having no carbon, which is one of the elements necessary to a perfect plant, they will present a pale and sickly appearance, as you have doubtless observed in the case of potatoes growing in a dark cellar."

"Is all the carbon in plants absorbed from the air by the leaves?"

"That question has given rise to several long series of very laborious experiments. It is found that a portion is absorbed by the roots, and that the relative proportion taken in by the roots and by the leaves varies with circumstances, and with the different kinds of plants. Boussingault found that the Jerusalem artichoke obtained the largest proportion of its carbon from the air, of any plant that he tried. Some plants, under certain circumstances, obtain nine-tenths of their carbon from the air, but two-thirds is probably not very far from the average."

"What was that you said last week about shears?"

"Oh! I said that we would discover the two blades of the shears that cut the atoms of oxygen and carbon, which form carbonic acid, asunder. One of the blades is light, the other is the force of vegetable life."

"How do they divide the atom of carbon from the two atoms of oxygen?"

"That is a question which any boy can ask, but which no man can answer. Notwithstanding all that we know about chemical affinity, and how its power varies over the several substances which we meet with, what is its essential nature—how it gets hold of one atom and draws it to another—is an absolute mystery. In every department of inquiry, a few steps bring us to the boundaries of knowledge. There is one singular thing about this action of plants on carbonic acid—the petals of the flowers exhale this gas both day and night."

"Do you say the carbon is carried down from the leaf by the sap?"

"Yes; the course of the sap has been carefully observed. It enters the roots, passes up through the pores of the wood, and after being spread through the leaf, returns again through the pores of the bark, depositing as it goes down, the materials by which the growth of the plant is carried forward between the wood and the bark. The sap is thickened in the leaf by the evaporation of its watery portion. A large tree draws up from the earth and gives off into the air an enormous amount of water. You now have a general idea of the way plants grow; and next week I will take you away back into the depths of time, and show you how carbonic acid was being decomposed and its carbon packed away in the hills long ages before man was created, where it could be preserved for the use of this steam engine generation. This will bring us back to illuminating gas, where we first started, and will complete the history of the great circle through which carbonic acid passes in the operations of nature.

SHARPENING SAWS.

Messrs. Editors:—Allow me to give a word of advice to lumber sawyers. After years of trial, labor and experiment, I have lately learned a "better method" of keeping a saw in order. Instead ot leaving the throat at the roots of the teeth almost a point, cut out the throat or foot of the space between the teeth nearly as wide as the base of the teeth; thus leaving more room for the sawdust, and reducing the labor of filing. And to sharpen the teeth, hold a smooth-faced iron or steel under them, and, with a light hammer, flatten down aad draw out the tooth; thus keeping the underside alwa,s level, the corners out full, the edges thin, and the temper good, finishing with a file, and being careful to give the "set" as near the end of the teeth as possible. E. Wilbur.

Albion, N. Y., Oct. 11, 1860.

STEAM FIRE-ENGINE TRIAL.

Messrs. Editors:—The statement, in your last paper, in the report of the steam fire-engine trials, that "it will be seen that, thus far, the plunger party have the best of it," should read *as to quantity*, the report, in other respects being correct. Your Reporter.

Supply of Cotton.—We understand that a meeting is to be held in Manchester, next week, for the purpose of discussing the propriety of forming a joint-stock company, the chief object of which will be to buy cotton in India of an improved quality, and ship it to this country. It will be recommended that a model farm be established in the East Indies for the cultivation of superior cotton for coarse spinning; and another model farm in Australia, where all the cotton of the Brazil, Egyptian, and Sea Island qualities can be produced. The importance of obtaining a plentiful supply of cotton for the manufactures of this country, from as many sources of cultivation as possible, all reasoning and prudent men of business acknowledge. A serions dearth of cotton would be to the manufacturing districts as distressing and ruinous as a famine of bread, for capital and labor would become unproductive, and insolvency and fearful personal suffering would be the result.—*London Engineer.*

A COLUMN OF VARIETIES.

Paris was astonished not long since, as it often is, by the sight of a carriage propelled by neither steam nor gas, going with such amazing swiftness as to leave far behind the four-in-hand carriages of the Jockey Club, which endeavored in vain to keep up with it. The inventor is said to be a poor man, who has constructed the vehicle entirely himself, and will not disclose the secret till he is properly secured by patents.

It is an old saying that lightning never strikes in the same place, but it has not been verified in the case of the Hollis-street church, Boston. Twenty-three years ago last Spring, the steeple of the church was struck twice within a month. The first time the electric fluid set the steeple on fire, and the vane fell over into an adjoining yard. On the second occasion the damage was slight, but the fact of its having been struck twice within so short a period, caused considerable excitement at the time. The steeple has recently again been struck by the electric fluid.

The silk culture is to be added to the industrial pursuits of California. It is ascertained that the climate is warmer and more applicable to the culture of the silk worm than that of France, where they succeed admirably, and that the silk worm of Japan will stand the best chance in that climate.

Captain Ericisson's admirable invention for setting in motion sewing machines, without the aid of a treadle, is meeting with much favor. Compressed air furnishes the power used. A large receiver is placed in the operator's room, into which is forced the air, afterwards conveyed to each machine through tubes. The sewing girls are thus relieved of the fatiguing task of working the treadle, and have nothing to do but to regulate the movement.

We learn by the Pittsburgh *Chronicle* that late intelligence from the oil districts reveals the fact that the celebrated Tideout well stopped flowing over the top after throwing out some two hundred barrels. The famous Crosby well has dwindled down from seventy barrels a day to six or seven, but the owner thinks the failure is attributable to the filling of the pump, and hopes to do better when it is cleaned. Out of two hundred and sixty-seven wells on the creek, above Titusville, only thirty-four are yet pumping oil, and many of the oil-seekers are just now in a state of very anxious suspense.

Some experiments have been made with wind wagons in Kansas during the past summer. One of these contrivances took a party from the Missouri river to Pike's Peak in twenty days. Another of these wagons started from Oskaloosa, two or three weeks since, and went on finely for a day or two till it was overtaken by a gale which drove it on at the rate of forty miles an hour until it tumbled into a ravine, smashing the vehicle into fragments and terribly bruising the travelers.

The California papers report that some of the pear trees in that State, of the Bartlett variety, bear two distinct crops of fruit this year. The trees blossomed in April and July. The pears of the first crop, at the 1st of September, were large, weighing eight or nine ounces each; the second crop then weighed about two ounces. It would astonish the fruit-growers of the Atlantic States to find two he lthy crops growing on one tree, both holding fair to mature into the most delicious fruit.

There are estimated to be 9,000 locomotives in use in the United States, their total mileage being about 175,000,000 miles. The average cost of fuel at ten cents a mile (the average in the State of New York is 18 cents) would be $17,500,000. A saving of only two cents a mile in fuel would reduce this sum $3,500,000. Nearly sixty locomotives are on order at the works of a single firm in Philadelphia.

One of our correspondents informs us that a new sleeping car was placed on one division of the Grand Trunk Railroad, and has made a daily trip between Montreal and Toronto (a distance of 333 miles) for twelve months, having performed 314 journeys of 333 miles each, equal to 104,562 miles, without loss of time or accident. The car is still in first-rate running order? Can this be beat?

Among the most curious *on dits* is one relative to the intention of the Beaufort family to open the coffin of the first Earl of Worcester, as it is said that he ordered the model of a steam engine he invented to be buried with him.