Correspondence

The Distillery Business---Distillation.

[Concluded from page 198.]

By means of the three processes already explained in the former articles, viz., malting, saccharification and fermentation, the formation of alcohol (whisky) is obtained in the beer; and now the only process remaining is to free the alcohol from all foreign matter with which it is associated. This constitutes the last part of the distilling process, and is, strictly speaking, the distillation. The fermented beer is a liquid composed of diluted alcohol, water, one or more volatile oily liqulds, gas and various solid undissolved substances. The separation of the alcohol from them is effected by means of evaporation—a very easy process, for the reason that alcohol evaporates in a temperature of 176° Fah., while water requires a temperature of 212° Fah.

Every fermented liquid, when distilled in a close vessel—a still—so that the vapors can rise and be conducted by a pipe into a cooled receiver—a worm—condenses into a liquid state, which is an ardent fluid, generally called whisky. Its radical is called alcohol. Alcohol obtained by simple re-distillation has a specific gravity at 60° Fah., of 825, and is therefore considerably lighter than water, which is 1,000. The purest alcohol obtained by rectification has a specific gravity of 791—usually however, 820. Alcohol is never produced except by the vinous or alcoholic fermentation of particular substances, and after the completion of such action, distillation of the fermented body affords it either in a concentrated or in a diluted state. By mere distillation, however long-continued or often-repeated, neither pure nor absolute alcohol—free from water—can be made; because alcohol has a great affinity for water, and the distillation is insufficient to overcome this affinity.

To procure absolute alcohol, the best adopted way is the use of quick-lime. It is reduced to coarse powder and put into a vessel with the alcohol, the whole mixed by agitation and left for several days. During this period the water unites with the desiccating body, leaving the spirit anhydrous, which may then be distilled by the heat of a water-bath. The quantity of the quick-lime used should never exceed three times the weight of the alcohol. Pure anhydrous or absolute alcohol is a limpid, colorless liquid of a greater fluidity than water, having a penetrating agreeable odor and a hot pungent taste, owing to its avidity of abstracting water from the tissue of the tongue. Alcohol requires an intense cold to effect its freezing, and, when of the specific gravity of 0.798, it becomes oily at 130°; it flows like wax at 146°; it thickens, but does not congeal, at 166° Fah. below zero.

As to the mode of running a still, the steam should not be introduced too rapidly into the beer, which is contained in the still, during the distillation, but a greater part of the water should evaporate simultaneously with the whisky and both passing through the worm, should make a whisky of lower proof. Besides, by forcing the steam too rapidly into the still and thus creating too high a temperature, a portion of the alcohol is transformed into gas and vapors, and escapes from being condensed in the worm, at the same time that a large portion of the volatile oil (essential oil) is caused to evaporate and is found contained in the whisky. By the distillation of fermented liquids the whisky, which passes over, contains always a small but variable proportion of one or more volatile oily liquids which mix with the whisky and give it a peculiar flavor. These volatile oils says a celebrated chemist, vary in kind, in composition and in sensible proportions with the kind of sugars which have been submitted to fermentation and with the substances which are present together with the wort. Hence, the whisky obtained from almost every different kind of fermented liquid is distinguished by its own characteristic flavor. Thus wine, when distilled, is called brandy or cognac; fermented molasses yield rum; Indian corn, rye and potatoes yield liquors which are distinguished as corn, rye and potato whisky; while malt liquors (from barley) yield Scotch and Irish whiskies. If juniper berries are added to the liquor previous to distillation, as is done in Holland, or anise, as in Poland, the flavor is imparted to the spirits, which is called gin and wudka; and if the malt is dried over a peat (turf) fire, the spirits assumes the flavor and taste of the peat.

The volatile oil of Indian corn, wheat or rye, &c., is neither of an agreeable flavor nor healthy. The faster the still has been run, the more of this volatile oil will be present in the whisky, and the quality of the whisky is then inferior. All volatile oils of any amylaceous substance, generally called amyle alcohol or fusel oil, appear to be identical with the same of the cognac distilled in the south of France from the grape husks, and it is, therefore, to be presumed that the contamination must, in all cases, lie in the skin or epidermis. These volatile oils, not the alcohol itself, are the principal causes of the *delirium tremens;* and it is therefore an essential requisite for making a pure, good and healthy whisky and gaining as much as possible from the beer, that the still is not run too fast and that the worm is kept sufficiently cool, so as to make the whisky run at a temperature of from 60° to 65° Fah.

The condenser used in all distilleries is the worm. It is almost impossible to clean it mechanically and thoroughly, which should be done frequently to remove the adhering essential oil and oxidized copper (verdigris). A condenser constructed of vertical pipes would be much better in almost every respect, and this kind is in use in the best distilleries of the old country. Such a condenser can be cleaned at any time and is much cheaper than a worm.

I will not lengthen this article by adding other minute details. My purpose has been to recount a few striking deficiencies in the present system, to indicate the surest means of essential reform, and to trace out a clear way for improving the quantity and quality of the whisky, when I compared the old system with the more perfect new one. I have made frequent reference in my articles to the opinions and explanations of the most eminent chemists, in order to prove that my own experience is upheld by them and that it is in strict harmony with scientific principles.

