THE MANUFACTURE

OF

LIQUORS, WINES, AND CORDIALS,

WITHOUT THE AID OF DISTILLATION.

Also the Manufacture of

EFFERVESCING BEVERAGES AND SYRUPS,

VINEGAR, AND BITTERS.

PREPARED AND ARRANGED EXPRESSLY FOR THE TRADE.

BY

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PREFACE.

ALL subjects affecting the interests of society generally have been discussed and examined, and all questions within the range of importance, have been adequately illustrated; and whence the neglect of a matter of as much importance as the following pages, it is difficult to conceive.

Thousands have acquired wealth from a knowledge of this business; and have passed from the stage of action, without leaving to the world the marks of their progress and improvements; and all previous works upon the Manufacture of Liquors were vague and unsatisfactory, furnishing no reliable information to warrant a speculative investment; for persons possessing really valuable information upon this subject, have found a greater remuneration in manufacturing than in publishing.

But few of the dram-drinking masses are acquainted with the *modus operandi* of a business, which affects, to no inconsiderable extent, both health and wealth, and that their own ignorance has often tested the strength of their constitutions, through the medium of "A pure old Article," or, "A choice old Brand;" and hence, the obvious necessity of a work upon this subject will not be denied, thus removing many popular errors regarding the production of liquors; and the dissemination of such knowledge would crush the cupidity of manufacturers, and articles of spirit so often found in commerce, containing deleterious adulterations, would disappear, which would strip intemperance of many of its attendant calamities.

It will be observed that the recipes throughout this work are those only that comprehend the manufacture of liquors, &c., that are usually met with in commerce, and the reader comes at once to the process and its productions; these formulas have been employed by all of the most extensive manufacturing establishments in Europe; and added to these recipes, are all of the recent improvements that have been suggested by chemistry.

It will be seen that the articles used in the formation of liquors, &c., mentioned in this work, are powerful stimulants to the digestive organs, constituting medicated drams that invigorate the whole system.

It will be noticed that the work contains numerous extemporaneous recipes, and in view of their non-availability under all circumstances the apparatus will be found both economical and simple

THE AUTHOR.

New Orleans, October 1st, 1853.

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I.

THE PROCESS OF

MANUFACTURING

LIQUORS WITHOUT DISTILLATION.

ALCOHOL,

In the chemical sense, is a liquid generated for the most part in vegetable juices and infusions by a peculiar fermentation called the vinous or alcoholic. The liquids which have undergone it, are called vinous liquors, and are of various kinds. Thus, the fermented juice of the grape is called wine; of the apple, cider; and the fermented infusion of malt, beer. With regard to the nature of the liquids susceptible of the vinous fermentation, one general character prevails, however various they may be in other respects; that, namely, of containing sugar in some form or other. It is found further, that after they have undergone the vinous fermentation, the sugar they contain has either wholly or in part disappeared, and that the only new products are alcohol, which remains in the liquid, and carbonic acid which escapes during the process, and these when taken together, are found to be equal in weight to the sugar lost; it is hence inferred that sugar is the subject matter of the changes that occur during the vinous fermentation, and that it is resolved into alcohol and carbonic acid. Sugar will not undergo the vinous fermentation of itself, but requires to be dissolved in water, subjected to the influence of a ferment, and kept at a certain temperature.

Accordingly, sugar, water, and the presence of a ferment and the maintenance of an adequate temperature, may be deemed the pre-requisites of the vinous fermentation. The water acts by giving fluidity, and the ferment and temperature operate by commencing and maintaining the chemical changes. The precise manner in which the ferment operates in commencing the reaction is not known, but the fermentative change seems to be intimately connected with the multiplication of a microscopic vegetable, in the form of diaphanous globules contained in the ferment, and called "*torula cervisiæ.*" The ferment is generally considered to contain a peculiar nitrogenous principle having a close analogy to albumen and casein.

Certain vegetable infusions, as those of potatoes and rice, though consisting almost entirely of starch, are nevertheless capable of undergoing the vinous fermentation, and form seeming exceptions to the rule that sugar is the only substance susceptible of this fermentation. The apparent exception is explained by the circumstance that starch is susceptible of a spontaneous change which converts it into sugar. How this change takes place is not well known, but it is designated by some authors as the *saccharine fermentation.* It has been proved that if a mixture of gluten from flour, and starch from potatoes, be put into hot water, the starch will be converted into sugar. When, therefore, starch is apparently converted into alcohol by fermentation, it is supposed that during the change it passes through the intermediate state of sugar. Alcohol being the product of the vinous fermentation, necessarily exists in all vinous liquors, and may be obtained from them by distillation. Formerly it was supposed that these liquors did not contain alcohol, but were merely capable of furnishing it in consequence of a new arrangement of their ultimate constituents—the result of the heat applied. This idea has been disproved by showing that alcohol may be obtained from all vinous liquors without the application of heat, and, therefore, must pre-exist in them. The method consists in precipitating the acid and coloring matter from each vinous liquor, by subacetate of lead, and separating the water by carbonate of potassa.

In vinous liquors, the alcohol is largely diluted with water, and associated with coloring matter, volatile oil, extractive, and various acids and salts. In purifying it, we take advantage of volatility, which enables us to separate it by distillation, combined with some of the principles of the vinous liquor employed, and more or less water. The distilled product of vinous liquors forms the different ardent spirits of commerce. When obtained from wine, it is called brandy; from fermented molasses, rum; from cider or peaches, it is called apple or peach brandy; from malted barley, rye, or corn, it is known as whiskey; from malted barley and rye meal, with hops, and rectified from juniper berries, it is known as Holland gin; from malted barley, rye, or potatoes, and rectified from turpentine, it is called common gin; and from fermented rice, arrack. The spirits are of different strengths, that is, contain different proportions of alcohol, and have various peculiarities by which they are distinguished by the taste. Their strength is accurately judged of by the specific gravity, which is always less in proportion as their concentration is greater. When they have the sp. gr. 0·920, they are designated in commerce as proof spirit; if lighter than this, they are said to be above proof;

if heavier, below proof; and the percentage of water or of spirit of 0·825 necessary to be added to any sample of spirit to bring it to the standard of proof spirit, indicates the number of degrees the given sample is above or below proof: thus, if 100 volumes of spirit require 10 volumes of water to reduce it to proof, it is said to be "10 over proof." On the other hand, if 100 volumes of spirit require 10 volumes of a spirit of 0·825 to raise it to proof, the sample is said to be 10 under proof.

Thus, for instance, these marks will be observed on the heads of rectified whiskey barrels, the initials "A. B. P.," signifying above proof, and "B. P.," below proof. This whiskey should contain about 40 per cent. of alcohol, of the strength of 92 per cent.; thus it will be seen that a barrel of forty gallons of whiskey is composed, as far as the fluid measure extends, of sixteen gallons of alcohol and twenty-four gallons of water; this is called "rectified proof spirit," or "proof spirit." Should the spirit contain above forty per cent. of alcohol, it will be denoted on the head of the barrel by the initials, "A. B. P." with the figures denoting the per centage. And if the spirit contains less than forty per cent. of alcohol, it will be known by the initials "B. P.," or below proof, with the less per centage indicated by figures.

Proof spirit is far from being pure, as it contains a considerable quantity of grain oil and other foreign matters ; it may be further purified and strengthened by distillation, or the impurities may be driven off by filtration through charcoal. Alcohol thus purified, is known in commerce as neutral spirits, and is used in the manufacture of the imitation of foreign liquors, cordials, syrups, aromatic waters, essences, perfumes, &c., &c.

II.

ARTICLES USUALLY EMPLOYED

IN THE MANUFACTURE OF

WINES, CORDIALS, LIQUORS, &c., &c.

ALCOHOL

CAN be obtained by distillation, from any article that is capable of undergoing fermentation.

The alcohol that is commonly found in commerce, is obtained from corn or potatoes, and contains an essential oil which is removed by rectification or filtration with charcoal (see Filtration); and when alcohol is thus cleansed of grain oil, it is then suited for the purposes of the manufacturer, and is known under the name of Neutral Spirit.

This spirit, when flavored, and the various articles added to give a vinous, mucilaginous, oily, or dry taste, are called Imitation Liquors, by virtue of their possessing some of the leading characteristics of the distilled spirit which they are supposed to represent.

ACIDS.

Tartaric, Citric, and Sulphuric, are used for imparting acidulous vinous taste to liquors.

Of these acids, that of *Tartaric* is made from or extracted from tartar, a peculiar substance which forms on the inside of wine casks, being deposited there during the fermentation of the wine; by some manufacturers, cream of tartar is preferred to any other acid.

Citric Acid is the peculiar acid to which limes and lemons owe their acidity; it is present also in the juice of other fruits, such as the cranberry, the red whortleberry, red gooseberry, currant, strawberry, raspberry, etc., etc. Citric acid is prepared from the juice of the lime or lemon.

Sulphuric Acid.—From the low price of this acid, it is used extensively for adulterating vinegar, and also in any form that an acid may be required for wines, cordials, &c. This acid is made from the combustion of sulphur—this acid should be kept excluded from the atmosphere, in well stopped vessels—this acid is used in forming the beading mixture, for giving a bead to the low proof liquors; for this formula, look under the head of Beads for Liquors.

Alum is manufactured occasionally from earths which contain it ready formed, but most generally from minerals, which, from the fact of their containing most or all of its constituents, are called *alum ores.* The principal alum ores are the alum stone, which is a native mixture of sub-sulphate alumina and sulphate of potassa.

The alum stone is manufactured into alum by calcination, and subsequent exposure to the air for three months; the mineral being frequently sprinkled with water, in order that it may be brought to a soft mass; this is lixiviated and the solution obtained, crystallized by evaporation.

Several varieties of alum are known in commerce. Roche alum, so called from its having come originally from Roccha, in Syria, is a sort that occurs in fragments of the size of an almond, and having a pale rose color, which is given to it by bole or rose pink. Roman alum also occurs in small fragments covered with a rose-colored efflorescence, derived from a slight covering of oxide of iron.

Alum is used for fining liquors; it is first finely powdered, from 3 to 5 ounces to 40 gallons of liquid, and it is used for imparting roughness to wines. The astringency of alum is preferable to catechu in the light wines.

AMYLIC ALCOHOL,

Or fusel oil, grain oil, corn spirit oil. This oil is distinguished by a strong disagreeable odor that is perceptible in corn whiskey, and is vulgarly known as ROT-GUT. Spirit distilled from grain, contains it in the proportion of one part in five hundred by measure. It is a colorless liquid, of a strong acrid burning taste—it is an artificial source of apple oil.

Pear Oil and heavy Oil of Wine.—For the reader to fully appreciate what chemistry has done for the manufacture of liquors, in this single instance, take, for example, 100 gallons of potato spirit, which contains a larger portion of grain oil than any other spirit. Now this spirit will be, owing to this grain oil, of a highly offensive odor, and if drunk in the usual quantities that clean spirit *is*, it would act as an emetic. This grain oil is separated by distillation, which leaves the spirit clean and inodorous—a neutral spirit; the grain oil is then distilled with sulphuric acid, which produces oil of wine, or its odor; if this be added to the spirit, it would, in point of flavor, possess all the essentials of pure brandy. And if the oil be subjected to further chemical decomposition, the product would be apple oil and pear oil—the former added to the spirit would yield apple brandy, and the latter gives the appearance of age to liquors.

AMMONIA.

This is commonly obtained by the action of lime on muriate of ammonia or sal ammoniac.

Water of ammonia is used in low proof liquors, for giving in combination with ethers, essences, &c., a strong aromatic perfume; and it is used singly in a liquid that needs a strong odor, as, for instance, in a barrel of *low proof whiskey*, containing only twenty gallons of proof whiskey to twenty of water, will have an odor commonly galled "GROGGY," the addition of ammonia completely "*cures*" this—that excess of ammonia should never be added that would indicate its own presence.

AMBERGRIS.

This substance is found floating on the sea, or thrown by the waves upon the shores of various countries, particularly in the southern hemisphere; is now generally believed to be produced in the intestines of the spermaceti whale. It is found in roundish or amorphous shaped pieces, usually small, but sometimes of considerable magnitude; and masses have been found weighing from 50 to 200 pounds.

These pieces are often composed of concentric layers; they are of various colors, usually grey, with brownish yellow and white streaks, often dark brown or blackish on the external surface. They are opaque, lighter than water, and of a consistence like that of wax, and have a peculiar aromatic agreeable odor, and are almost tasteless, and soften with the warmth of the hand. Ambergris is insoluble in water, but will dissolve in hot alcohol.

Ambergris is used as a perfume for liquors. It is never used alone, always being combined with other aromatics. The usual form of adding it to spirit, is to rub it well with sugar, which acts by minutely separating the particles of ambergris. Ambergris should be used in very small quantities, when used as a flavoring ingredient, as the odor would be easy of detection. In light-bodied liquors, one grain will often suffice. Its different applications will be found in the different formulas throughout the work.

ALMONDS.

There are two varieties of almonds, sweet and bitter.

Sweet Almonds, when blanched, which is easily done by immersing them in boiling water and rubbing them between the hands until the husk is removed, are without smell, and have a sweet and pleasant taste.

Sweet almonds enter into the composition of various syrups, &c. They are also used for giving the appearance of age, and a nutty flavor and taste to all kinds of spirituous liquors. When this object is intended for fine brandies, &c., say for twenty gallons of the spirit, five ounces of sweet and one of bitter almonds are well worked to a paste with acetic ether in a mortar; the paste is then strained, being first diluted with a sufficiency of water; the strained product, being a milky emulsion, is added to the spirit, for wines, &c. Use in the same manner,

Bitter Almonds.—These are smaller than the preceding variety; they have the bitter taste of peach kernels, and though in their natural state inodorous, or nearly so, have when triturated with water the fragrance of the peach blossom. They contain the same ingredients as sweet almonds, and like them form a milky emulsion with water. Bitter almond meal is sometimes used in the quantities of three to five ounces to twenty gallons of spirit, for imparting a nutty taste. Much care should be used in selecting almonds that are not rancid, as they would be highly deleterious if added to a cordial or wine.

Oils of Sweet and Bitter Almonds.—The oil of sweet almonds is of a sweet bland taste, and may be substituted for all the uses of sweet oil. This oil is sometimes dissolved in ether or alcohol, and is used for the same purposes in liquors that the almond is for; from one to two ounces of the oil, to double that quantity of alcohol or ether.

Oil of Bitter Almonds has a yellowish color, a bitter acrid burning taste, and the peculiar odor of the kernels in a very high degree. The purity of this oil may be known by its ready solubility in sulphuric acid, with the production of a reddish brown color. Oil of bitter almonds is used as a flavoring ingredient in cordials, wines, and liquors, but more extensively in cordials. This odor is too well known and easily detected, and should be used in small quantities.

ALE OR PORTER

Is sometimes used in quantities of from one to five quarts to forty gallons of spirit; it is used in cases where catechu and alum would be objectionable on account of their easy detection in rum, brandy, &c. Ale gives a mild and pleasant bitter. Four pints of porter and one ounce of sulphuric acid added to forty gallons of spirit, will give a taste similar to the decoction of peaches. Where porter is not convenient, add an infusion of hops.

ALKANET ROOT.

This root, as found in commerce, is usually much decayed internally; it is in pieces three or four inches long, from the thickness of a quill to that of the little finger, somewhat twisted, consisting of a dark red easily separated bark; it is reddish externally, and whitish near the centre, and composed of numerous distinct fibres, and internally of loose spongy texture. The fresh root has a faint odor and a bitter astringent taste, but when dried it is inodorous and insipid. It does not impart its color to water but to alcohol, and is used for coloring port wine and Stoughton's Bitters, &c. The red of alkanet is rendered deeper by the addition of an acid, and changed to blue by alkali.

BONE BLACK

Consists of the bones of animals, being burned and ground. The particles are porous, and are composed chiefly of lime. Bone black is used in the manufacture of liquor for removing grain oil, and as a decolorizing agent. Both of these processes are detailed in another chapter of this work.

RED BEETS

Are only used for the red coloring matter that they yield, which is obtained by slicing them and infusing in water, or fermenting them with the fermenting liquid that is desired of a red color. Five pounds will color forty gallons of liquid a light shade of pink, and ten pounds will give to the same quantity a deep-red rose color.

BRAZIL WOOD.

This wood yields to water a beautiful red color, which is used in all classes of liquors. Where a red would be desirable, three pounds of the wood to five gallons of water, and infuse for five to ten days.

BEECH WOOD.

The chips of this wood are used in the manufacture of vinegar, as described in another part of the work. The advantages that this wood presents over any other for the purpose are owing to a strong predisposition to fermentation that is manifest in this wood while in contact with any fermentive matter.

BALSAM OF PERU

Is viscid, like syrup or honey, of a dark, reddish-brown color, and a fragrant odor and warm bitterish taste, leaving when swallowed a warm or prickling sensation in the throat. It is used in cordials.

BLACKBERRIES,

Raspberries, mulberries, and strawberries, are all used in the manufacture of syrups. The process of depressing the fruit of its juice consists in placing it in a muslin bag and expressing the juice. One pint of the fruit is allowed to make one pint of syrup. For full directions, look under the head of Syrups.

CATECHU

Is used in all kinds of liquors where a rough astringent taste would be desirable. The dark colored catechu is the best. The usual mode of using it is to reduce it to a powder, and work it into a paste with some of the liquid, and then add it to the mass. The extremes for its use is from four to ten ounces to one hundred gallons.

CAUSTIC POTASSA

Has been proposed as an economical source for rec-

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tifying alcohol. The plan consists in the saponification of the grain oil by the aid of potassa, and separating this product from the spirit by straining. With some this process has failed, owing to the fact that the potassa did not attack the oil.

