Scientific.

HOW THE CANDLE BURNS.

INTERESTING FACTS IN CHEMISTRY.

The following description of the process by which a candle burns is prepared from "The Chemistry of a Candle," published in Dickens' Household Words.

By looking down on the top of a wax candle, a little cup of melted wax may be seen just around the wick. The cool air keeps the outside hard so that a rim is formed, which prevents the melted wax from running down the side. The wax in the little cup goes up through the wick to be burned, just as oil does in the wick of a lamp. It goes up through the little passages in the cotton wick because very small channels, or pores, have the power in themselves of sucking up liquids. This power is called capillary attraction.

When the candle is blown out a smoke rises from the wick. If a bit of lighted paper be held in the smoke, the candle will light again without touching the flame to the wick. This shows that the melted wax sucked up through the wick is turned into vapor, which burns and communicates the fire to the wick.

When the candle is lighted, the heat of the burning vapor keeps on melting more wax, and that is sucked up within the flame, where it is turned into vapor and burned; and this process is continued until the wax is all used up, and the candle is gone, or burned up, as it is termed.

Notwithstanding the flame of the candle looks flat, it is both round and hollow, and runs up to a point. It is thus drawn up by the hot air. Hot air always rises—and that is the way smoke is taken up a chimney. It goes up with the current of heated air.

The bright flame of the candle is often no thicker than a sheet of paper, and it does not even touch the wick. That the flame is hollow may be seen by taking a piece of white paper and holding it for a second or two down upon the candle flame, keeping the flame steady. When the black from the smoke has been rubbed off, it will be seen that the paper is scorched in the shape of a ring, while inside of the ring it is only soiled, and not scarcely singed at all.

Inside of this hollow flame is the vapor spoken of just now. By putting one end of a bent tube in the middle of the flame, and the other into a bottle, the vapor, or gas, from the candle will mix with the air in the bottle. If fire be set to this mixture of air and gas it will explode with a report.

The flame of the candle, then, is a little shining case, with gas inside of it, and air on the outside, so that the case of flame is between the gas and the air. The gas keeps going into the flame to burn; and, when the candle burns properly none of it passes out through the flame, and none of the air gets through the flame to the gas. The greatest heat of the candle is in the case of flame.

A candle will not burn without air. If it has not enough air it goes out or burns badly, so that some of the vapor inside of the flame comes out in the form of smoke. A candle smokes because the wick is so large that in burning it makes too much fuel, or vapor, in proportion to the air that can get to it—consequently some of the vapor must escape in the form of smoke.

The smoke that comes out of a candle is what burns and makes the light. This smoke is a cloud of small dust or bits of charcoal, or carbon. These are made in the flame, and burned by it, and while burning make the flame bright. They are burned the moment they are made, but the flame goes on making more of them; and that is how the flame keeps bright.

These little grains of carbon are made in the case of flame itself, where the strongest heat is. The great heat separates them from the gas which comes from the melted wax, and as soon as they touch the air on the outside of the thin flame they burn. Carbon, or charcoal, is what causes the brightness of all lamps and candles, as well as gas light; hence there must be carbon in what they are made of.—*N. Y. Organ.*

Reproduction.

The following epitome is taken from the Patent Office Report, Part 2. It speaks the value of a whole volume in a few sentences:—

It is not necessary to restore to a corn-field all the matter removed in the crop, to maintain its fertility. A part of each seed, however, ought to be carried back and replaced in the soil, to make good its loss by the harvest

In every barrel of meal or flour sent to market (196 pounds) there are not far from 186 pounds of carbon (coal) and the elements of water. When a bird eats wheat or corn, I have reason to believe, from several experiments, that over 80 per cent. of the food escapes into the air through its capacious longs in the process of respiration and yet, the 20 per cent. of guano left will reproduce as much wheat or corn as was consumed. Imported guano, which has been exposed to the weather for ages, often gives an increase in the crop of wheat equal to three pounds of seed to one of fertilizer, while it has given a gain of seven to one of corn, and fifty to one of green turnips.

Chemists have ascertained that the air expelled from the lungs of man and his domestic animals in breathing, contains 100 times more carbonic acid than it possessed when it entered the organs of respiration.

While carbon or coal in bread, meat, potatoes, grass, hay, and straw, consumed by warm blooded animals, is constantly passing out of the system as carbonic acid gas, the elements of water (oxygen and hydrogen) are also escaping from the lungs in the form of a vapor, which in cold weather is often visible. Over 50 per cent. of the solids consumed by man and beast is thus thrown into the atmosphere by a slow, continuous combustion, which generates animal heat. These elements of the farmer's crops fall upon his cultivated fields in rain and dew. Hence, when a pig, or any other animal, eats 100 pounds of corn, and voids by the bowels and kidneys 40 pounds of the matter consumed, these 40 pounds will reproduce, and generally more than reproduce 100 pounds of corn again. Even this 40 per cent. of the elements of corn may be reduced one half by skilful fermentation, by which carbon and the elements of water are still further removed, and reproduce an amount of grain equal to the original.