The judicious distiller who contrasts the processes described in the foregoing paragraphs with his own method will readily perceive their great superiority. They occasion less expense and promise greater returns. For both reasons he ought to favor their adoption. It will certainly not be unprofitable to the distiller to examine the statements I have made in the foregoing articles, when he will find every one of them an irrefutable truth. I wish nothing more than that every distiller would try what I have said and judge for himself.

The state of the business at the present time urges the introduction of some improvements. A distillery managed on the old plan cannot yield the profits that it did in former times, because it is burdened with the increase in the price of grain, a corresponding reduction in the value of whisky and with the additional heavy tax of a high duty. We may wait for a change in affairs, a general restoration of credit and the impetus imparted to trade by renewed commercial activity. But these circumstances will hardly avail to render distilling as lucrative as it was several years ago. The true remedy lies in an abandonment of old methods with their useless waste of time, material and money, and the substitution of a system founded on scientific principles, whose perfectness, cheapness, profitableness and simplicity must win for it the support of every intelligent distiller. There never was a time when new and useful improvements were more needed in the art of distilling, and the old processes have ceased to repay the capitalist who invests his money in this business.

The writer is willing to prove beyond the possibility of a doubt all that he has said in his articles; his aim being to make himself useful to distillers and to contribute some valuable and important improvements to the distilling business.

L. Smith.

15 North Main street, St. Louis, Mo.

A Californian Tree 6,300 Years Old!

Messrs. Editors:—On page 20, current volume of the Scientific American there was published a paragraph entitled "Great Ages of Trees," in which you quote a Mr. Denton as authority for saying that one of our Californian trees was 2,496 years old. I presume he had reference to one of the group of trees known as the "Mammoth Tree Grove," situated in Calaveras county in this State; but I think he committed an error in his calculation. I herewith inclose you a small block of wood, cut from one of those trees, to enable you to make your own calculation. The tree of which that block once formed a part was rather more than thirty feet in diameter; but, for convenience of reckoning, I estimate the diameter at precisely 30 feet; and I have counted 35 rings to the inch. Now by multiplying the rings per inch by half the diameter, I ascertain the age of that tree to have been 6,300 years. This leaves the saplings of our ancient friends, Nebuchadnezzar and Socrates, standing "out in the cold," and carries our mind back to a period long before Eve ate stolen fruit from an apple-tree and Adam instituted the tailor's trade by stitching fig-leaves into aprons for "self and spouse." The inclosed specimen block is *genuine.* R. R. Haines.

Placerville, Cal., Feb. 28, 1863.

[The piece of wood sent us by our humorous correspondent is a beautiful specimen, resembling mahogany, but much lighter in weight. The annual rings are clearly marked. Think of a tree measuring rather more than thirty feet in diameter! California is certainly a "big" State.—Eds.

Experience with Friction Gearing.

Messrs. Editors.—Noticing a letter on page 167, current volume of the Scientific American, in relation to smooth-faced frictional gearing, the thought occurred to me to give you what information I possess in regard to them. In a steam sawmill in which I was employed was a circular saw, about twenty-five inches in diameter, used for cutting up slabs and other waste from the logs into wood and lengths for lath. The shaft from which it received its motion was driven by a set of bevel friction wheels. They were about two feet in their largest diameter, and had a face of about eight inches. They were made of pine and turned smooth.

Although we were frequently troubled by the belts slipping or running off (there were two between the saw and bevel wheels), the friction wheels always held. The saw was thrown in and out of motion by means of a lever, thus bringing the wheels into close contact or leaving them apart as we pleased. They had the following advantages over toothed gearing:—Their first cost was less; they run smoother and stiller; they were more easily thrown in and out of gear. The machinist who put them in says if he were to build a grist mill for his own use, he would use smooth-faced cast-iron frictional gearing in preference to toothed wheels.

H. Holcomb.

Andover, Ohio, March 26, 1863.

Analogy.

We often find great difficulty in trying to make people understand what analogy is, and yet in its simplest form there is scarcely anything more easy of comprehension or more frequently used. Analogy is the resemblance or comparison which exists between two or more persons or qualities or things. The common and every-day forms of speech abound in analogies, which are so well-known and trite that it seems almost ridiculous to quote them, and yet it is necessary to do so in order to be properly understood. When we say a boy is like his father, we discover and indicate points of analogy. They are analogies when we say of a thing that it is as green as grass, or as white as snow, or as pure as faith, or as true as steel, or as precious as gold. In fact, these simple forms of analogy are so common in the language, that we can scarcely open our mouth without one dropping out, for comparison is one of the most active faculties of the human mind, beginning its operations at a very early age—long before the child can speak, and continuing without the least diminution of vigor down to the latest period.

Perfumes.—So perfect were the Egyptians in the manufacture of perfumes that some of their ancient ointment, preserved in an alabaster vase in the Museum at Alnwick (England), stills retains a very powerful odor, though it must be between 2,000 and 3,000 years old.