CHARCOAL (" VEGETABLE")

Is used for rectifying spirit. The charcoal acts by absorbing the grain oil. Vegetable charcoal is inferior to animal charcoal. The common objection urged against the use of animal charcoal is the peculiar ammoniacal fetor that it imparts to the liquor that is filtered through it. This, it must be obvious, is owing to the animal matter not being entirely driven off by burning. As a decolorizing agent, vegetable is inferior to animal charcoal.

COCHINEAL.

Cochineal.—This insect is found wild in Mexico, and as a coloring substance it is one of the most useful that we have, and is suited for all kinds of liquors that are dependent upon red as a color. Cochineal is soluble in water and alcohol, but more so in boiling alcohol.

COTTON

Is made use of in filtration in liquors that need clarifying. The liquid is allowed to pass through the cotton, and the clarification is effected by the particles in the liquid becoming entangled in the fibres of the cotton. The cotton is sometimes placed in a funnel, or in a filtering or straining bag, and the liquid is allowed to pass through it. The sand filterers will be found to be superior, more particularly where a large volume of liquid is to be clarified.

EGGS.

Every part of the egg is made use of as finings for liquors, wines, cordials, and syrups. The egg effects clarification of fluids by involving during its coagulation the undissolved particles, and rising with them to the surface or subsiding.

ETHERS

That are made use of by the liquor manufacturer, consist of acetic ether, which is obtained by the distillation of sulphuric acid, acetic acid, and alcohol, and are used in the imitation of brandies, wines, &c.

Nitric Ether is distilled from nitric acid and alcohol. This is used principally for flavoring gin.

Butyric Ether is produced by the chemical decomposition of rancid butter, and is used for imparting a flavor of pineapples.

For the full directions for quantities necessary in the formation of liquors, see another chapter, and also the formulas.

FLAXSEED.

The mucilage of this seed is obtained by boiling, and is used for giving a body to wines.

FILTERS

Are used for clarifying liquids of impurities, and are made of various forms and composed of different articles. The most usual are charcoal (animal and vegetable), sand, cotton, and muslin. The most common form, however, in arranging filters is to use any convenient sized cistern or barrel; and in this arrange one bed of charcoal (vegetable) to a depth varying from two to five feet, and the last bed consisting of sand to the depth of from twelve to forty inches, packed in alternate layers with shells, which prevents the sand from becoming too closely embedded, which would prevent free filtration. But for ordinary purposes the sand filtration alone will remove the objectionable impurities. As the sand becomes charged with coloring matter from continued filtration, it will have to be removed from the sand by washing in clean water. It may be necessary to pass the fluid through the sand several times before it becomes perfectly clear. To obviate this, increase the quantity of sand to double. Sand is only used to give transparency to any color by separating the minute particles that tend to impart a heavy cloudiness to liquids ; but when a liquid is to be rendered limpid (colorless) filtration through animal charcoal will have to be resorted to.

" FININGS "

Are used for clarifying liquids. They consist of bodies or matter that is either lighter or heavier than the fluid. The whole process of fining is mechanical, for when the article used for fining is lighter than the fluid, it floats on the surface, and acts on the principle of the attraction of particles, and these particles subside. On the other hand, when the finings are heavier than the liquid, they fall to the bottom, and carry down with them the heavier impurities. These two points are illustrated in the use of eggs, milk, flour, isinglass, &c., which are lighter than water ; and in the latter instance in the use of alum, potash, &c., which are heavier than water.

FLOUR,

Prepared from wheat and rice, is used for finings but more particularly for giving a body to wines and liquors. This process is fully described under the head of "Starch Filtration."

When flour is used for finings, it is made into a smooth paste before adding.

Liquors are sometimes prepared, on a small scale, for domestic use, by digesting from one to two pints of wheat flour, in five gallons of spirit, for a few days, agitating it daily, and then straining for use. This quantity is usually added to twenty gallons of spirit. The body and taste of liquor containing flour is equal to that given by honey.

GRAPE SUGAR

Is used in the manufacture of wines and brandies. It is formed by digesting sugar in a solution of acetic acid ; and some manufacturers digest or saturate any given quantity of the sugar to the consistence of paste. With water acidulated with sulphuric acid to the strength of common vinegar, the fluid is after digesting for two weeks, evaporated by solar or artificial heat.

This sugar is used for giving a sweetish, acidulous taste to wines, and a vinous taste to brandy. But the same ends can be obtained by the assistance of sugar and acid, without farther preparation.

GAMBOGE

Is a yellow coloring resinous substance. This gum is soluble in water, forming a yellow opaque emulsion. It is dissolved by alcohol, and a golden yellow tincture results, which is rendered opaque by the addition of water.

So intense is the color of this resin that one part communicates a perceptible yellowness to ten thousand of water.

GENTIAN

Is intensely bitter, without being nauseous, and the bitter principle is extracted by water and alcohol. Gentian enters largely into the composition of the different formulas for bitters. See Bitters.

HYDROMETER.

The specific gravity of liquids affords one of the best tests for their purity. The instrument commonly used for this purpose is Baume's hydrometer. This consists of a glass bulb loaded at one end, and drawn out at the other into a tube on which the scale is marked. That used for alcohol is graduated by loading it until it sinks to the foot of the stem (which is marked zero), in a solution of one part of common salt in nine parts of water. It is then put into water, and the place to which it sinks is marked 10° of the scale, which is constructed from these data.

HONEY.

Owing to its peculiar, though feebly aromatic taste, honey is one of the most useful articles that can be found for giving a fine body, and the apparent virtues of both brandy and wine to the palate when used in imitating liquors or wines. When used in the finer liquors, it may sometimes need clarifying; but, generally, if it should be heated and strained, will answer all purposes. The usual impurities are earth, sand, and coloring.

INDIGO

Is only used for its coloring substance, which it yields best to a solution of sulphuric acid. The blue from indigo is only used for cordials.

IODINE

Is used to indicate the presence of starch in liquors; in this manner it is used in detecting French brandies. See chapter on "Ascertaining the Purity of Brandies."

LOGWOOD

Imparts its color to water and alcohol; the color that is imparted to boiling water is of a much warmer tone than that of any other; the color is of a deep red, bordering on purple. This is suited for the wines, and is sometimes combined with burnt sugar, in coloring brandy.

MOLASSES

Is sometimes used in manufacturing liquors; the objection to its use is, that it contains a large portion of charcoal, and that it is indebted to it for its own color; this charcoal being in such minute particles, that their removal is attended with great difficulty, as finings will have no effect on them. It is exceedingly difficult to render a fluid transparent that holds molasses in solution, and for this reason coloring for liquors should never be prepared from molasses, and coloring, from this source, may be known by the heavy color it leaves in liquor.

NEUTRAL SPIRIT,

Or clean spirit, is a spirit of variable strength, say from 40 to 70 per cent. of alcohol. This spirit is colorless and inodorous, though, as usually found, it has the odor of rum, or acetic ether, which is generally added to conceal some slight trace of remaining grain oil. The only reliable tests for this spirit are the hydrometer, and nitrate of silver; the former indicating the per centage of alcohol, and the latter that of grain oil. And neither should this spirit, when drunk, or after having been drunk, leave any disagreeable or heavy sensation in the throat or on the palate, and all the disagreeable and stinging sensations should pass off without leaving the slightest traces of astringency, roughness, acridness, or of pungency in the mouth or throat, as these indications would point to the usual adulterations of acrimonious substances. These remarks will apply to any other liquor for detecting adulterations.

NITRATE OF SILVER.

This is used in solution for detecting grain oil in liquors; the silver throws the oil to the surface of the liquid in the form of a black powder; this will serve to detect fictitious liquors generally, or at least as far as common grain spirit may enter into their composition.

OAK BARK.

Red and black oak are best suited for the manufacture of liquors, both for coloring and tannin ; the bark is best suited for brandies, as it yields a fine brown color, and its bitter principle adds a pleasant taste to the liquor. The color can be obtained either by infusing the bark in water or spirit. Sulphuric acid is sometimes added to liquor colored with this bark, as the acid gives to the liquid a bright trans parency.

In some manufactories oak bark coloring is used to the exclusion of sugar coloring, for brandies. The coloring is prepared from the bark by infusing it in barrels, along with proof spirit ; fresh bark is added to the spirit until it becomes an amber color, it is then used in the same manner as brandy coloring.

Care should be observed that no metallic body comes in contact with liquid containing tannin, either in the form of oak bark, catechu, or tannic acid, as the color must, to a greater or less extent, become contaminated.

The most convenient mode of discharging oak bark coloring, or tannin, in any form, is by a solution of gelatine, composed of one to three ounces of isinglass, beat fine, or to shreds, and dissolved in warm water, two pints, and when cold, whisk to a froth with water, and add it to forty gallons of spirit.

OATMEAL, ETC.

Oatmeal, rice flour, and wheaten flour, are for giving a body, &c., by filtration, to spirits.

The rationale of this process is, that the flour alluded to is of a feebly sweetish taste, and is composed (mechanically) of minute particles, which is the result of grinding and bolting. The spirit, in filtering through a body of this flour, becomes charged with a portion of these particles. Now the natural taste of the spirit is hot and pungent; this taste is modified, softened, mellowed, by the addition of these particles of flour. Without lessening its strength, it adds to the density of the spirit, and hence an oily taste and appearance.

The particles alluded to should not be discerned by the naked eye; this is prevented by placing a few folds of muslin at the bottom of the flour; this muslin strains off all the coarser particles, or prevents their passage.

Oaten meal and wheaten flour are used for colored liquors, viz. brandy, whiskey, &c. Rice flour is used for white liquors, viz. gin, and all liquors that are uncolored.

Some manufacturers make use of equal quantities of either wheat flour or oatmeal and rice flour.

PEPPER—LONG, CAYENNE, AND BLACK.

Of the different varieties of pepper, none answer for the purpose of giving a false strength to liquors, except Guinea pepper; a tincture prepared from this variety has a taste analogous to alcohol, whereas the taste from the other varieties remains on the palate a considerable length of time after being swallowed.

It is usual in preparing large quantities of the above tincture, to add a portion of long or cayenne, to increase the strength.

PELLITORY.

This is a powerful acrimonious substance, which is used in the form of a tincture for giving a false strength to liquors generally, and also to vinegar. See Pellitory.

RUM

Is too well known to require a description. There are several commercial varieties; the most common are Jamaica, New Orleans, St. Croix, and New England; they are stated agreeably to their relative com mercial positions, and are found colored and uncolored.

For the purposes of the manufacturer the Jamaica rum is preferable. Rum gives to neutral spirit a fine aroma, when tempered with acetic or butyric ethers, and also an agreeable vinous taste. In extemporaneous formulas, rum is highly useful. See Formulas.

RED SANDERS WOOD.

A tincture is prepared from this wood that is used for coloring all kinds of liquors. The red from sanders is inferior to cochineal. See chapter on Coloring.

RICE.

Rice flour is used for filtering liquors through to give them a body. See chapter on Filtration.

SAFFRON.

There are two varieties, the English and American; that of the former is best suited for coloring liquors, and of the latter for cordials.

SNAKEROOT.

Of these varieties, the Virginia snakeroot is preferable; this is one of the constituents of the various brands of bitters. The bitter principle is yielded to water and alcohol. For particulars, see chapter on the Manufacture of Bitters.

SWEET SPIRITS OF NITRE

Is distilled from nitric acid and proof spirit, and is used by some manufacturers for giving a false strength to liquors. The proportions vary, say from six to twelve ounces to forty gallons of spirit. The excessive use of the sweet spirit of nitre in liquors, will cause an involuntary flow of urine from the consumer; probably there are but few instances in which the use of nitre would be necessary in managing liquor; some manufacturers use it in liquors that have become *musty*, and others use it under the impression that it adds a peculiar vinosity to the spirit.

These ends can be obtained by other articles that are more economical and less injurious to health; the articles in question consist of honey or sugar, acid tincture of the grains of paradise, starch, &c.

In the extemporaneous preparation of liquors, nitre is preferable, as it needs no preparation. From two causes, the exact quantity of nitre necessary for a given quantity of spirit cannot be given. First, owing to the extensive adulterations that it is subject to, which are alcohol or water, and the second is owing to what apparent strength the liquor is to be brought to. The palate will be the most correct guide; it will be found that the use of the grains of paradise tincture will be the most economical for giving a false strength to low proof or cheap liquors, and that the tincture is less injurious than nitre.

OLIVE OIL.

The pure oil is of a pale yellow or greenish yellow color, with scarcely any smell, and a bland, slightly sweetish taste. This oil is largely adulterated with the cheaper oils; a mode to detect the pure oil, founded on the property possessed by the supernitrate of mercury, of solidifying the oil of olives without a similar influence upon other oils—six parts of mercury are dissolved at a low temperature in seven and a half parts of nitric acid, of the sp. gr. 1.35, and this solution is mixed with the suspected oil in the proportion of one part to twelve, the mixture being occasionally shaken. If the oil is pure it is converted, after some time, into a yellow solid mass; if it contains a minute proportion, even so small as the twentieth, of common oil, the resulting mass is much less firm. Another test is founded on the fact that pure olive oil is changed to a greenish yellow color by nitric acid. Olive oil is used in the manufacture of liquors for making the beading mixture which is used for low proof spirits. See Beading Mixture.

OIL OF CARAWAY

Is, like cinnamon, only used for flavoring cordials, and if added to liquors it should be so combined, that it will only assist in making a new compound in the family of aromatics.

OIL OF CLOVES

Is sometimes added to the ethers to increase their pungency. When used for domestic or foreign brandies the proportion of oil is one drop to every ounce of ether. Ether is a solvent for any of the essential oils. Great care should be used in the use of this oil in liquors, as its odor would indicate its presence. In the manufacture of cordials, clove oil is one of the most valuable that is in use ; the quantity to be used is generally regulated by the palate.

OIL OF CEDAR.

Five drops of the oil are added to one ounce of nitric ether, for flavoring Holland gin, and is sometimes used in imitating Scotch and Irish whiskey,—from 20 to 40 drops are added in combination with creasote.

OIL OF JUNIPER.

It is this oil that imparts to Holland gin its peculiar flavor and diuretic power. From three to four ozs. dissolved in alcohol, for 100 gallons of spirits.

OIL OF LAVENDER.

Used for flavoring cordials, in combination with other aromatics. It is rarely, if ever, used for flavoring spirits.

OIL OF LEMON.

This oil, dissolved in ether or alcohol, is highly useful for cordials, wines, and liquors. With raisin spirit or prune spirit, essence of lemon forms a valuable adjunct; or from one to two drops of the oil dissolved in acetic ether constitutes a fine and natural flavoring for French brandies. When used in conjunction with rum, the essence of lemon is suited from its flavor to enter into any compound that may be used for flavoring either wines, liquors, or cordials.

OIL OF MACE

Is obtained from nutmegs.

It is solid, soft, unctuous to the touch. Of a yellowish or orange yellow color, more or less mottled, with the odor and taste of nutmeg. It is dissolved by alcohol or ether.

An artificial preparation is sometimes substituted for the genuine oil. It is composed of suet, tallow, spermaceti, wax, and adding coloring and giving a flavor to the mixture with oil of nutmeg. Oil of mace is used for giving a nutty flavor to liquors, —from two to three ozs. to one hundred gallons. Its other uses will be found in the receipts.

OIL OF PARTRIDGE-BERRY

Is used for flavoring the syrup of sarsaparilla, and for the sarsaparilla cordial—see farther Directions for Making Syrup and Cordial.

OIL OF ROSEMARY

Is sometimes used in flavoring raisin and prune spirit in the proportion of from one drachm to one oz. of the oil dissolved in acetic ether. The proportion of oil to ether is as one to five.

Oil of rosemary is used for flavoring the cordials, and enters into some formulas for peach brandies, which consists of rosemary, bitter almond oil, dissolved in acetic ether; but butyric ether and pear oil have superseded these articles.

Many of these articles have sunk into disuse or have been superseded by others better adapted to these purposes; yet it would be deemed necessary to a full comprehension of this business, that all articles bearing any relation to the manufacturing of wines, liquors, &c., should be mentioned and explained.

OIL OF ROSES, OR OTTO OF ROSES,

Is used for all of our cordials, and for flavoring peach brandy, fine apple brandy. It is combined with pear oil essence, and with essence of mace, for pale and brown sherry; and combined with ambergris it is used for claret. Acetic ether six ozs.; essence of mace two ozs.; oil of roses one oz.; one drop well rubbed up in two ozs. of white sugar—this is added to forty galls. of neutral spirit in imitation of foreign brandy. Rose water is made from oil of roses by dissolving twenty grains of the oil in two ounces of clean alcohol. The alcohol should be kept hot till the complete dissolution of the oil has taken place. The alcohol is then added to a half-gallon of clean clear water.

In bottling champagne it is usual to add a few drops of rose water to each bottle.

For correcting a peculiar mustiness that is sometimes perceptible in brandies, the addition of one grain of the oil of roses well rubbed in sugar, and added to every forty gallons, will completely cure it. In adding this or any other aromatic to brandy, they should never be added in excess, but in such small proportions that they would form a harmonious odor in which nothing could be noticed that would attract attention. The novice should recollect that the object of all this aromatizing is merely an attempt to imitate oil of wine, the ingredient that brandy owes its flavor to.

OIL OF SASSAFRAS.

The essence is made by dissolving the oil in alcohol, in the proportions of half an ounce of the oil to four ounces of alcohol. Sassafras is used in the syrups and cordials, and for beer made from saccharine fermentation. The essence, when used as above, the quantity is generally added to suit taste—the odor of sassafras is too well known to attempt its use in liquors.