To make Paint without Lead or Oil.

Two quarts skimmed milk; two ounces fresh slacked lime; five pounds whiting. Put the lime into a stoneware vessel, pour upon it a mixture resembling cream, the balance of the milk is then to be added; and lastly the whiting is to be crumbled and spread on the surface of the fluid, in which it gradually sinks. At this period it must be well stirred in, or ground as you would other paint, and it is fit for use. There may be added any colouring matter that suits the fancy. It is to be applied in the same manner as other paints, and in a few hours it will become perfectly dry. Another coat may then be added, and so on until the work is completed. This paint is of great tenacity, which enables it to bear rubbing even with a coarse woolen cloth without being in the least injured. It has little or no smell even when wet, and when dry is perfectly inodorous. It is not subject to be blackened by sulphureous or animal vapors and is not injurious to health. All which qualities give it a decided advantage over white lead. The quantity above mentioned is sufficient for covering 57 yards with one coat.—*Annapolis Repub.*

We endorse this recipe. The case in or curd of the milk by the action of the caustic lime, becomes insoluble, and has been used for time immemoral as a lute for chemical experiments. It is a good, and in comparison with white lead, a durable paint.—*Moore's New Yorker.*

Names of Provisions.

The names of provisions throw some light upon the mode of living among the higher and lower classes of our population. Bread, with the common productions of the gardens, such as peas, beans, eggs, and some other articles which might be produced in the cottage garden or yard, retain their Saxon names, and evidently formed the chief nourishment of the Saxon portion of the population. Of meat, though the word is Saxon, they ate probably little; for it is one of the most curious circumstances connected with the English language, that while the living animals are called by Anglo-Saxon names, as oxen, calves, sheep, pigs, deer, the flesh of those animals when prepared for the table is called by names which are all Anglo-Norman, beef, veal, mutton, pork, venison. The butcher who killed them is himself known by an Anglo-Norman name. Even fowls, when killed, receive the Norman name of poultry. This can only be explained by the circumstance that the Saxon population in general was only acquainted with the living animals, while their flesh was carried off to the castle and table of the Norman possessors of the land, who gave it names taken from their own language. Flesh meat, salted, was hoarded up in immense quantities in the Norman castles, and was distributed lavishly to the household and idle followers of the feudal possessors. Almost the only meat obtained by the peasantry, unless, if we believe old popular songs, by stealth, was bacon, and that also is still called by an Anglo-Norman name.

The Farm.

STARCH FROM INDIAN CORN.

Many of our readers are not aware of the extent of this new branch of manufacture, which we hope soon to see take the place of whiskey distilleries in the consumption of our great American staple, Indian corn. There is now in operation at Oswego, New York, a manufactory that consumes 2,000 bushels of corn a week, which makes 40,000 pounds of the whitest and most beautiful starch for all domestic purposes, whether for the laundry or pantry. The building is 140 by 190 feet, five stories high, (to which an addition is about being erected,) and contains two hundred cisterns for precipitating the starch, eleven furnaces with drying-rooms, and employs about 70 men, and manufactures upwards of $120,000 worth of starch annually. There are two other similar establishments in the United States, and yet the demand is constantly increasing. It is found that this kind of starch is superior to any other for culinary purposes, because it is always made of clean, sweet corn, the gluten of which is separated by a peculiar process of grinding and washing, the corn being steeped in a chemical liquor, then reduced to pulp, sifted and filtrated, and passed into huge cisterns, whence it flows through long narrow troughs, draining off the water through coarse cotton cloths. In twelve hours the starch becomes like wet clay, capable of being handled and dried, a process that requires much care and a powerful heat. The residue of the corn is used for feeding hogs and other domestic animals.

This is a new use for Indian corn, but one we hope, that will prove profitable to the manufacturer, and induce a very large consumption of this grain, and thereby increase the price to the grower. We should like to have some statistics of the corn starch manufactories in this country, for the purpose of noticing them, as being intimately connected with the interests of the agricultural community, and the object of our journal.—*Am. Agriculturist.*

Materials for Potting Plants.

According to the Gardener's Chronicle, the best materials for the cultivation of plants in pots, are the following:—

Loam—the best is procured from very old pastures or commons—the surface to be pared off not more than two inches—to be laid in a heap to decompose for eight or ten months. A heavier and lighter will be found of great convenience, for plants of different habits.