OIL OF TAR, OR CREASOTE,

Is used for flavoring malt whiskey, or well cleaned corn whiskey, in imitation of Irish or Scotch whiskeys ; from sixty to eighty drops to one hundred gallons. Some contend that the addition of from thirty to fifty drops of cedar oil, first dissolving it in alcohol, perfects the imitation ; the number that use cedar oil are in the minority, as the most extensive dealers and importers use creasote alone. It is not an unusual occurrence to find a large portion of this whiskey made from common corn whiskey, with the grain oil concealed by the powerful odor of the creasote. Persons not familiar with the odor of fusel oil or corn oil can detect it by the use of nitrate of silver. For particulars on this subject, see the chapter on tests for the purity of French brandy.

The spirit intended for an imitation of this whiskey should be well cleaned or freed of grain oil by filtration, and barrelled in the barrels that formerly contained the genuine. Irish and Scotch whiskey contain from forty-eight to fifty-five per cent. of alcohol.

TURPENTINE.

This is used singly, or combined with oil of juni per. for the different brands of gin, and the common gin contains this alone. Strasburg turpentine is the best. From one drachm to half an ounce to one hundred gallons. The excessive quantity is added to destroy any traces of grain oil that may exist, for the base of the American gin is rectified whiskey. Spirit intended for gin should be free of essential oil, and should show but little traces of this oil by the nitrate of silver test.

OIL OF WINTERGREEN, OR OIL OF PARTRIDGE-BERRY.

This oil, when freshly distilled, is nearly colorless, but as usually found has a brownish or reddish yellow color. It is of a sweetish, pungent taste, and of a very agreeable odor.

It may be distinguished from other oils from its great weight—it is the heaviest of the known essential oils.

Its unusual weight affords a convenient test of its purity.

This oil is used for flavoring clean spirit in imitation of "Old Bourbon, "Monongahela," "Rye," "Old Roanoke," and "Tuscaloosa" Whiskeys. For Bourbon the spirit is cleaned, allowing no smell of grain oil. and from ten to fifteen drops of oil of wintergreen are added to forty gallons.

For giving liquors a body, bead, and age, look under the proper heads, as those chapters are intended to point to the most useful flavoring materials.

Rye whiskey consists of clean spirit, containing about the same portion wintergreen oil, dissolved in four ounces of acetic ether. "Old Roanoke" same as the last. Some dealers add a few drops of creasote, say from fifteen to twenty drops to every forty gallons. "Monongahela," when prepared for bottling, contains to ten gallons of spirit, five drops of the oil of wintergreen dissolved in acetic ether, six ounces.

Every manufacturer varies the proportions of both the oil and the ether. These variations are matters of fancy; the object sought is merely a pleasant and agreeable aroma, which if added in excess will attract observation. When an excess does exist, it is for the purpose of covering the smell of the grain oil.

ESCUBAC, "FOR FLAVORING."

Cochineal 4 ozs.; catechu 5 ozs.; ambergris 1 gr.; raisins 1 lb. (bruised); anise seed, cloves, mace, and coriander seeds 1-2 oz.; 20 drops oil of cinnamon. All of the above solid ingredients should be well bruised or washed, and let them stand or digest in two lbs. of acetic ether, for two weeks, then strain through muslin, and add one quart of clean spirit; this is used for flavoring bottled brandies; 5 ozs. to 10 gallons of clean spirits; this is also used for cordials, ice creams, beverages, &c. Small quantities are often added to the different brands of the whiskeys, combined with the ethers intended for them.

ESCUBAC.

Nutmegs one pound, coriander seed one pound, bitter almonds two pounds, damaged raisins one hundred pounds, red beets, sliced, forty pounds. Allow these ingredients to digest for fourteen days in forty gallons of whiskey, and then strain off into a fresh barrel; then add to the strained liquor two pounds of acetic ether that has had two grains of ambergris, one ounce of oil of lemons, and one drachm of oil of cinnamon dissolved in it; then add half a pound of nitric ether. This is used for making or flavoring common New York double anchor, cognac, French brandy, and all of the lower brands of domestic brandy. The proportion is various, owing to the amount of grain oil present; the quantity may be stated at one quart to one gallon. Where persons wish to imitate brandy from whiskey, the above spirit will be found highly useful.

ARTICLES USED

FOR FLAVORING

WINES, LIQUORS, AND CORDIALS.

THE great secret of success in the manufacture of liquors consists in imparting to the imitation the precise aroma of the genuine, and thus obtain an article of spirit as near reality as possible, at a far less cost.

Brandy, for example, contains alcohol, oil of wine, &c., &c. Analysis has rendered the components of this fluid familiar, and has furnished the exact proportions, with their properties, and hence the various imitations of brandy, and some of them containing all of the essentials of, and scarcely distinguishable from the genuine. The list of aromatics, perfumes, &c., presented in the following, comprises the whole that are in use.

The operator should avoid, as far as is practicable, the excessive use, either singly or combined, of any aroma, or perfume, that would indicate its own presence; that this would be an injurious result, must be obvious. In imitating the aroma of brandy, the ethers will be found to be the most valuable. The aroma of cordials have been greatly neglected by manufacturers. Why this should be the case is certainly astonishing, since this addition could be made at an insignificant cost.

The consumer of these articles will find it more economical to manufacture them, as the same articles, when found in commerce, contain adulterations to a greater or less extent, and the chemical preparations particularly, which are made by the manufacturing chemists to suit the low price paid for them, are largely adulterated. The articles in question will be arranged rather with a view to their importance and availability, than to an alphabetical arrangement.

GENERAL REMARKS ON ETHERS.

They consist of acetic ether, butyric ether, nitric ether, chloric ether, and sulphuric ether.

Owing to their extreme volatility, they should be excluded from the air. Ether, when good, evaporates from the hand without leaving a disagreeable odor. The inflammability of ether should prevent its use in the vicinity of flame—when too long kept they undergo decomposition. They combine in all proportions with alcohol; their usual impurities are, water, acids, alcohol, and heavy oil of wine. As these impurities do not injure the ethers for manufacturing purposes, to offer any tests would be deemed unnecessary. The process of their formation will be necessary to fully comprehend their adaptation.

SULPHURIC ETHER

Is generated by the distillation of sulphuric acid, or oil of vitriol, with alcohol; it is a colorless, very limpid liquid, of a strong and sweet odor, and hot and pungent taste. It is used in imitating brandy, and also rum; the proportions are from four to nine ounces to forty gallons of clean spirit; though it is used more extensively in combination with spirit of orris root, orange, lemon, and rum; thus, for instance, five parts of the ether to one of orris root, or two parts of orange, and eight of rum. These proportions are for brandy, but sulphuric ether is inferior to acetic or butyric ether, for any of the purposes of the manufacturer of liquors. By some, it stands very high in imitating rum. From neutral spirit, acetic ether, three parts; sulphuric ether, six parts; rum, eleven parts.

NITRIC ETHER

Is the product by distillation of nitric acid with alcohol.

Nitric ether is a colorless volatile liquid, of a fragrant, etherial odor, and pungent, aromatic, sweetish, acidulous taste. This ether is commonly used for the fine gins—see the quantity in the receipts, and also for common American brandies. In some instances it is combined, one part acetic ether, and two of nitric ether; and again, the odor of this ether is tempered by the addition of a few drops of oil of winter green, or by a few drops of essence of ambergris, or essence of cassia; or by the spirit of nutmeg; any of these are added to suit the fancy of the operator. They should never be added to that excess that they would indicate themselves.

ACETIC ETHER

Is distilled from acetic acid, sulphuric acid, and alcohol. This ether is colorless, of a very grateful odor, and of a peculiar agreeable taste. This ether undergoes no change by being kept.

This ether enters largely into the aromatic portion of all domestic liquors, either singly or combined. Singly, for New York brandy, and for old Bourbon; or combined with essence of wintergreen, for old Roanoke whiskey, for peach brandy, combined with orange flower water. In imitating the imported brandies, combined with rum, orange essence, raisin spirit, spirit of prunes, or oil of wine, to any of these named articles, by its addition; acetic ether promotes a great saving of the more costly articles that are used to impart a distinguishing flavor to spirits. In imitating rum, combined with rum and sulphuric ether, added to neutral spirit, acetic ether is highly useful. To any of the cordials, viz. peach, sunny south, strawberry, raspberry, &c., &c., one ounce per gallon would be a great improvement. For the full use of acetic ether, see the Formulas.

PURE LIGHT OIL OF WINE

Is a colorless, oily liquid, having an aromatic odor, and imparts a greasy stain to paper. This is the product by distillation of alcohol, sulphuric acid, and potassa. It is used for imitating foreign brandies; it is first dissolved in alcohol; the proportion is from one and a half ounces to five hundred gallons of clean spirit. We have nothing better than the oil of wine, as this is the article that imported brandies are indebted to for their aroma, and it is the perfume that we are endeavoring to imitate.

The objections to be urged against the oil of wine by the manufacturer are, the high price, and almost all that is found contains extensive adulterations. And now it is rarely, if ever, used, having found so very many excellent substitutes. But in the manufacture of brandy on a small scale, oil of wine is preferable, and also for the imitation wines, viz. madeira, teneriffe, sherry, port, &c. It is used in the same quantities for wines as for brandies; the spirit to which it is added must be free of grain oil. The oil of wine is highly useful in bottling imitated wines and brandies, for these packages are examined with greater scrutiny than they would otherwise be. It is also used in the fancy whiskeys, when they are put up in small packages.

BUTYRIC ETHER

Is formed by the saponification of rancid butter by the aid of alkali, and then distilled with sulphuric acid. This ether has a strong odor of pineapples, and is used for making pineapple ale, which consists in adding from four to six ounces of ether to a hundred gallons of common ale. Also for pineapple syrup, pineapple cordial, and pineapple brandy. It is also used as a flavoring ingredient in fine peach brandy. This ether is used in the same proportion as all other ethers for liquors, &c. In the imitation of the Sazarac brandies, of the vintage of 1795–98, 1802–05, Godard, vintage of 1828, Otard, Dupuy, Maret, and Poultney brandies, two parts of butyric ether, five of oil of wine, form the principal and the most approved flavoring ingredients; and also in the imitations of Copenhagen cherry brandy grape leaf champagne, sparkling Burgundy, champagne, Heidsieck champagne; and also in the imitations of the juices of fruits. When the aroma is applied to champagne, butyric ether is combined with four to six parts of oil of wine, dissolved in alcohol, free of grain oil. Alcohol is used as a solvent for oil of wine in the proportion of four parts alcohol to one of the oil of wine. The ethers intended for champagne, after being dissolved, are added to the spirit that is intended for champagne. Butyric ether will, owing to the strength of its odor conceal a considerable amount of grain oil.

VALERINATE OF AMYLIC OXIDE

Is produced from grain oil by distillation; its odor recalls that of sweet apples, and is known as apple oil. It is used in flavoring plain spirit in imitation of apple brandy, and also in champagne cider, and for flavoring fine bottled cider. Apple oil, combined with butyric ether, is used for *old reserve*, *pathetinho*, *south side*, and *East India madeira;* and when combined with Jamaica rum, it is used in making imitations of rum from neutral spirit. The apple oil and oil of wine form one of the finest perfumes that we have for the conversion of clean spirit into peach brandy; and with acetic ether it is used, giving a fine, and at the same time, natural aroma to the juices of fruits, fruit cordials, and syrups prepared from fruits for use; it is dissolved in clean alcohol, in the proportion of one part to four of spirit.

ACETATE OF AMYLIC.—OXIDE.

This is also prepared from grain oil, and is known as pear oil, and is sometimes used in the finer brandies, under the impression that it imparts an odor peculiar to old liquors. For old rye, Bourbon, and Roanoke whiskey, pear oil is highly useful, and is to be preferred to the essence of wintergreen. Its soft, mellow odor will give it a preference over any article in use for imparting to any kind of liquor the fine, soft mellowness of age. Its solution is obtained by dissolving in alcohol one part of pear oil to four of clean alcohol. It is used at discretion in such quantities that it will neither absorb nor become absorbed by any other aromatic. The usual quantities are from two to six ounces to one hundred gallons of clear spirit.

AROMATIC SPIRIT OF AMMONIA.

This spirit is distilled for the use of rectifiers from oil of lemon one-half ounce, nutmegs two ounces, oil of cinnamon one drachm, cleaned alcohol four pints, and mix the oils ; then add spirit of ammonia three ounces. The proportions, of course, can be varied, and any aromatic can be used. This spirit is of a fine aromatic taste and odor, and is well suited for flavoring cordials and domestic brandies.

SPIRIT OF PRUNES.

Properly this would be called a tincture or infusion. Take any convenient quantity of prunes, and add double their quantity by measure of clean spirit, and digest for ten days. Used principally for flavoring domestic brandies, from one pint to three quarts to forty gallons of clear spirit. When an excess is added, the object is to conceal the remaining traces of grain oil in the spirit. The tincture of prunes is greatly benefited by the addition of an equal quantity of Jamaica rum. Prunes do not yield a very strong odor, and care should be used in their selection. As they are usually found, they contain but little flavor, and the only test for them will be their aroma. This tincture is used in conjunction with nitric ether and acetic ether, for brandies. The usual quantities of the tincture of prunes are added to forty gallons of spirit, and from one to five ounces of either one of the last named ethers. The spirit used for digesting the prunes in should be perfectly free of grain oil. The prunes are subjected to this digestion as long as they will yield any perceptible perfume to fresh spirit. It is usual to add to the spirit containing the prunes one ounce of powdered orris root to every gallon, or orange peeling, or nutmegs ; and the whole of them combined will make a desirable perfume for common brandy.

RUM.

This is one of the most convenient and economical flavoring aromatics that the rectifier makes use of. Jamaica contains a larger per centage of alcohol than any other brand, and also a corresponding amount of essential oil ; and it is this essential oil that is sought for. The perfume of rum will answer in the absence of butyric ether, or oil of wine. Each gallon of rum is tempered with one ounce of acetic ether. Rum thus charged is used for flavoring plain, clean spirit, in imitation of French brandies, in the proportion of from four to fifteen gallons to one hundred. The lowest extremes are for domestic brandies, and the highest are for fine imitations. This excess of fifteen to twenty gallons of rum adds a fine vinous taste to the brandy. The rum added to this extent is usually New England rum, which is, from its low price, the most convenient; but the most economical mode of imparting a vinous taste to any kind of spirit is by the use of sulphuric acid, from one to two ounces of the acid to one hundred gallons of spirit. For the general effect of acids on liquors, see chapter on "The Benefit of Acids to Liquors." Rum tempered with one ounce of butyric ether and half an ounce of acetic ether to each gallon, is used in the proportion of one gallon to six of well cleaned spirit in imitating rum.

RAISIN SPIRIT.

This is produced by the distillation of raisins. This spirit can be manufactured at that season of the year in which the previous year's stock of raisins have deteriorated from age. Spirit of raisins occupies a position, from its properties, near oil of wine, as they are obtained from the same sources, only under different circumstances; and as much of the original flavor of the raisin has been dissipated from age, this spirit is extensively used by all classes of manufacturers, and probably to a greater extent in France than elsewhere in flavoring clean spirit for brandies; and, also, for flavoring madeira, sherry, teneriffe, and all of the different brands of champagne. The process consists in using any well managed champagne, and adding the raisin spirit to the neutral spirit intended for the champagne. See the Formulas for Champagne.

Raisin spirit is sometimes adulterated with acetic ether, butyric ether, orris, nutmegs, apple oil, pear oil, &c., &c. The adulterations are sometimes carried to such extremes by some manufacturers that the so-called raisin spirit possesses none of the peculiarities of the original. The spurious raisin spirit is manufactured ex-tempore for auction sales, and is sold to the ignorant for brandy flavoring. The most common formula for this imitation is to take rectified whiskey (clear of color) forty gallons, sulphuric acid three ounces, acetic ether twelve ounces, essence of orange four ounces, ambergris two grains, rubbed up well with two ounces of dry white sugar, and added to the forty gallons of whiskey. This liquid is then charged with from fifteen to twenty-five gallons of water containing pellitory, grains of paradise, and catechu ; and again the spirit is not diluted with water, but the strength is heightened by the addition of from six to twelve ounces of sweet spirits of nitre, combined with a quart or three pints of tincture of grains of paradise. The consumers of this latter article are coffee-house keepers, &c., &c. It is for flavoring and giving a false strength to liquors, wines, &c.

And even the distiller becomes imbued with the spirit of the age ; for if the manufacturer operates on his customer's purse through the medium of his olfactory nerves, the manufacturer, by the same rule, is done equally as "brown" by the distiller ; because the adulterations that the raisin spirit is liable to contain coming from the hands of the distiller are various, and among the most prominent, and at the same time difficult of detection, are the different ethers.

We have no positive chemical tests for ethers, but their volatility will serve to detect their presence. Thus, for instance, if a portion of suspected raisin spirit be exposed, in an open-mouthed vessel, for a few hours, the pungency and odor of the sample will be greatly lessened, or entirely dissipated. To detect any acrimonious substances, evaporate a quantity of the spirit to dryness, and the different substances will be perceptible to the taste. In separating the ether from the spirit by evaporation, the operation will be greatly facilitated by heating the spirit to a point below the boiling point for one hour; and if the odor has undergone no perceptible change, allowing a small per centage for evaporation of the natural bouquet of the raisin spirit, which, it must be recollected, is not of that volatile nature that the ethers are.

Raisin spirit has its perfume varied by the addition of various perfumes. Thus, for instance, in the imitations of the fancy brands of the American bottled whiskey, the essence of wintergreen, or essence of pear oil, is added to the raisin spirit in such quantities that will change the general tone of the original odor to that required.

TINCTURE OF BALSAM OF PERU AND OF TOLU.

Digest one ounce of the balsam with eight of rectified spirit, for some days, shaking it occasionally. Then filter. Tincture of benzoin in the same manner.

TINCTURE OF MUSK.

Musk two drachms, rectified spirit twelve ounces.

ESSENCE OF VANILLA.

Vanilla, cut very small, two ounces; rectified spirit one pint. Infuse for three days.

ESSENCE OF VERBENA.

Essential oil of verbena two drachms, rectified spirit four ounces, essence of ambergris one-half drachm. Mix.

ESSENCE OF NEROLIA.

Spirit of wine one-half pint, oil of orange peel one drachm, orris root, in powder, two drachms; musk, two grains. Let it stand in a warm place three days, and strain.

FLAVORING ESSENCE.

Oil of bitter almonds eight drops, oil of lemon five drops, oil of cinnamon four drops, oil of nutmegs eight drops, high proof spirit one pint. One to two drops added to each bottle, in bottling cordials that have little or no perfume.

ESSENCE OF BITTER ALMONDS.

Oil of bitter almonds one ounce, spirits one pint.

SPIRIT OF ROSES.

One pint of clean spirit, otto of roses twenty drops.

ESPRIT DE BOUQUET.

Oil of lavender, oil of cloves, and of bergamot, of each two drachms ; otto of roses ten drops, oil of cinnamon five drops, essence of musk one drachm, clean spirit one pint, for wines.

EAU DE MILLEFLEURS.

Rectified spirit two pints, balsam of Peru one quarter of an ounce, essence of bergamot one-half ounce, oil of cloves one quarter of an ounce, essence of nerolia one-half drachm, essence of musk one drachm. Mix the above. Is used for brandies and cordials.

ESSENCES FROM THE ESSENTIAL OILS.

All essences are prepared from the oil. For example, half an ounce of the oil to one pint of clean spirit will form a pint of strong essence. Take of any of the following oils :—Oil of cedar almonds, anise, bergamot, bitter almonds, caraway, cassia, cinnamon, cloves, horsemint, jessamine, juniper, lavender, lemons, mace, marjoram, mustard, nutmeg, origanum, peppermint, pimento, rosemary, roses, sassafras, spearmint, sweet marjoram, thyme. These, it will be observed, either singly or combined, form the base of all our perfumes.

ORRIS ROOT.

As the manufacturer makes use of this root extensively, a description of it will not be out of place, the better to enable the consumer to become a judge of it. This plant is a native of Italy, and other parts of the south of Europe. The root is dug up in the spring, and prepared for market by the removal of its cuticle and fibres.

It is prepared in pieces of various forms and sizes, often branched, usually about as thick as the thumb, knotty, flattened, white, heavy, of rough, though not fibrous fracture ; of a pleasant odor, resembling that of the violet, and a bitterish, acrid taste. The acrimony is greater in the recent than in the dried root, but the peculiar smell is more decidedly developed in the latter. The pieces are brittle and easily powdered, and the powder is of a dirty white color.

One gallon of clean spirit (proof), and eight ounces of orris root bruised. Digest for ten days, and strain. This is suited for fine brandies, all of the imitation wines, and enters into the composition of cordials, in some instances, singly; or combined, for instance, in the brandies. It is combined with acetic ether in fine gin, with juniper essence. In the wines in different proportions, as will be seen in the Formulas.

ESSENTIAL OILS, &C., USED FOR FLAVORING.

Oil of bitter almonds is used for flavoring, in imitation of peach blossom, by the addition of orange flower water, in the imitation of peach brandy, and also for the imitation of syrups and cordials of fruits. Essence of bitter almonds has a tendency to destroy the flavoring ingredient of almost any article combined with it; the destruction is not immediate, but gradual. This essence is sometimes added to brandy, whiskey, &c., to give a nutty flavor to them. The oil of bitter almonds has become quite common from long use, and is easily detected; and therefore should be used with the greatest caution. A few drops will suffice for forty gallons. The essence is made by dissolving one ounce to four ounces of alcohol.

AMBERGRIS.

Ambergris differs somewhat from the generality of aromatics, as it combines its odor with any other and forms by each addition a new and desirable perfume. It is used for flavoring the light wines, and it will be seen enters into various other formulas throughout the work.

OIL OF ANISEED

Is used principally for a cordial of the same name. The odor of anise has become too common for any other use.

OIL OF BERGAMOT (ESSENCE OF BERGAMOT).

The composition of oil of bergamot and that of lemon are nearly the same. In composition bergamot is used extensively for all kinds of cordials, and combined with acetic ether it is used for flavoring domestic brandies, and with nitric ether for Holland gin. It is never used alone for flavoring.

OIL OF CINNAMON

And oil of cassia are the same. This odor has become too popular with the masses to be of any value to the manufacturer. Cinnamon is the flavoring ingredient in some aromatic cordials; when it is used it should be concealed to as great an extent as possible. Cinnamon is highly useful where a warm aromatic odor is required.

AROMATICS

Are used for giving a false strength, an aromatic pungency, and in some instances an appearance of age, and a nutty flavor to liquors, wines, and cordials.

Of the two classes of aromatics, solids and fluids, the former is used for both its taste and odor; and the latter is employed for its odor alone.

Care should be exercised in the use of aromatics, that they are not added in such excessive quantities that would indicate their own presence.

The most convenient mode of obtaining the active principles of solid aromatics, is by infusion; for instance, a recipe directs to a given quantity of spirit, a corresponding amount of aromatics to be infused in the spirit, and then strain. To obviate the necessity of straining a large quantity of fluid, the infusion should be prepared with a much smaller quantity of fluid. From one to three gallons will form an infusion of aromatics, sufficiently strong for one hundred gallons of spirit.

To protect the consumer from imposition, particular attention has been paid to a description of those articles most liable to be found impure or adulterated.

ANISE.

The seed are brought from Spain, Germany, and France. The Spanish are smaller than either, and are usually preferred. The seed appear of a light greenish brown colour, with a shade of yellow; their odor is increased by friction, and is too well known to need a description; their taste is warm, sweet, and aromatic; the oil is obtained by distillation. The seeds are sometimes adulterated with small fragments of argillaceous earth, which resembles them in color; the aromatic qualities are sometimes driven off by a slight fermentation, which they are apt to undergo in the mass when collected before maturity. The star aniseed is analogous in sensible properties to the common aniseed.

Aniseed are used in the distillation of cordials, etc., and some manufacturers prepare an infusion from the star aniseed; for flavoring brandies, acetic ether or spirit of prunes are used with it; the oil is used for preparing anisette, and should be first dissolved in alcohol. For quantity, etc., see Cordials.

ANGELICA.

Of this root there are two varieties. That known as garden angelica is preferable ; it should be bought in powder, in well-stoppered bottles. The dried root is greyish brown, and much wrinkled externally, whitish and spongy within. The smell is strong and fragrant, and the taste at first sweetish, afterwards warm, aromatic, bitterish, and somewhat musky. This root is for cordials. See Formulas.

CALAMUS,

Or sweet flag. This is an indigenous plant, growing abundantly throughout the United States, in low, wet, swampy places. By the process of drying, the root loses nearly one half of its diameter, but is improved in odor and taste. The active principles are taken up both by spirit and boiling water. Calamus enters into the composition of the different varieties of bitters and cordials.

CARAWAY.

The caraway plant is a native of Europe, growing wild in meadows and pastures. It has been introduced into this country. Our supplies come partly from Europe and partly from our own gardens, Caraway seeds are about two lines in length, slightly curved, with five longitudinal ridges which are of a light yellowish color, while the intervening spaces are dark brown. They have a pleasant, aromatic smell, and a sweetish, warm, spicy taste. These properties depend on an essential oil which they afford largely by distillation. The seed yield their virtue to alcohol, and but slowly to water. See Formulas.

CARDAMOM.

This valuable plant is a native of the mountains of Malabar, where it grows spontaneously. The odor of cardamom is fragrant, the taste warm, slightly pungent, and highly aromatic. These properties are extracted by water and alcohol, but more readily by the latter. The volatile oil is colorless, of an agreeable and very penetrating odor. It cannot be kept long.

CINNAMON.

There are several botanical varieties of cassia. Ceylon cinnamon is in long cylindrical fasciculi, composed of numerous quills, the larger inclosing the smaller. In the original sticks, which are somewhat more than three feet in length, two or three fasciculi are neatly joined at the end so as to appear as if the whole were one continuous piece. The finest is of a light brownish yellow color, almost as thin as paper.

The inferior sorts are browner, thicker, less splintery, and of a less agreeable flavor. The Chinese cinnamon, called cassia in commercial language, is usually in single tubes of various sizes, from an eighth of an inch to half an inch, and even an inch in diameter, and is the variety commonly found in the shops. Cinnamon from which the oil has been distilled is sometimes fraudulently mingled with the genuine. This bark may be known by its greater thickness and deficient taste. This aromatic yields its virtues wholly to alcohol, and less readily to water.

CREASOTE.

A peculiar substance, obtained from tar or from crude pyroligneous acid by distillation. Creasote when pure, is a colorless liquid, of the consistency of oil of almonds, slightly greasy to the touch, and having a caustic, burning taste, and a penetrating, disagreeable odor, like that of smoked meat.

Creasote is sometimes adulterated with the fixed and volatile oils. These substances are detected by strong acetic acid, which dissolves the creasote, and leaves them behind, floating above the creasote solution. Creasote is used in flavoring plain spirit, in imitation of Irish and Scotch whiskey, and also for some of the American brands.

CUBEBS.

The odor of this berry is agreeably aromatic. The taste warm, bitterish, and camphorous, leaving in the mouth a peculiar sensation of coolness, like that produced by the oil of peppermint. The powder is of a dark color and of an oily aspect; powdered cubebs become impaired by age, in consequence of the escape of their volatile oil. The powder is sometimes adulterated with pimento. Powdered cubebs form an ingredient in the French medicated gin bitters, and also the gin bitters. An infusion is prepared from powdered cubebs and proof gin. See chapter on Bitters. Cubebs are gentle, stimulant, excite the digestive organs, with special direction to the urinary organs.

SLIPPERY ELM BARK.

The inner bark is the part made use of, and is found in commerce in long, nearly flat pieces, from one to two lines in thickness, of a fibrous texture, a tawny color, which is reddish on the inner surface, a peculiar sweetish, not unpleasant odor, and a highly mucilaginous taste when chewed. It abounds in mucilaginous matter, which it readily imparts to water. This mucilage is precipitated by the solutions of lead, but not by alcohol.

Much of the bark recently brought into the market is of an inferior quality, imparting comparatively little mucilage to water. It has the characteristic odor of the genuine bark, but is much less fibrous and more brittle, breaking abruptly when bent, instead of being capable, like the better kind, of being folded lengthwise without breaking.

The mucilage of Slippery Elm Bark is used by some for giving the appearance of age to liquors, and also an oily mucilaginous quality, in the proportion of three or four ounces to eight gallons ; and if added in excess, the mucilage will be observed floating through the liquid in the form of small flaky particles, which will have to be removed by straining. Considering that this mucilage is tasteless and has but little body or substance, its effects should not be relied upon in the manufacture of liquors, when honey, sugar, &c., can be obtained.

GINGER

Is too well known to need a description. Those pieces of ginger which are very fibrous, light, and friable, or worm-eaten, should be rejected. Ginger is used in the manufacture of cordials and syrups.

HOPS

Consist of numerous thin-veined, leaf-like scales which are of a pale greenish yellow color, and contain near the base, two small, round black seeds.

Though brittle when quite dry, they are pulverised with great difficulty; their odor is strong, peculiar, and fragrant; their taste very bitter, aromatic, and slightly astringent. These qualities are imparted to water. Hops are extensively used, by some manufacturers, in the place of catechu, or for furnishing the bitter principle of fine brandies, rum, &c.

JUNIPER.

The berries, as the fruit is sometimes called, are sometimes collected in this country; but though equal to the European in appearance, they are inferior in strength, and are not much used. The best comes from Europe, particularly from Trieste and the Italian ports. They are globular, more or less shrivelled, about as large as a pea, covered with a glaucous bloom, beneath which they are of a shining, blackish purple color, and containing a brownish yellow pulp and three angular seeds. The berries impart their substance to water and alcohol—and are used in the preparation of gin.

MACE OR NUTMEGS.

The small and round nutmegs are preferred to those which are large and oval. They should be rejected when very light, with a feeble taste and smell, worm-eaten, musty, or marked with black veins, or feel light, deficient in weight.

An artificial oil of mace is sometimes substituted for the genuine. It is made by mixing together various fatty matters, such as suet, castor oil, spermaceti, wax, tallow, &c., adding some coloring substance, and flavoring the mass with the volatile oil of nutmeg. The various formulas throughout this work, will show the great utility nutmegs are to the manufacturer.

Orange Peel.—A tincture is prepared from this peel, with clean spirit, that possesses all the substance of the oil. For convenience a small bag, containing the peel, is suspended in those liquors where this odor would be desirable. This peel also enters into the composition of the various formulas for bitters.

When the object in the use of the orange peel is simply to obtain its agreeable flavor, the rind of the sweet orange is preferable, and for a bitter principle, that of the Seville orange.

ORANGE FLOWER WATER.

Orange flower water is commonly prepared in France and Italy. It is nearly colorless, though usually of a pale yellowish tint, in consequence of being kept in copper bottles.

Much color, an offensive odor, or mouldiness, would indicate impurity, derived from the flowers in the process of distillation.

An oil is obtained from the flowers by distillation, which is called Nerolia, in France, and enters into the composition of various liquors and cordials.

Orange berries are sometimes used for flavoring cordials. See Formulas.

The rind of the Seville orange is much more bitter than that of the other varieties.

The essential oil is imported into the United States in tinned or copper cans. It has properties resembling those of the oil of lemons, but spoils more rapidly on exposure to the air, acquiring a turpentinish odor. This oil is employed as a flavoring material in all classes of liquors. See Formulas.

ORRIS ROOT.

This root is only used for its odor in this business. The root should be bruised or ground, and the spirit used to obtain the odor, should be free from grain oil; from two to four ounces to a quart of spirit. This odor enters into the composition of various perfumes for brandy, acetic ether, and spirit of orris, and for cordials, &c. See Formulas.

QUASSIA.

This wood is inodorous, and has a pure bitter taste, which is surpassed by that of few other substances in intensity; it imparts its bitterness, with a yellow color, to water or alcohol.

Quassia is sometimes used in the place of catechu to impart a bitterness without astringency to liquors, but is used more extensively in the manufacture of bitters. See Bitters.

VANILLA

Is a climbing plant, growing in the West Indies, Mexico, and South America. The pods are collected before they are quite ripe, dried in the shade, and covered with a coat of drying oil, and then tied in bundles which are surrounded with sheet-lead or inclosed in small metallic boxes and sent to market. Several varieties of vanilla exist in commerce. The most valuable consists of cylindrical, somewhat flattened pods, six or eight inches long, three or four lines thick, nearly straight, narrowing towards the extremities, but at the base shining and dark brown, externally wrinkled, longitudinally soft and flexible, and containing within their tough shell a soft black pulp, in which numerous minute black glossy seeds are embedded. It has a peculiar, strong, agreeable odor, and a warm, aromatic, sweetish taste; the interior pulpy portion is most aromatic.

Vanilla does not yield volatile oil, but the odor is extracted by clean spirit, in the form of the tincture or essence, which is made by cutting very small two ounces of vanilla, and infusing in neutral spirit for twelve days; this is sometimes distilled, forming the spirit of vanilla. The essence is used in vanilla syrups, for flavoring chocolate, ice cream, cordials, cognac brandy, peach brandy, &c.

BLACK MUSTARD SEED.

Owing to the adulteration that ground mustard is liable to, the use of the seed will be found more economical. Black mustard seed contain different properties to those of white mustard, and are best suited to the purposes of the manufacturer. The acrid properties of mustard are not yielded to alcohol, neither does this property pre-exist in the seed, but is dependent upon water for its development; and when the active principle is to be obtained, it should be by infusing in water, or if the spirit is low proof containing an excess of water, the mustard should be added to the spirit.

Horseradish is used for the same purposes and in the same manner as mustard, and their properties are identical.

The above articles are used for giving a pleasant, biting sensation, to cordials and wines.

TEA.

This is a native of China, and is used in the manufacture of liquors, wines, and cordials, for imparting a roughness to them, which is both agreeable and natural to the taste. A decoction of it is made by boiling. See Formulas.

LIQUORICE ROOT.

The acrimony perceptible to the taste in this root, renders it unfit for any of the purposes of the manufacturer, other than in the manufacture of sarsaparilla syrup that is used in soda water, which may be given thus: liquorice root, bruised, two ounces; oil of sassafras, oil of anise, 8 drops; oil of wintergreen, 5 drops; 6 lbs. brown sugar; water, 3 quarts. Boil the liquorice two hours, then mix the sugar, water, and liquorice water, and boil as for other syrups, then work the oils in the syrup when cool.

IV.

MANUFACTURE OF DOMESTIC LIQUORS

BY CONCEALING

THE ODOR OF THE GRAIN OIL.

ON THE MANUFACTURE OF DOMESTIC LIQUORS FROM RECTIFIED WHISKEY, BY CONCEALING THE SMELL OF THE GRAIN OIL BY THE USE OF AROMATICS.

WHEN ethers are used, the barrels should be closely bunged, as the ether will soon escape by evaporation if exposed.

The perfume of the essential oils are more lasting than those of the ethers. The objection to the essential oils is, that their odors are too common, and will detect themselves. These remarks apply more particularly to the oils of cinnamon, cloves, aniseed, and peppermint.