Peat—in choosing this, it should be procured from a dry rather than wet locality. If coarse from fern roots, it should decompose in a heap. Peat is of great value in keeping composts open, and assisting drainage. In this country, where it cannot always be easily had, leaf-mould, from the woods, is a good substitute.

Manure—stable dung, quite rotted, is perhaps as good as anything. It should never undergo fermentation. For some kinds of plants, cow-dung three or four years old, will prove very useful.

Sand, of a pure white kind, is the most desirable—the nearer it approaches pounded silica, the better.

To attempt anything beyond mediocrity, without being possessed of the above materials, will be found a waste of labor. These materials should be always kept within reach of the potting bench, in a condition fit for immediate use. It is this foresight that has rendered the course easy to many a successful aspirant, and the want of it the ruin of half the plants propagated. For plants will not generally thrive in any compost, however carefully attended to, unless some attention is paid to their natural wants and habits. Plants in pots are in an artificial position, and require a proportionate amount of care in cultivation.

About Apples.

Preserving Winter Apples. After picking in the fall, the apples should be kept in some cool shed until the weather becomes so cold as to render their removal to the cellar necessary, in order to keep them from freezing; for it is heat and moisture that hastens their decay. Apples that are to be kept long must be kept cool and dry. A cellar which has ice in one part of it is desirable. We have always found them to keep best by having hanging shelves for their reception.

Another Mode.—To keep Apples for Spring Use. The following, judging from experience, I believe to be a very efficient mode of keeping apples: They are to be kept in chaff. First put a layer of chaff sprinkled with quicklime over the bottom; then a layer of apples, followed by another stratum of chaff and lime, and so on until the cask is filled.

Luck with Trees.

We have noticed that certain men always have much finer peaches, and pears, and plums, than most of their neighbors, and are called *lucky*. Their luck consisted, in the first place, in doing everything well—taking what their neighbors called foolish pains—leaving nothing unfinished; and in the second place, in taking good care of what they had; that is, giving their trees wide, deep, and mellow cultivation, applying manure where necessary, and especially the liquid manure from the chamber and wash tub. Great pains taken, whether with fruit trees or with children, scarcely ever fail to produce good results.

Prize Ham, how Cured.

At a recent Agricultural Fair in Montgomery County, a prize was awarded to N. G. White for the best ham. This gentleman's mode of curing is as follows:—

"The pork should be perfectly cold before being cut up. The hams should be salted with fine salt, with a portion of red pepper, and a gill of molasses to each ham. Let them remain in salt five weeks, then hang them up and smoke with hickory wood five or six weeks. About the first April take them down and wet them with cold water, and let them be well rubbed with unleached ashes. Let them remain in bulk for several days, and then hang them in the loft again for use."

To Make Good Candles.

Take 12 pounds of alum for every 10 pounds of tallow, dissolve it in water, before the tallow is put in, and then melt the tallow in the alum water, with frequent stirring, and it will clarify and harden the tallow, so as to make a most beautiful article, either for winter or summer use, almost as good as sperm. If the wick be dipped in spirits of turpentine, the candles will reflect a much more brilliant light. The above is from the American farmer, and appears to be a good receipt.

Frauds in Vinegar.

It is not generally known to what extent the adulteration, or rather the counterfeiting of this article, is carried on in this city. Under the name of Vinegar, deadly poisons are sold in large quantities. The mode of this dangerous swindle is to manufacture a spurious article from vegetable or mineral poisons, to wit, of sulphuric acid, or of nitric acid, or citric or tartaric acids—a sufficient quantity to give to a barrel of Croton, a sharp, pungent, acid taste. This colored with sour beer or burnt sugar, is sold for "cider vinegar," or is sold uncolored for "white wine vinegar."—Sulphuric and nitric acids by their common names of oil of vitriol and aqua-fortis, are known by all to be deadly mineral poisons, and the others, though to a less degree, highly injurious. A mock article called vinegar, can be manufactured of any of these materials at an expense of *ten* cents per barrel, exclusive of the cost of the barrel.—*Farmer and Mechanic.*

To Make Hens Lay.

The South Carolinian says a neighbor states that hog's lard is the best thing that he can find to mix with the dough to give to his hens. He says that one cut of this fat as large as a walnut, will set a hen to laying immediately after she has been broken up from sitting, and that, by feeding them with the fat occasionally, his hens continue laying through the whole winter.

Worth Knowing.

It is said that a small piece of resin dipped in the water which is placed in a vessel on the stove, will add a peculiar property to the atmosphere of the room, which will give great relief to persons troubled with a cough. The heat of the water is sufficient to throw off the aroma of the resin, and gives the same relief as is afforded by a combustion of the resin.—It is preferable to the combustion, because the evaporation is more durable. The same resin may be used for weeks.