The perfumes best suited to this purpose, are acetic and nitric ether, oil of wintergreen, oil of lemon, essence of ambergris, oil of mace and creasote. The ethers are usually found in two to five pound packages, and the manufacturers' prices vary from fifteen cents to thirty cents a pound, but when found at the druggists, they are usually sold for an advance of one hundred per cent.; this is partly owing to the cupidity of dealers, and the expenses incident to the transportation of the article.

Ethers are sometimes largely adulterated with various articles. When pure, ether evaporates from the hand without leaving any disagreeable odor, and evaporates from paper without leaving any stain of grease, color, &c., &c.

The consumer should, to prevent imposition, become familiar with the nature and composition of ethers. See Ethers.

The essential oils are usually dissolved in alcohol or rubbed up well with dry sugar, and added, to prevent detection of the oils by their odors; they should never be added singly or uncombined, owing to the similarity existing between the odor of pure brandy and acetic ether. The detection of the latter would be difficult, and the same remarks will apply to nitric ether and gin; and thus it will be seen, that neither nitric nor acetic ethers require combinations of other perfumes to prevent detection. In the absence of acetic, nitric ether can be substituted by the addition of any sweet-scented aromatic.

To give these liquors the appearance of age and a body, add to every forty gallons, from half to two thirds of a pint of the decoction of slippery elm bark, which is made by boiling one pound of the bark with one and a half gallons of water for two hours. By the addition of an excessive quantity of this mucilage of elm bark, it will be observed floating throughout the mass of spirit, in the form of small flakes. The removal of these flakes is effected by passing the liquor through a straining bag.

The articles used for giving strength to these liquors, are grains of paradise, pellitory, sweet spirits nitre, and a strong decoction of *samqua* tea.

The nitre is the most dangerous to animal life, and should not be used. The other three enumerated articles are extremely healthy, and not in the slightest degree are they injurious.

These liquors will be greatly improved if the same quantity of refined sugar or honey is added to them, that is prescribed in the Formulas for the finer liquors.

COGNAC BRANDY.

One barrel of whiskey, say forty gallons, add tincture of grains of paradise, one quart; powdered catechu, three ounces; mucilage of slippery elm bark, two thirds of a pint; oil of lemon, eighty drops; well rubbed in an ounce of dry white or brown sugar, and added to the liquor; then add six ounces of acetic ether. If this brandy is desired of a very deep color, it can be rendered so by the addition of a pint of the tincture of cochineal or sanders wood, and the same of burned sugar. For full particulars on Coloring, look under that head.

NEW YORK BRANDY.

Common rectified whiskey, forty gallons; water, six gallons; tincture of the grain of paradise, three quarts; decoction of strong tea, two quarts. Color with a quart of tincture of beet root, and one pint burnt sugar, then add nitric ether, five ounces, with fifteen drops of oil of wintergreen, dissolved in the ether.

The use of fine or delicate aromatics, such as oil of wine, orris root, &c., would be lost if added to a spirit containing fusil or grain oil.

OLD PEACH BRANDY.

Common rectified whiskey, forty gallons; tincture of grains paradise, three pints; powdered catechu, four ounces; mucilage of slippery elm, two thirds of a pint; take half a pound of hulled peach kernels or bitter almonds, and beat them to a powder, and allow them to infuse in a gallon of the whiskey for nine days, and then add sulphuric ether, one ounce; acetic ether, three ounces; oil of lemon, fifty drops; dissolve in the ether, one grain of ambergris well rubbed up in sugar, and the whole well mixed and colored as for other brandies. But the new mode consists of coloring this brandy yellow, with a half ounce, or more if the color is desired of a deeper yellow, with gamboge. If the whiskey used for this purpose, should be bright or clear of coloring, the brandy will be of a fine yellow color, but if the whiskey should be colored, as it usually is, the tincture of red sanders wood and burnt sugar should be added to bring the spirit to the usual color of the common brandies, allowing the red color to predominate.

APPLE BRANDY.

Common rectified whiskey, forty gallons; tincture of strong tea, half a gallon; sulphuric acid, one and a half ounces; acetic ether, five ounces, and ninety drops oil of wintergreen dissolved in ether. Color to a light brown with burnt sugar.

CHERRY BRANDY.

Rectified whiskey, twenty gallons; tincture of grains of paradise, one gallon; powdered catechu, six ounces; water, sixteen gallons; refined sugar from forty to eighty pounds; sulphuric acid, four ounces. Oil of bitter almonds, one drachm; oil of lemon, half ounce; twenty drops oil of cinnamon—these oils are to be dissolved in four ounces of alcohol, and added. The sugar is to be dissolved in sixteen gallons of water. This is to be colored with one ounce of cochineal, to digest in a gallon of warm water for a few days, or until the coloring is completely extracted; then add two ounces of powdered alum, and then strain the infusion, and add it to the brandy. If this brandy was made with two and a half to three pounds of sugar per gallon, it will make a superior article of brandy, or if honey be substituted for sugar, in the same proportions.

BOURBON WHISKEY.

Rectified whiskey, thirty gallons; tincture of grains of paradise, one gallon; water, 9 gallons; mucilage of slippery elm bark, one half pint; acetic ether, three ounces; oil of wintergreen, fifteen drops dissolved in the ether. This whiskey has the color usual to all rectified whiskeys.

ROANOKE RYE WHISKEY.

Rectified whiskey, thirty gallons; water, nine gallons; decoction of strong tea, one gallon; grains of paradise tincture, half gallon; ten drops each of the oils of wintergreen and lemon, are to be dissolved in three ounces of alcohol, and added. The whiskey used in base of this formula will contain sufficient coloring for the entire mass.

MONONGAHELA.

Rectified whiskey, thirty gallons; grains of paradise tincture one and a half gallons; catechu, five ounces; water, nine gallons; sulphuric acid, one ounce; oil of lemon, one drachm, dissolved in four ounces of acetic ether; rub up half a grain of ambergris in an ounce of sugar, and mix the whole. This whiskey should have a slight tinge of red in it from sanders wood. Supposing the spirit to be perfectly transparent, half a pint each of tincture of red sanders and burnt sugar would answer for coloring.

TUSCALOOSA WHISKEY.

Rectified whiskey, thirty-nine gallons; tincture of grains of paradise, a half gallon; powdered catechu three ounces; fifteen drops of oil of wintergreen dissolved in four ounces of nitric ether. This whiskey should be of a very pale color.

OLD RYE WHISKEY.

Rectified whiskey, thirty-two gallons; tincture of grains of paradise, three quarts; decoction of strong tea, two quarts; water, seven quarts; make a pint of common wheat flour into a smooth paste with water, add this to the barrel; then add ten drops oil of wintergreen, dissolved in two ounces of alcohol. This whiskey should have but a slight color, partaking of a reddish derived from sanders wood.

The most convenient mode of preparing the tincture of sanders wood is to infuse the wood in a pulverised state in clear whiskey; if the tincture should appear heavy or cloudy, it will have to be filtered through sand; but if the sanders wood contains no impurities, and the spirit that is used for digesting it is bright and clean, the cloudiness alluded to will be prevented. The burnt sugar should be strained before using.

SCOTCH WHISKEY.

Rectified whiskey, thirty-nine gallons; tincture of grains of paradise, half gallon; powdered catechu, three ounces. Color with burnt sugar, and add thirty drops creasote.

IRISH WHISKEY.

Rectified whiskey, thirty-nine gallons; tincture of grains of paradise, three pints; powdered catechu, three ounces; tincture of pellitory, two ounces; creasote, thirty drops. Color with burnt sugar as for common whiskey. These two last named liquors should be put up in the same packages that the genuine was imported in.

This mode of making liquors, viz. by concealing the grain oil, is at best but a poor one; for the sale of them is dependent entirely on the ignorance and simplicity of the purchaser, yet this class of liquors are sold at the auctions, and probably are as remunerative as the more expensively prepared liquors.

Liquors prepared with the view of being sold at an auction, should possess at least three qualifications, viz. a fine transparent color, and a good body and bead; the first can be given by proper attention to the coloring materials used, for extracting the coloring matter from the substance with a fluid that is of itself perfectly transparent, and then if it should appear cloudy or muddy, it should be strained through flannel or filtered through sand. Manufacturers experience more difficulty with the brandy coloring, or burnt sugar, as it is usually found in commerce, than they do with any other coloring material. The spirit colored with it, presents to the naked eye, minute particles of impurities which give to the spirit a dull, heavy, cloudy appearance. These impurities will have to be removed by passing the coloring through the sand filterer. To obviate these difficulties, the manufacturer should prepare the coloring either from refined or fair brown sugar ; the coloring, if made from refined sugar, is usually prepared for coloring bottled liquors.

The chapter on Starch Filtration, offers an economical mode for giving both a body and bead to all kinds of liquors, and more particularly to low proof liquors. This body more than compensates for the deficiency of strength that may be apparent, but in contemplating the mild and pleasant taste of the spirit, the deficiency of strength is lost sight of.

HOLLAND GIN.

Uncolored whiskey, thirty-five gallons ; tincture of grains paradise, three quarts ; nitric ether, four ounces ; oil of juniper, one drachm. Dissolve the oil in the ether, and mix.

NEW YORK GIN.

Clear, bright whiskey, thirty gallons ; clear bright tincture of the grains of paradise, one gallon ; water, ten gallons ; oil of juniper, one drachm. Dissolve in two ounces of alcohol.

The tincture of the grains of paradise should be well strained, to insure transparency. The most common mode of treating gin, is to add about twelve ounces of sweet spirits nitre to every thirty gallons of spirit. This gives an artificial strength, but the nitre is injurious to health.

A bead can be given to these liquors when needed. See the Formula for the Beading Mixture.

DOMESTIC BRANDY.

New York Brandy.—Cleansed alcohol, thirty gallons ; water, forty gallons ; tincture of Guinea pepper, two gallons ; mix nitric ether, two ounces ; acetic ether, three ounces ; one ounce sulphuric acid. Color with red beets and burnt sugar.

COGNAC BRANDY.

Cleansed alcohol, forty gallons ; water, thirty-five gallons ; one gallon of strong tea, and one gallon of tincture of grains of paradise ; twenty pounds white or clarified sugar, dissolved in the thirty-five gallons of water before adding to the spirit ; add two quarts of prune spirit, and three ounces of acetic ether. Color with a quart of burnt sugar, and a pint of tincture of sanders wood. "This is strong brandy.

PINEAPPLE BRANDY.

Clean alcohol, thirty-five gallons; water, forty gallons; mix. Tincture of the grains of paradise, one gallon; tincture of pellitory, one pint; six common sized red beets, sliced; one and a half pints of sugar coloring; five ounces of butyric ether. If this is not convenient, add two quarts of Jamaica rum, and six ounces of acetic ether, with five drops of oil of cloves rubbed up in a couple of ounces of sugar, and mix.

PEACH BRANDY.

Clean alcohol, seventy gallons; water, fifty-five gallons; one and a half ounces of English saffron, or the same of gamboge; five gallons of honey, or sixty pounds of white or clarified sugar; this is to be dissolved in the above mentioned water before adding; add fifteen drops of creasote; balsam of Peru, half ounce; essence of lemon, a wine glass full; essence of orange peel, half ounce. The saffron or gamboge should be suspended in the spirit, which will obviate the necessity of straining the liquid.

Burnt sugar, &c., is no longer used for peach brandy, but those preferring it can color as for other brandy.

The above receipt furnishes a really fine sample of "old peach." It will have a fine body, pleasant taste, and approved flavor. This is sold for a distilled spirit, and is branded on the head to the effect that it is the product of some high sounding, though imaginary distillery.

Some manufacturers flavor this brandy with essence of almonds, and a small portion of ether; others, again, make use of ethers and water of ammonia; and others, of rum and essence of wintergreen; and, in fact, every operator has a formula of his own, and the receipt is good enough until the product is found unsalable. In America, almost every one is acquainted with peach brandy. *And the aromatics should be added in minute quantities.*

APPLE BRANDY.

Clean alcohol, twenty gallons; water, twenty gallons; strong decoction of grains of paradise, one quart; tincture of pellitory, half pint; three ounces each of sulphuric and acetic ether; one ounce each of essence of vanilla; tincture of sanders wood, one pint; burnt sugar, one pint.

The above brandy can be manufactured at as low a figure as could be desired, if the tincture of grains of paradise and tincture pellitory be substituted for alcohol.

Apple brandy belongs to that class of liquors that pays but a small percentage, and, therefore, is scarcely worth noticing; yet it is desirable that the manufacturer should possess a knowledge of it. This brandy will be greatly improved by the addition of honey or sugar, in the proportion of four gallons to forty gallons of the spirit. A cheaper article of this brandy is made of common rectified whiskey, thus: to forty gallons of whiskey, add eight ounces of acetic acid; one ounce of sulphuric acid, three sliced red beets, one pint of burnt sugar, coloring; add a pint of wheat or rice flour, slightly scorched over the fire, to the liquor, and allow it to stand for ten days. The flour can be suspended in the spirit, by being tied up in a piece of muslin and hung in the barrel.

CHERRY BRANDY.

Rectified whiskey, one hundred gallons; honey, eight gallons; clarified sugar, thirty pounds; bruised bitter almonds, one pound; cloves, one-half ounce; cassia, one ounce; bruised nutmegs, two ounces; infuse two ounces of cochineal in two gallons of warmed water for a few days, until the coloring is extracted, and add one pint of sugar coloring, and two ounces of sulphuric acid. The above is usually put up in ten gallon kegs.

CHERRY BRANDY (CHEAP).

Corn whiskey, twenty gallons; water, seventeen gallons; loaf sugar, twenty-five to fifty pounds; tincture of grains of paradise, one and a half gallons; pellitory, one pint; five ounces of ground mustard, one-half ounce of sulphuric acid; cloves, one-half ounce, bruised; cassia, one ounce; one-half pound bruised bitter almonds. Color with six red beets, sliced, and one-half pint of burnt sugar coloring. If the acid in either of the above is not clearly perceptible to the palate, it should be added until it is.

RUM.

The best is Jamaica rum. This rum is indebted to the mode of its distillation for its superiority, which consists in conducting the process of distillation very slowly.

IMITATION OF JAMAICA RUM.

Clean proof spirit, 100 gallons; sugar refined, dissolved in five gallons water, sixty pounds; pale ale, five gallons; sulphuric acid, two ounces; Jamaica rum, eight to twelve gallons; acetic ether, eight ounces; burnt sugar, one and a half pints; tincture of sanders, half a pint.

ST. CROIX RUM.

Clean spirit proof, 100 gallons; refined sugar, dissolved in five gallons water, forty pounds; catechu, five ounces; spirit of vanilla, a tumbler or glass full; acetic acid, five ounces; Jamaica rum, five gallons; color as above, or leave it transparent; add half a gallon tincture grains of paradise, and one and a half ounces sulphuric acid.

NEW ORLEANS RUM.

Clean proof spirit, one hundred gallons; refined sugar, dissolved in five gallons of water, fifty pounds; tincture grains of paradise, half a gallon; powder catechu, five ounces; sulphuric acid two ounces: Jamaica rum, five gallons; acetic acid, ten ounces; ten drops oil of cinnamon, dissolved in alcohol.

NEW ENGLAND RUM.

Whiskey, one hundred gallons; refined sugar, dissolved in four gallons of water, thirty pounds; sulphuric acid, two ounces; oil of cinnamon, ten drops, dissolved in alcohol; acetic ether, ten ounces; Jamaica rum, five gallons. Mix.

These liquors can be colored, if desired. The

New Orleans rum is usually transparent; the same proportions as for other liquors, using cochineal and burnt sugar.

RUM SHRUB.

Tartaric acid, five pounds; refined sugar, on hundred pounds; oil of lemon, four drachms; put them into an eighty gallon cask, and add water ten gallons; rumage until the sugar and acid are dissolved, then add proof rum, twenty gallons; water, thirty-five gallons; coloring, one quart fine with twelve eggs; if twelve oranges, and five ounces of bitter almonds be added, it will improve the flavor.

RUM SHRUB.

Sugar, two hundred pounds, dissolved in fifty gallons of water; add rum, thirty gallons; oranges sliced, twelve; two dozen sliced lemons; cassia bruised, half an ounce; cloves bruised, half an ounce; bitter almonds, eight ounces; tincture of the grains of paradise, and as much tartaric acid as may be necessary to give it the required acidity; let it stand for a week, and fine with twenty eggs, shells yellows, and whites.

GIN.

Holland Gin.—Clean spirit, one hundred gallons; one and a half ounces of juniper oil, dissolved in half a glass of alcohol; half an ounce angelic essence; filter twenty gallons of the clean spirit through starch, this is to give the whole mass a body.

SCHIEDAM SWAN.

Clean spirit, one hundred gallons; refined sugar, forty pounds; add, after dissolving in a few ounces of alcohol, two ounces oil of juniper; oil of coriander, half an ounce: nitric ether, four ounces; dissolve the sugar in four gallons of water, and mix the ingredients with the spirit.

ENGLISH GIN.

Clean spirit, one hundred gallons; three gallons honey, and twenty pounds sugar, dissolved in five gallons water; two ounces oil of juniper, dissolved as above, and spirit of vanilla six ounces; bruised bitter almonds, one pound; digest the almonds in two gallons of the spirit for forty-eight hours, then strain and mix.

The clean spirit contemplated in these formulas, is spirit of about the strength of common proof spirit, containing, say from forty-three to forty-nine per cent. of alcohol.

NEW YORK GIN.

Clean whiskey, one hundred gallons, oil of juniper, two ounces, dissolved in three ounces of alcohol; a few drops of turpentine are sometimes added.

ROSE GIN.

Clean whiskey, one hundred gallons; two ounces oil of juniper, dissolved in two ounces of alcohol; nitric ether, twelve ounces.

NEW YORK GIN—CHEAP.

Clean whiskey, sixty gallons; water, forty gallons; tincture grains of paradise, two gallons; tincture of mustard, half a gallon (tincture of mustard is made by digesting one pound of ground mustard in half a gallon of whiskey, for thirty-six hours); one ounce of sulphuric acid; two ounces oil of juniper, dissolved in half a pint of alcohol; nitric ether, six ounces; fine this by the addition of four ounces of powdered alum.

Gin Cordial.—Of the oil of bitter almonds, sulphuric acid, turpentine, and juniper, half a drachm each; dissolve these in alcohol, fifteen gallons clean spirit, and add one drachm coriander seed, two ounces bruised orris root, ten pounds of sugar, dissolved in four gallons of water; mix the whole.

WHISKEY.

Pure Irish and Scotch whiskey contain about fifty-two to fifty-five per cent. of alcohol, which would be equal in strength to pure French brandy.

The fancy brands of American whiskey contain from thirty to forty-eight per cent. of alcohol. A choice article of whiskey, which would not require the addition of foreign substances, should contain fifty-two per cent. of alcohol, freed of its grain oil; the aromatics necessary in the production of this whiskey, will conceal a considerable portion of grain oil.

Novices are apt to disregard all rules in adding foreign substances to liquors, acting under the impression that each substance imparts a peculiar virtue, and the mistake is not obvious until the liquid has been spoiled.

Experience has long since proven, that saccharine matter and starch will impart all the necessary and most desirable qualities to plain spirit.

SCOTCH WHISKEY.

Clean spirit, ninety-two gallons; water, thirty-five gallons; honey, dissolved in three gallons of water, six gallons; creasote, fifty drops; color slightly with burnt sugar.

SCOTCH WHISKEY—CHEAP.

Rectified whiskey, thirty gallons; creasote, ten drops; tincture grains of paradise, one quart decoction of strong tea (see directions for making), three quarts; thirty-five pounds, or less, of clarified sugar, dissolved in eight gallons of water; mix the whole, and color with a pint of tincture of sanders, and the same of burnt sugar coloring.

IRISH WHISKEY.

Cleaned alcohol, ninety-two gallons; water, thirty-five gallons; refined sugar, thirty pounds, dissolved in six gallons of water; creasote, thirty drops; water of ammonia, two ounces.

IRISH WHISKEY—CHEAP.

Rectified whiskey, thirty gallons; grains of paradise tincture, three quarts; catechu, two ounces;

creasote, ten drops; water, five gallons; mix the liquor before it is charged with any of the articles. It should be passed through a bed composed of ground oatmeal, or of ground rice, or of a mass composed of three parts of unground rice, to one part of wheat flour. This bed should be about twelve inches in depth, and for convenience can be arranged in an *empty whiskey barrel.* Full instructions for this will be found under the head of "Filtering." The spirit should pass with rapidity through the filter, and if it comes off too highly charged with starch, it should have clean spirit added until the starch becomes dissipated, or is not perceptible to the naked eye; or if the spirit should be too heavy, or cloudy, run it through the sand filter alone, until it comes out bright. The amount of flour necessary to impart the desired flavor to the spirit, is not distinguishable by the naked eye; and neither should the liquor have the slightest tinge imparted to its original color.

OLD ROANOKE WHISKEY.

Rectified whiskey, thirty-five gallons; honey, three gallons; decoction of strong tea, one quart; of bitter almonds, bruised, eight ounces (the almonds should not be rancid, as they leave an unpleasant taste on the palate); creasote, six drops; oil of wintergreen, ten drops, dissolved in an ounce of alcohol. If the above liquid is to be filtered through starch, the honey may be dispensed with. The bitter almonds give to this whiskey that peculiar nutty flavor on which its celebrity rests. The three gallons of honey are to be dissolved in two gallons of water, and added; thus making the mass into forty gallons.

OLD RYE WHISKEY.

Clean whiskey, one hundred gallons; water, twenty gallons; honey, five gallons,—mix; wintergreen, twenty-five drops, dissolved in alcohol, ten ounces; acetic ether, five ounces; one pint tincture sanders, one pint sugar coloring.

TUSCALOOSA WHISKEY.

Starch filtered rectified whiskey, one hundred gallons; pale ale, four gallons; Jamaica rum, three gallons. This should be colored very slightly, as the spirit used may contain sufficient coloring for the whole. This whiskey usually comes in half barrels, and stands deservedly high with consumers; as yet it only has a local reputation.

MONONGAHELA WHISKEY.

Starch filtered whiskey, one hundred gallons; water, twenty-five gallons; decoction of strong tea two gallons; tincture of grains of paradise, one gallon; sanders wood, one quart; burnt sugar, one quart.

MONONGAHELA WHISKEY FOR BOTTLING.

Clean spirit, five gallons; honey, one gallon; water to dissolve honey, half gallon; bruised bitter almonds, six ounces; rum, one quart; catechu, one ounce; spirit of vanilla, fifty drops; half pint tincture of cochineal; and half pint clean burnt sugar. This is a superb liquor, and of fiue color.

MONONGAHELA RYE WHISKEY.

Starch filtered whiskey proof, one hundred gallons; water, twenty gallons; decoction of strong tea, two gallons; tincture of grains of paradise, one gallon; two grains of ambergris, dissolved in hot alcohol, or well rubbed in a small portion (say two ounces) of sugar; acetic ether, eight ounces. If the whiskey originally contained no coloring, make use of burnt sugar alone, and color to suit fancy. As a general rule these whiskeys are not to be highly colored.

OLD BOURBON WHISKEY.

Starch filtered clean spirit, one hundred gallons; water, twenty-five gallons; strong tea, one gallon; tincture grains of paradise, one gallon; thirty drops wintergreen oil, dissolved in one ounce alcohol.

OLD BOURBON FOR BOTTLING.

Clean spirit, five gallons; honey, one gallon, dissolved in half gallon water; expressed juice of dried peaches, two quarts; sulphuric acid, one ounce; spirit of nutmegs, half pint; acetic ether, two ounces; oil of wintergreen, four drops, well rubbed up in sugar, and added. This is colored with half a pint of the tincture of cochineal, and the same of burnt sugar. If the sulphuric acid should be objectionable, a quart of common vinegar can be added The object of the acid in liquors, has been fully explained under the head of Acids in Liquors.

When it is desired, these liquors can be manufactured at a low figure by the filtering process, and the free use of pellitory, tea, and grains of paradise. These inferior liquors should be well colored, and in neat packages and neatly marked. For directions on barrelling liquors, look under the head of Barrelling Liquors, &c., &c.

RECTIFIED WHISKEY

Consists of from forty to forty-five per cent. of alcohol, and is known as single and double rectified whiskey; and probably the only difference between them is to be found in their names, as there is but little or none in their relative properties. It is possible that the double rectified whiskey may contain less essential oil than single rectified, by virtue of having passed through the rectifier for the third time; and this was a positive necessity, as the rectifiers were nearly exhausted; and thus it will be observed that three courses of filtration in exhausted rectifiers, are equivalent to one filtration through new rectifiers. For arranging rectifiers, and all information of interest upon this subject, see under the head of "Removal of Grain Oil."

Rectified whiskey always contains a greater or less portion of stimulus for the palate, either in the form of pepper, pellitory, or the astringent properties of tea.

COMMON RECTIFIED WHISKEY.

This whiskey is noticed under the head of low proof spirit. It contains about twenty per cent. of alcohol, and the deficient alcohol is supplied from the usual articles used for giving artificial strength to spirits.

FUSEL OR GRAIN OIL.

This oil is always present in the production of alcoholic fermentation, and is an ingredient in spirit distilled from grain and potatoes. Grain spirit contains one part in five hundred by measurement. Fusel oil is an oily, colorless liquid, of a strong, disagreeable odor, and acrid, burning taste. It is soluble in a very small proportion of water, but in all proportions in alcohol.

There has been a multiplicity of plans proposed, and numerous theoretical suggestions offered, for the removal of grain oil for manufacturing purposes. We will notice a few of them. The first consists in saponifying the oil by the aid of caustic potassa, rendering the oil of a soapy consistency, or forming the oil into flocculent particles, that would be easily separated from the spirit by straining. Unfortunately for this theory, the potassa combines with the spirit, and forms an alkaline solution.

The other plans consisted of filtration through chloride of lime, magnesia, &c.,—they have all been rejected as impracticable. The most feasible one, however, was the destruction of the oil by means of nitrate of silver; the oil, on coming in contact with the silver, subsides in the form of a black powder, and the powder to be separated by straining, and the silver to be recovered by the use of nitric acid.

Animal and vegetable charcoal are to be preferred, as presenting innumerable advantages over any other articles whose uses involve a chemical knowledge. The action of charcoal is simple, and adapted to the comprehension of all, being mechanical, when used for grain oil, as it acts by absorption. For full information see Charcoal Filterers.

The last process consists in concealing the oil, by infusing an article, the aroma of which conceals the odor of the grain oil.

Our list of aromatics, either singly or combined, furnishes some tempting inducements to those disposeed to deal in this manner.

Another process, involving but a trifling expense, consists in filtering the spirit through a body of wheat bran, from eight to twelve inches in depth. The liquid as it passes off is somewhat heavy in color; finings will remove this. To obviate this, oat meal is used to the same depth as the bran in the filter. By some rice is used in alternate layers, the better to enable the fluid to pass off rapidly. This process gives to the spirit a luscious taste, a fine bead, and is decidedly the most economical mode that is in use for the manufacture of low proof spirits.

REMOVAL OF GRAIN OIL BY FILTRATION.

Arranging the Stands or Rectifiers.—The material used for stands or filters may be adapted to all circumstances, thus: water casks, pipes, barrels, &c., will answer as well as the regular filter. The only objection to the barrels is the loss of the liquid and labor consequent upon the frequent filtrations necessary for the effectual removal of the grain oil, whereas a cistern of sufficient dimensions would obviate this difficulty.

The greater the surface presented to the action of the fluid, the greater the benefit. Usually, in all large establishments in America and Europe, the stands vary in size, say from twelve to thirty feet in height, and six to twelve feet in diameter. Again, others give the preference to filters six feet high; a series of these are arranged from the fourth or fifth story to the basement. These are packed alternately with charcoal and bone black; the two last stands being packed with charcoal alone, which removes the ammoniacal taste and fetor peculiar to spirit filtered through bone black.

In small establishments, stands twelve feet high, and six to ten feet in diameter, will answer. The most simple and economical stands are made of barrels, so arranged at their bottoms with pipes, that the liquid flows from one barrel to the other, of course acting on the charcoal in its course, regardless of their outward structures. All stands are arranged, internally, alike, viz. in having a false bottom perforated with half inch holes. This false bottom rests from about four to eight inches above the main bottom, according to the size of the stand; for example, if a common cask or barrel is used for a stand, the space between the two heads need not be more than four inches, whereas a stand thirty feet in height would require a space of eight to ten inches. The number of holes in the false bottom are generally about twelve to twenty to the square foot; and beneath this false bottom should be fitted one or more faucets, as the operator may deem fit for the convenience of drawing off the spirit. This false bottom should be securely braced from the main bottom, as the entire weight of the contents comes upon it. The first process towards packing, consists in laying a blanket over the perforated bottom, which prevents the passage of any substance whatever. On this blanket, place clean, washed, sharp, white sand, to the depth of ten to twenty-five inches, according to the size of the stand. The object of the sand is to remove any particles of coloring matter that the liquid may have acquired in its passage through the charcoal, and the liquid passes off perfectly transparent—and all that does not, should be returned until it does. A second blanket is now placed upon top of the sand ; this prevents particles of charcoal being forced, by hydraulic pressure, through the sand. The stand is now to be filled from this blanket up two thirds full, or to within fifteen or twenty inches of the top, with either bone black or charcoal, for reasons known to the reader. Bone black is objectionable, and many, from motives of economy, prefer charcoal, which can be found in all large commercial cities, prepared for the manufacturers of liquors. Almost all kinds of charcoal will answer, except that prepared from pine, which not being sufficiently carbonized, imparts to the liquid a turpentinish taste and odor. Any wood that imparts taste or color to spirit, is unsuitable to any of the purposes of the manufacturer of liquors. The common charcoal of the country, prepared from chestnut, walnut, ash, oak, beech, &c., needs no other preparation than pulverizing to small particles, one third smaller in size than a garden pea, and to separate by sifting the fine powder consequent upon pulverization, which, if allowed to remain, would render the liquor "inky." The stand or filter being filled as above, a blanket or gunny bags are spread over the whole, and a well fitting and strongly secured perforated head is placed on the charcoal. The object of the perforations in the head, is to cause the liquid to filter uniformly through the charcoal. The filtering is greatly facilitated by the use of "Digesting Barrels," and the grain oil is more effectually removed and presents all the advantages of filtration.

Digesting barrels consist of either wine, brandy, or water casks; and are filled through the bung one third full of bone black, and it is then filled with alcohol or whiskey; the bung is then tightly replaced, the barrel is rolled over several times, daily, from three to six days. It is then filtered through the charcoal, which removes the objectionable taste that was acquired in the digesting barrels. Manufacturing on the small scale, barrels will answer, but otherwise, digesting boxes are used. They are made of any convenient size, close jointed, without the use of any metallic lining, and air-tight coverings to prevent evaporation of the spirit; the inside is provided with loose jointed shelving, about ten inches apart from the bottom of the box to the covering. Bone black is deposited on these shelves to the depth of two to three inches; these boxes are filled from the top through a funnel, and so arranged that the spirit in its fall, will not displace any of the bone black from any of the shelves. These digesting apparatuses must of course be placed above the stands or filters, and so arranged that the liquid can be conducted to the stands for filtration.

The advantages of barrels over boxes are innumerable. The pecuniary advantage is an important one, as old barrels can be made available at an insignificant cost compared to the boxes. The rotary motion of the barrel brings the particles composing both bodies in contact, a matter not attainable in the boxes. It will be seen that this rotary motion is highly beneficial, as the grain oil is diffused throughout the entire mass of the spirit. The multiplicity of barrels required is the only objection to them.

To make a spirit that will show no traces of grain oil with the nitrate of silver (see preparation of the test), requires the spirit to be digested with and filtered through bone black; the digestion should continue from four days to a week, and the peculiar taste the spirit acquires from the bone black not having been sufficiently burned to have disengaged the animal matter that it contains, can be removed by a subsequent filtration through charcoal; after a few barrels of alcohol have been passed through, the disagreeable taste and odor disappear, that is, in the majority of cases. Instances may occur, when, the bone black not being burned sufficiently, to attempt the use of an article of this kind, would be to realize results not agreeable, and the best preventive in this instance, would be in testing a portion of bone black in spirit by digestion, and note the result. If it should prove unfit for use, it can be saturated in a strong solution of potash, and burned to a low red heat; and this course is to be pursued with bone black that has exhausted its absorbing powers by long use.

When filtration is to proceed rapidly in the rectifiers, the sand should have a quantity of small shells or gravel mixed throughout it, which prevents the mass from becoming too solid. Straw is sometimes used in alternate layers with the sand. Straw is liable to decomposition, and imparts a slight taste to the fluid, which renders its use objectionable. Alternate layers of gunny bags and sand are used by some operators.

When spirit is rectified for neutral spirit, it should not be taken from the rectifiers until the nitrate of silver test has shown the entire absence of fusel oil. Some manufacturers add one gallon of Jamaica rum to every hundred gallons of neutral spirit; the effect of the rum is to conceal any traces of the grain oil that might be perceptible to the nasal organ.

When spirit is rectified for the manufacture of common liquors, viz. domestic brandies, gin, and fancy brands of whiskey, &c., the object sought is to remove the oil, as far as practicable, by a single filtration, and to conceal the remaining portion by the addition of aromatics, and the nitrate of silver test would be useless with these liquids, as the sense of taste will answer every purpose.

The stands or rectifiers should never be used for decolorizing or discharging color from fluids, as the rectifier will soon become charged to such an extent, that any liquid filtering through it will become contaminated in color. Separate cisterns should be arranged for the purpose. See Clarifying and Filtering.

When spirit is rectified or freed of grain oil, for the manufacture of domestic brands of rum or whiskey, it should pass through a bed of oatmeal; this should be placed on the bottom of the last stand or filter that the spirit has to pass through. The usual depth of this bed is twelve to sixteen inches.

But when clear and transparent liquors are required, the spirit should be filtered through the same depth of equal parts of rice and rice flour. The use of the whole grains of rice is to prevent the flour from lying in a too compact and solid body, which would impede the free filtration of the fluid.

V.

DIRECTIONS FOR PREPARING

THE MOST CHOICE LIQUORS

IN QUANTITIES OF FIVE GALLONS.

FOR bars, hotels, wine-cellars, and private use, the following directions will insure a saving of from forty to two hundred and fifty per cent. per gallon; and the most critical examination will scarcely detect the imitation from the genuine, a chemical test alone being able to indicate the difference of the one from the other.

The consumer finds one strong inducement, aside from the economical production of this liquor, for its use, viz. he is familiar with its composition, which is not the case in relation to foreign liquors. Aside from the manufacturer, who can say whether the ends used to obtain that spirit were prejudicial to health or not? It must be presumed that the incentive to exertion, on the part of the manufacturer, is founded on interest, and it would be but a reasonable conclusion that he will make use of articles in manufacturing liquors that are the most economical. His liquors are made for exportation, and thus he will never witness the thrusts and cuts that he gave in the dark : for the reader must not suppose that foreign liquors are always prepared from distillation. On the contrary, owing to the high character that they have attained, it has given the foreign manufacturer an extensive field for imitating and adulterating, and he does this with a confidence of favorable commercial results.

Persons desirous of preparing liquors from the following formulas should be provided with any convenient quantity of neutral spirit containing about fifty to fifty-five per cent. of alcohol.

Neutral spirit is alcohol freed from the essential or grain oil by distillation or filtration through charcoal. This process is fully explained in another chapter of the work.

Some attention should be paid to the selection of the neutral spirit, to obtain it perfectly limpid, inodorous, and free of all tastes, except those peculiar to alcohol, viz. a biting, pungent taste, that soon becomes dissipated after swallowing the liquor. If, on the contrary, the spirit, after being drunk, should leave a slight stinging, burning, or sense of roughness, either in the throat or mouth, it should be rejected as unsuited for the purposes of the following recipes.

Pure neutral spirit should evaporate from the hand without leaving any odor.

Neutral spirit usually comes in forty gallon barrels, and usually contains about fifteen to twenty per cent. more of alcohol than proof whiskey does, or say about sixty to sixty-five per cent. of alcohol. This spirit is perfectly clear and transparent, of a peculiar alcoholic taste, and sometimes it has a slight aromatic odor, recalling that of acetic ether or rum. The addition of aromatics is made to conceal the slight odor of grain oil that may exist; but the better to prevent deception, the nitrate of silver should be used to indicate the presence of grain oil,—for a really fine imitation of foreign liquors cannot be made with a spirit containing grain oil.

The use of nitrate of silver, for testing, is fully explained under the head of "Tests for the Purity of French Brandy."

Any acrimonious substances that the spirit might contain will be indicated by evaporating a quantity of the spirit to dryness, and the extract will indicate *to the taste the pepper, pellitory, &c.* The liquors under consideration, owing to their fine aroma and beautiful transparent color, are admirably adapted to the purpose of bottling; and, if intended for commerce, the manner in which they are put up should be characterized by neatness. The colors necessary for the following liquors are red, brown, and yellow.

The red is prepared from infusing cochineal, one ounce, in one and a half gallons of water, with three drachms of potash. The water should be allowed to boil for fifteen or twenty minutes, and then be kept near the fire for two hours; and then strain through muslin. The brown color is made from white, or clean brown sugar. (See Coloring.) The yellow is made from English saffron, thus: Take two ounces of saffron chopped fine, one quart of proof spirit, and digest for twenty-four hours, and strain.

The colors enumerated above are the finest in use.

BRANDIES.

Cognac Brandy.—Neutral spirit, four gallons; half a gallon of honey dissolved in water, two pints; Jamaica rum, one gallon; catechu, half an ounce; butyric ether, one ounce. Mix.

COGNAC BRANDY (*2nd*).

Neutral spirit, four gallons; five pounds of refined sugar dissolved in water, four pints; decoction of tea, two pints ; infusion of bitter almonds, one pint ; oil of wine, one ounce. Color either of the above with five ounces of the tincture of cochineal, and nine ounces of sugar coloring.

SARZERAC BRANDY OF THE VINTAGE OF 1795, 1798, 1805 1837.

Neutral spirit, four gallons ; three pints of water to dissolve honey, four pints ; rum, three quarts ; porter, three pints ; infusion of almonds, half a pint ; oil of wine, one ounce ; sugar coloring, four ounces ; cochineal tincture, one ounce ; then add of the alcoholic solution of starch, three pints ; and mix. This starch solution is made by infusing one quart of wheat or rice flour in one and a half gallons of equal parts of clean spirit and water for twenty-four hours.

OTARD BRANDY.

Neutral spirit, four gallons ; four pounds of refined sugar dissolved in water, two pints ; powdered catechu, one ounce ; sulphuric acid, half an ounce ; butyric ether, one ounce ; twenty drops of oil of orange dissolved in the ether ; four ounces of sugar coloring. Mix.

MARETT COGNAC BRANDY.

Neutral spirit, four gallons; Jamaica rum, four pints; three pints of water to dissolve honey, three pints of the decoction of tea, one quart of alcoholic solution of starch, four pints; oil of wine, half an ounce; acetic ether, one ounce; burnt sugar, five ounces.

POULTNEY BRANDY.

Neutral spirit, four gallons; three pints of water to dissolve honey, three pints; infusion of bitter almonds, half a pint; oil of pears, one ounce; oil of wine, one ounce. Color with eight ounces of burnt sugar, and one ounce of cochineal; then add starch solution, five pints.

SEIGNETTE BRANDY.

Neutral spirit, four gallons; refined sugar, four pounds, dissolved in three pints of water; sulphuric acid, half an ounce; catechu, one ounce; alcoholic solution of starch, four pints; oil of wine, one ounce. Color with four ounces of burnt sugar.

If raisin spirit be substituted for rum, in these recipes, the imitation will be perfect.

The infusion of bitter almonds, alluded to, is formed by digesting ten ounces of bitter almonds well mashed, bruised, or ground, with five ounces of sweet almonds, for thirty-six hours, in one gallon of the spirit.

The decoction of tea is formed by boiling two ounces of green tea in one gallon of water for one hour. The brandy containing either tea or catechu should not leave any sense of roughness on the palate when drunk.

The alcoholic solution of starch is made by digesting one quart of rice flour, in one and a half gallons of a liquid composed of equal measures of spirit and water. The most convenient vessel for this purpose will be a jug or demijohn. The mixture should be frequently shaken, and after digesting for twenty-four hours decant the clear liquid for use. This gives to the spirit a fine dry taste, and the appearance of age. The flour should be made to a paste before adding it to the spirit.

Wheat flour, when used, often leaves the bran in the form of brown specks through and on the surface of the liquor. This will be remedied by straining.

By some the use of rice flour is preferred, as its use is unattended by any of the above objections.

CHERRY BRANDY.

Neutral spirits, four gallons; refined sugar, five pounds; water, to dissolve, one gallon; catechu, one ounce; infusion of bitter almonds, half a pint; cloves, cassia, of each half an ounce; these are to be well bruised before adding; tartaric acid, four ounces, dissolved in a pint of water; honey, one quart, dissolved in a pint of water; four drops oil of wintergreen, dissolved in one ounce of acetic ether, then color with one pint of the tincture of cochineal; burnt sugar, one ounce.

PEACH BRANDY.

Neutral spirits, four gallons; three pints of honey, dissolved in two pints of water; mix infusion of bitter almonds, one pint; sulphuric acid, eighty drops; porter, one pint; tincture of saffron, half a pint; and flavor with oil of pears, one ounce, dissolved in two ounces of alcohol, and acetic ether, half an ounce.

OLD APPLE BRANDY.

Neutral spirit, four gallons; decoction of tea, one pint; alcoholic solution of starch, three quarts; sulphuric acid, half an ounce; this is flavored with the oil of apples, one ounce, dissolved in alcohol, two ounces; color with four ounces sugar coloring; valerinate of amylic oxide is the chemical name for apple oil.

WHISKEY.

Irish Whiskey.—Neutral spirits, four gallons; refined sugar, three pounds, in water, four quarts; creasote, four drops; color with four ounces burnt sugar.

SCOTCH WHISKEY.

Neutral spirits, four gallons; alcoholic solution of starch, one gallon; creasote, five drops; cochineal tincture, four wine glasses full; burnt sugar coloring, quarter of a pint.

ORONOKO RYE WHISKEY.

Neutral spirit, four gallons; refined sugar, three and a half pounds; water, to dissolve, three pints; decoction of tea, one pint; burnt sugar, four ounces; oil of pear, half an ounce; dissolved in ounce of alcohol.

TUSCALOOSA WHISKEY.

Neutral spirits, four pints; honey, three pints, dissolved in water, four pints; solution of starch, five pints; oil of wintergreen, four drops, dissolved in half an ounce of acetic ether: color with four ounces of burnt sugar.

OLD BOURBON WHISKEY.

Neutral spirit, four gallons; refined sugar, three pounds, dissolved in water, three quarts; decoction of tea, one pint; three drops of oil of wintergreen, dissolved in one ounce of alcohol; color with tincture of cochineal, two ounces; burnt sugar, three ounces.

MONONGAHELA WHISKEY.

Neutral spirit, four gallons; honey, three pints, dissolved in water, one gallon; alcoholic solution of starch, one gallon; rum, half a gallon; nitric ether, half an ounce; this is to be colored to suit fancy.

Some consumers prefer this whiskey transparent, while others like it just perceptibly tinged with brown; while others, again, want it rather deep, and partaking of red. The novice will find sufficient examples in "Coloring" to guide his fancy.

OLD RYE WHISKEY.

Neutral spirit, four gallons; alcoholic solution of starch, one gallon; decoction of tea, one pint; infusion of almonds, one pint; color with one ounce of the tincture of cochineal, and of burnt sugar, four ounces; flavor with oil of wintergreen, three drops, dissolved in one ounce of alcohol. By some, rye whiskey is colored only of a slight brownish tinge, with burnt sugar alone.

JAMAICA RUM.

Neutral spirit, four gallons; Jamaica rum, one gallon; sulphuric acid, half an ounce; acetic ether. four ounces; burnt sugar coloring, eight ounces.

PINEAPPLE RUM.

Neutral spirit, four gallons; honey, five pints; water, to dissolve, three quarts; Jamaica rum, one gallon; sulphuric acid, one ounce; butyric ether, two ounces; tincture of cochineal, three ounces; burnt sugar, two ounces.

GIN.

Aromatic Schiedam Schnapps.—Neutral spirit, four gallons; water, four pints, to dissolve honey, four pints; oil of juniper, fifteen drops, dissolved in nitric ether, one ounce.

HOLLAND GIN.

Neutral spirit, four gallons; three pounds of sugar, dissolved in water, two pints; Strasburg turpentine, four drops; oil of juniper, twelve drops; dissolve them both in alcohol, and add one half ounce of spirit of orris root.

The preceding formulas will furnish as pure liquors as those obtained by distillation, and of the proper and natural strength. It will be seen that at the prices these liquors are made, any one desirous of it, can keep a choice selection of staple liquors at comparatively low costs. The neutral spirit is the most valuable constituent. Those who are desirous of manufacturing on a small scale, will find that from a barrel of neutral spirit, a choice lot of liquors can be made.

If any of the preceding liquors should appear to have too great a strength to the palate, they should be lowered by the addition of water.

As no establishment, where liquors are necessary, would be complete without a few choice cordials, a few receipts are offered.

ANISETTE DE BORDEAUX.

Whiskey, two gallons ; five pounds refined sugar ; water, to dissolve, a gallon and a half ; one drachm oil of aniseed, dissolved in one ounce of alcohol, or well rubbed up in dry sugar, and added ; if this is for white anisette, fine with half an ounce of powdered alum ; if it is for rose or pink anisette, color to suit taste.

Common rectified whiskey will answer in the above formula, or in any other in which a powerful aromatic is found necessary.

CURACOA.

Common whiskey, five gallons ; fresh orange peel, four pounds ; oil of bitter almonds, one drachm ; oil of cassia, one drachm ; oil of lemon, two drachms ; oil of cinnamon, fifty drops ; water, five quarts, to dissolve refined sugar, sixteen pounds ; tincture of cochineal, half a pint ; burnt sugar, three ounces ; allow the above to digest for five days ; the whole of the oils should be dissolved in half a glass of alcohol, and mix well.

MARASCHINO.

Proof whiskey, three gallons ; six quarts of water, to dissolve; sugar, twelve pounds; oil of bergamot, and oil of cloves, of each one drachm; oil of cinnamon, five drops; two ounces nutmegs, bruised; one pound of orange peels; three ounces of bitter almonds, bruised; oil of lemon, one drachm; dissolve the oil in alcohol; color with cochineal and burnt sugar.

VI.

ON THE MANUFACTURE

OF

LOW PROOF SPIRIT.

FOR MAKING WHISKEY, BRANDY, GIN, RUM, CHERRY BOUNCE, PEACH BRANDY, AND ALL KINDS OF LIQUORS, AT TWELVE TO TWENTY CENTS PER GALLON, ASSUMING RAW WHISKEY AT TWENTY CENTS PER GALLON.

THESE liquors, when tested in the usual manner, will present a fine color, a good bead, and an excellent body. The first step in this process is to provide one or more filters. These are to be used in giving a body and bead to the spirit. A whiskey barrel will answer. It should be provided with a perforated false bottom, firmly secured about twelve inches above the bottom of the barrel, and it should be packed in the same manner as the stands or filters (for which, see under its appropriate head).

The first layer should be of sand three inches in depth, and the second composed of rice flour and oatmeal in equal proportions, with a small portion of rice mixed throughout the mass to allow a free passage to the liquid, which should be filtered with rapidity. Some operators use rice flour, with one third of wheat flour, and pack the barrel alternately with this mixture and straw. The straw prevents the agglutination of the mass. In no instance should the mass exceed twelve inches in depth. The barrel should be so adjusted with a faucet fixed in the bottom that barrels could be filled; that is, the liquid should pass from the discharging barrel through the filtering barrel to a barrel ready for its reception at the faucet of the filtering barrel. Spirit filtered in this manner may appear at times heavy in color. This will be removed by allowing it to rest for a few days; if it is required for immediate use, apply finings. The operator will recollect to renew the charges of meal or flour when they should become exhausted, or the sand when it becomes too highly charged with foreign matter, by washing it in clean water. Burnt sugar and tincture of red sanders are the only colors necessary. For their preparation, the reader is referred to the chapter on coloring. The pellitory and Guinea pepper will furnish the artificial strength necessary. For their properties and preparations, see chapter on "Pellitory and Pepper."

PREPARATION OF LOW PROOF LIQUORS.

RECTIFIED WHISKEY.

Take of raw whiskey, twenty gallons; water, twenty gallons; tincture of Guinea pepper, one and a half gallons; tincture of pellitory, one pint; strong decoction of Samqua tea, three quarts; put on a bead of oil and acid (see Beading Mixture); and add one and a half pints of sugar coloring, and a tumbler or glass full of tincture of red sanders, which gives a slight reddish tinge to the fluid, which makes it very desirable, and causes it to sample well; and is a great improvement on the old style of coloring. This spirit is sometimes prepared without the filtering process, though if the mixture had been filtered, it would have greatly improved its general qualities.

All liquors made according to this plan should be filtered before the stimulants, coloring, &c., are added.

NEW YORK BRANDY.

Filtered whiskey, twenty gallons; clear water, seventeen gallons; tincture of Guinea pepper, one and a half gallons; tincture of pellitory, one pint; strong decoction of tea, one gallon; if required, add a bead. Color with burnt sugar and sanders, viz. a quart of good bodied sugar coloring, and one pint of tincture of red sanders; and add four ounces of nitric ether, and half a gallon of tincture of prunes. (See directions for making this tincture under the head of Ethers.)

COGNAC BRANDY.

Filtered whiskey, twenty-five gallons; clear water, fourteen gallons; tincture of pepper, one gallon; decoction of strong tea, one and a half gallons; add six drops of oil of orange dissolved in a wine glass full of alcohol; acetic ether, one pound. Color with burnt sugar, and sanders to suit taste.

NEW YORK GIN.

Perfectly clear filtered whiskey, twenty-five gallons; clear water, ten gallons; clear tincture of grains of paradise of double strength, one gallon; one drachm of oil of juniper dissolved in a gill of alcohol. Sometimes a small portion of turpentine is added; that is, when the grain oil is perceptible to the smell. If finings should be necessary, use alum. (For full directions, look under the head of Finings.)

PINEAPPLE BRANDY,

Same as New York Brandy.—Manufacturers in all large cities have different brands for the same article. These local names will not be noticed only where the recipe presents some feature in its composition that would be available.

PEACH BRANDY.

Filtered whiskey, twenty-five gallons; water, ten gallons; grains of paradise, one gallon; tea, one gallon; color with burnt sugar, one quart; add acetic ether, twelve ounces; one wine-glassful of water of ammonia.

CHERRY BOUNCE.

Clarified sugar, twenty-five pounds; whiskey, twenty gallons; water, thirty gallons. The sugar to be dissolved in the water. Of the oil of cloves, oil of cassia, and oil of almonds, dissolve one hundred drops of each in a wine glass of alcohol; color a deep, beautiful red with the tincture of red sanders. To the above add two gallons of tincture of grains of paradise.

RUM.

This is prepared from neutral spirit. The spirit is let down to any proof with water, and an artificial strength given with grains of paradise, and five to ten gallons of Jamaica rum added to every forty gallons; and when desired, colored with burnt sugar.

IMITATIONS OF FRENCH BRANDIES, AS PRACTISED IN FRANCE.

COGNAC BRANDY.

Clean spirit, containing fifty per cent. of alcohol, one hundred gallons; seven gallons of honey dissolved in three gallons of water, having first bruised one and a half ounces of cochineal, and allowed it to macerate in the water for a few days. If the honey is slow in dissolution, assist it by heat; then add first, working it to a thin paste, eight ounces of catechu; then add five gallons of rum (Jamaica is preferable); twelve ounces of acetic ether; then add good, clean, burnt sugar, and bring the color to suit fancy, or the particular market intended for.

It is a fact, though not generally known outside of the trade, that the "unsophisticated barbarians" prefer all high or strongly colored spirits, under the impression that the coloring indicates its true strength. Thus, coffee-colored brandy to them is the highest proof brandy that is distilled; whereas, a pale light-colored brandy is supposed to have a mean origin, or rather it is indebted to a barrel of whiskey for its existence; and, on the other hand, persons of intelligence reject high colored liquors, as the excess of coloring favors the notion that the spirit is an *imitation*. And thus between the two extremes of ignorance, the operator will be guided by a sense of common discretion. Under the present improved mode of manufacturing spirits, burnt sugar alone is unsuited for brandy. As all good imitations are not of a brown color, rather of a purplish brown, made by the addition of red; for this, use cochineal for the finest, and tincture of sanders wood for the common (see directions for preparing this tincture); for the third, use red beets. The two last are used in domestic brandies.

OTARD BRANDY.

Clean spirit, one hundred gallons; honey, six gallons, dissolved in two of water; catechu, five ounces; Jamaica rum, seven gallons; acetic ether, five ounces; half a glass of spirit of orange peel (see directions for making these spirituous essences); and four ounces of spirits of orris root. Color this pale by the addition of one and a half pints of sugar coloring, and half a pint of tincture of cochineal. See directions for preparing all of the tinctures for coloring and flavoring that are mentioned in these Formulas in another part of this work.

SARZERAC BRANDY.

Clean spirit, one hundred gallons ; honey, nine gallons, dissolved in four of water ; catechu, four ounces ; decoction of strong tea, three gallons (this is made by boiling three gallons of water with three pounds of Samqua tea, for two hours) ; raisin spirit, five gallons ; sulphuric acid, one and a half ounces. Color this any desired shade with cochineal and burnt sugar. Sarzerac, Marett. and Poultney brandies contain about fifty-two to fifty-five per cent. of alcohol ; and a spirit containing this per centage of alcohol should be used in their manufacture.

MARETT COGNAC.

Clean spirit of fifty-five per cent., one hundred gallons ; add five gallons of honey, dissolved in two gallons of water ; catechu, eight ounces ; one grain of ambergris dissolved in an ounce of warm alcohol ; two gallons of the infusion of bitter almonds. This infusion is made by digesting two pounds of bruised bitter almonds in two gallons of the spirit for a week. Rum, four gallons ; raisin spirit, five gallons. Color to suit fancy.

POULTNEY BRANDY.

Clean spirit of fifty-five per cent. of alcohol, one hundred gallons ; honey, nine gallons, dissolved in three of water ; infusion of bitter almonds, two gallons ; two grains of ambergris dissolved in alcohol ; sulphuric acid, half an ounce ; catechu, nine ounces ; rum, five gallons ; acetic ether, six ounces ; raisin spirit, four gallons. Color same as the last.

SEIGNETTE BRANDY.

Clean spirit of fifty per cent., one hundred gallons ; add sugar, forty pounds, dissolved in three gallons of water ; three gallons of honey, dissolved in two of water ; six ounces of catechu, one-half ounce of sulphuric acid, two gallons of the spirit of prunes (see directions for making this spirit), nine ounces of acetic ether ; of the infusion of sweet almonds, two gallons ; this is made in the same manner ; infusion of bitter almonds. Color with cochineal and burnt sugar.

The rum, acetic ether, raisin spirit, and prune spirit, that are prescribed in the preceding formulas, are added for the vinous flavor that they yield, being a good imitation of the heavy oil of wine, for which pure brandy is indebted for its flavor or aroma. The acid gives a vinous taste, the almonds give a nutty flavor, the sugar or honey gives a fine body and luscious taste, the ambergris, in combination, gives an odor that is much *admired by good judges of brandy.*

The cheapest modes, however, of making these brandies, and to save a large portion of sugar or honey, is to pass the clean spirit through a bed of starch, &c. See Directions. Liquors containing starch, need but a small portion of sugar.

The operator has an extensive range of aromatics to select from as substitutes for oil of wine. Among the most prominent, may be found butyric ether, which possesses a strong odor of pineapples, prune spirit, raisin spirit, acetic ether, rum, a combination of orange, orris, and ambergris perfumes, nitric and chloric ethers, and an extensive assortment of perfumes.

AROMATIC SCHIEDAM SCHNAPPS.

This is one variety of gin that is obtained by the distillation of juniper berries with spirit free from grain oil. The imitation of this article, is prepared as follows—in quantities of five gallons:

No. 1.—Take of neutral spirit, five gallons; honey, four pints; orange flower water, two pints; English oil of juniper, thirty drops. Dissolve the honey in the orange flower water, and the oil in two ounces of hot alcohol, then add, and shake up well; then add, finely powdered, four drachms each of alum and dried potash, for finings. Allow it to stand for twenty-four hours, and then bottle.

No. 2.—Neutral spirit, five gallons; orange flower water, one pint; English oil of juniper, forty drops; honey, five pints; nitric ether, one ounce; Dissolve the honey in three pints of clear water, and the oil of juniper in the nitric ether, and mix the whole well together, and if it is not perfectly transparent, fine with alum and potash, as above. If the honey is warmed and strained, the finings can be dispensed with, which would be desirable.

No. 3.—Neutral spirit, five gallons; honey, three pints; water, two pints; orange flower water, one pint; oil of juniper, thirty-five drops; acetic acid, two ounces. Dissolve the honey in the water, and the oil in six ounces of alcohol; add the acid first and then the orange flower water, and agitate well, then add the honey and oil of juniper.

The neutral spirit contemplated in these receipts, should be entirely free of all impurities, such as grain oil or any acrimonious substances, or when it is drunk, there should be no roughness, acridness, or bitter ness, left in the throat or about the roots of the tongue; the spirit should be perfectly limpid—clear—transparent; and the honey should be as near transparent as possible, rendered so by warming and straining. The warming renders the honey so perfectly fluid, that it can be strained through fine muslin.

The objection to the use of the potash and alum, as fining, are that the potash is liable to attach to oil of juniper and saponify it, and also it leaves, in some instances, where the spirit is low proof, a somewhat disagreeable taste. This must be obvious, as the alum and potash combine with the water in the spirit.

No. 4.—Neutral spirit, five gallons; refined sugar, four pounds; water, two pints; spirit of nutmegs, two pints; rose water, one pint; English oil of juniper, forty drops. Dissolve the sugar in the water, and add the two pints of spirit of nutmegs; this spirit is formed by digesting four ounces of bruised nutmegs in two pints of clear spirit for four days, and straining.—Dissolve the juniper oil in two ounces of alcohol, then mix by agitation.

The spirit used for making this gin, should contain about fifty to fifty-two per cent. of alcohol.

No. 5.—Neutral spirit, five gallons; honey, four pints; water, three pints; orange flower water, one pint; rose water, one-half pint; oil of juniper, fifty drops; alcohol, two ounces. Dissolve the honey in the water, and the oil of juniper in the alcohol, and then mix the whole well together.

When this gin is prepared on an extensive scale, the starch filtration, for giving a body to the spirit, can be resorted to, which will economize an immense quantity of honey or sugar.

FOR THE CONVERSION OF COMMON GIN INTO SCHIEDAM SCHNAPPS.

1. Common gin, five gallons; strained honey, four pints; sulphuric acid, two drachms; spirit of nutmegs, one pint; spirit of nitric ether, one ounce; clear water, three pints. Mix the honey and water, and add to the gin the sulphuric acid.—The spirit of nutmegs is formed by digesting three ounces of bruised nutmegs in a pint of the gin for five days, then strain and add with the ether.

2. Common gin, thirty gallons; strained honey, four and a half gallons; clear water, two gallons; sulphuric acid, one ounce; sweet spirits of nitre, eight ounces; spirit of nitric ether, three ounces; acetic ether, two ounces; oil of wintergreen, ten drops,

dissolved in the acetic ether. Dissolve the honey in the water, and then add all of the articles to the spirit. If this should appear somewhat cloudy or heavy in color, fine with two ounces each of alum and potash, dried by the heat of the fire sufficiently to admit of being finely powdered.

The above is really a fine gin, and cheaply made, of a fine body and luscious taste. The gin used should be free from all disagreeable tastes.

VII.

A DESCRIPTION

OF

BEADS FOR LIQUORS.

FOR GIVING A BEAD TO POOR AND LOW PROOF SPIRIT.

A bead is composed of one or more small white globules, found floating on the surface of any liquid that has been subject to agitation, and is supposed to denote the strength of liquors; for instance, if a portion of spirit be subjected to a brisk agitation for a moment in a tumbler, or proof glass, and the bubbles continue on the surface for a few minutes, it is called proof spirit; but if, on a discontinuance of the agitation, the bubbles disappear, the spirit is said to be below proof.

A bead can be given to spirits from three sources; first, from alcohol, which may be known from the globules being of the size of a duck shot; the second source is from filtering the liquid through any substances that may contain mucilage, or starch. This bead may be known from its magnitude, being twice and thrice that of the alcoholic bead, and also their great tenacity, by continuing for some time after the agitation has ceased ; and when the exciting substance, viz. mucilage or starch, is added to excess, the surface of the spirit will be covered with these globules.

The distinguishing feature of this bead is the great magnitude of its globules, which greatly exceed any others.

The bead derived from the third source is a chemical compound, resulting from the combination of sweet oil and oil of vitriol ; say by mixing drop by drop, twenty drops sulphuric acid, with thirty drops sweet oil ; this quantity is used to give a bead to ten gallons of spirit. This quantity, in some instances, may not suffice, as the spirit may contain some incompatibles ; in this case the mixture may be added until the proper bead can be seen by agitation. This bead may be distinguished by the globules bearing a strong resemblance to the frothy productions of soap : they are small, frothy, and white, lying compact, or closely knit together, on the surface of the liquid.

The above beading mixture should only be prepared when required, as it does not improve by age. To prevent a failure in the above preparation, owing to adulterated sweet oil being used, which has become so plentiful in market, any oil that will stand the following test, will answer: mix equal portions of nitric acid and sweet oil; if the margins of this mixture should become a yellowish or yellowish green color, the oil is pure.

Alum, alkalies, and acids, in solution, are all incompatible with the beading mixture.

GUINEA PEPPER, PELLITORY, &C.,

Are used in the manufacture of the cheaper kinds of liquors, wines, cordials, and vinegar; the object of their use is to supplant the place of alcohol, to produce the stimulating, burning, and biting effects of the alcohol on the palate. For example, a given quantity of water may be charged with a proportional quantity of the tincture and solution of pepper, pellitory, sulphuric acid, a very small quantity of alcohol, wheat flour, or mucilage of slippery elm and burnt sugar, and sanders wood coloring, and you will have an article of spirit that will compare favorably with any of the domestic liquors of the day, at a cost truly astonishing. The articles above enumerated cost comparatively nothing. The pepper is preferable to spirits of nitre for producing a false strength for liquors, as it is not destructive to health; and pecuniarily, it is more economical. Liquor, adulterated as above mentioned, after having been swallowed, leaves a dull, heavy, slightly stinging, acrid sensation in the throat and palate, which continues for a few moments. This sensation is rarely, if ever, noticed, as it is regarded as one of the peculiarities of all alcoholic drinks; and as an evidence of this, thousands of gallons of the above article are consumed annually, under the name of domestic brandy, &c. And, while on this subject, I would remark, that any liquor should be rejected that leaves the slightest tingling sensation in the throat.

Description and Preparation of Pepper, known under the Names of Grains of Paradise.—Guinea pepper, and Melegueta pepper, are kept in the shops; small seeds, of a round or ovate form, often angular, minutely rough, brown externally, white within, of a feebly aromatic odor when rubbed between the fingers, and of a strong, hot, and peppery taste. They are brought from Guinea; their effects on the system are analogous to those of pepper.

Guinea pepper is prepared for use by grinding, or pulverizing to a powder, one to one and a half pounds of the powder to a gallon of proof spirit, and used for giving false strength to liquor, in the proportion of from one to two quarts, to forty gallons; this tincture should be well strained, to prevent muddiness in the barrel, after the pepper has been added.

Description and Preparation of Pellitory.—Pellitory, the dried root, is about the size of the little finger, cylindrical, straight, or but slightly curved, wrinkled longitudinally, of an ash brown color externally, whitish within, hard and brittle, and sometimes furnished with a few radicles, and destitute of odor, though when fresh, of a disagreeable smell; its taste is peculiar, slight at first, but afterwards acidulous, saline, and acrid, attended with a burning and tingling sensation over the whole mouth and throat, which continues for some time, and excites a copious flow of saliva; of the two substances just mentioned, viz. pepper and pellitory, preference must be given to the pepper in all instances, although they could be used to a decided advantage in combination for the coarser liquors, as common whiskey and brandy; the pellitory is too powerful, and not at all adapted to the nature of fine or light liquors, as the acrimony would partially destroy the flavor of the liquors.

The burning sensation produced by pepper and alcohol is nearly identical; and it must be obvious that the former will answer all the purposes of the latter, with the exception of not furnishing the intoxicating quality, which must be added in the form of alcohol.

In the manufacture of all the cheap light wines, cordials, &c., where alcohol would be an important consideration, pecuniarily, Guinea pepper will answer admirably. Although, I would not recommend this, or any other foreign substances, for producing a false strength in liquors, where it was intended for a pure article; the alcohol, if added in a sufficient volume, will answer all purposes. The manufacturer should not lose sight of the fact, that the powerfully biting and burning sensation that is found in some liquors, is not the slightest evidence of its purity. Mildness of taste is one of the characteristics of a good liquor, and the successful operator should copy nature as closely as possible.

FOR INCREASING THE VOLUME OF WHISKEY, &C., FROM TWENTY TO FORTY PER CENT., WITHOUT LOSS OF STRENGTH.

This whiskey will not stand the test of the hydrometer.

For increasing liquor as above, take from the barrel the per centage of liquor desired, and add a corresponding per centage of clean clear water, charged with a tincture of Guinea pepper (see Formula), and then put on a good bead (see Formula for Bead Bearing). The quantity of pepper can be varied in the above formula, and if the operator desires that the spirit in question should have greater strength (to the taste) than it had previous to the adulteration, it can be obtained by increasing the quantity of pepper, and by the addition of three to four ounces pellitory, well washed, or bruised, to the gallon tincture of pepper.

As the pepper is liable to vary in strength, from age, and unripe seed, and a variety of unexplained causes, the operator will have to depend more upon the judgment of his palate, as to the quantity necessary for any given amount of spirit, and also as to the quantity forming the tincture. For particulars, see Formulas.

CLARIFYING WINES AND LIQUORS; WITH A DESCRIPTION AND PARTIAL ANALYSIS OF THE PROPERTIES AND ACTION OF THE ARTICLES USED.

The object of clarification is transparency. This all-important branch of this business is effected in various ways; first, by filtration through charcoal, sand, &c.; secondly, by the use of finings, such as eggs, isinglass, wheat flour, milk, alum, &c.; thirdly by straining, which separates the solids from the fluids.

Clarification by filtration is explained in the chapters on animal and vegetable charcoals, and the preparation and arrangement of filters.

Finings effect clarification of liquors, by involving during coagulation, the particles that are floating in the liquid, and rising with them to the surface or subsiding.

Eggs possess this quality to the greatest extent, caused by the particles of albumen becoming more minutely divided. Eggs when used should be whisked to a froth, and used in the proportion of two to six per barrel of forty gallons. When the shell is used it should be finely powdered. Eggs are sometimes solidified by heat, by manufacturers, for future use.

Egg powder.—Take any number of eggs, and beat them to a froth, and dry them by a gentle heat or in the sun; they are then powdered, and one eighth of wheat flour is added, and made to a paste with water and dried in the form of cakes or balls. Egg powder is used in the same manner and for all the purposes of eggs.

Isinglass is a gelatinous substance, prepared from the sounds or swimming bladders of fishes. There are different varieties of isinglass; the best is book isinglass. One hundred grains of this article dissolve in ten ounces of water, forming a tremulous jelly when cold. That in cakes is brownish, and of an unpleasant odor, and is employed from its low price in the clarification of inferior liquors. The purest isinglass is whitish, semi-transparent, of a shining, pearly appearance, and destitute of smell or taste. The inferior kinds of isinglass are yellowish and opaque.

Isinglass is soluble in boiling water, acids, and alkalies, and is insoluble in alcohol: its watery solution putrifies. The proportions for its use are one to six ounces per one hundred gallons; it is beaten to shreds and dissolved in a pint of boiling water; when this is cold, it becomes a stiff jelly. Whisk this jelly to a froth in a sufficient quantity of the fluid intended for fining; then add it to the mass and stir the whole well for a few moments, and then bung; in twenty-four to sixty hours the particles will have subsided.

Milk, when used for fining, should be boiled a few minutes, and added while hot to the barrel, in the proportions of one pint to forty gallons.

Alum is used in the proportions of four to five ounces per hundred gallons. Being finely pulverized, alum is incompatible with the "beading mixture." Liquors that contain starch, mucilage, &c., should not be "fined" with alum.

Wheat flour is sometimes used in the form of paste with water—one pint per one hundred gallons.

Filtering Bags.—Take a square yard of Canton flannel, and cut it in two pieces (diagonally) from one corner to the other, and sew up the two edges, thus forming a triangle-shaped bag; then sew a hoop of suitable size in the mouth of the bag, and fix a suitable handle of rope or twine.

If all the coloring matter, and fluids used to impart coloring to liquors, was sufficiently strained and filtered, finings would be rarely, if ever, used; the hurried manner in which color makers manage their business, using inferior materials, and taking advantage of all the "tricks of trade" that may be suggested. Coloring derived from such a source as this must entail a vast deal of unnecessary labor and expense upon the manufacturer. The manufacturers of coloring should be provided with all kinds of filters, strainers, &c., to cleanse and purify their coloring of its own and foreign matter. As good color is one of the principal essentials of all good liquors, the manufacturer would find the coloring made under his supervision to be preferable to any other.

All colors, except brown, from sugar, should be filtered through a bed of white sand from six to fifteen inches in depth ; this can be done in a keg or barrel ; the cleaner and clearer the sugar the finer the color. Thus fine brown and loaf, or clarified sugar, which is used for coloring very choice bottled liquors, is the most exquisite brown we have. The objection to the burnt sugar found in commerce is, that it contains a large portion of minute particles of charcoal that would pass through the strainer, and can easily be detected with the naked eye, in liquors that have been colored by this article. This was the result of preparing the color from molasses, or filthy dark sugar.

Giving body, age, and a mucilaginous, oily appearance to wines and liquors.—The above desirable qualifications are imparted by filtration or digestion—the former plan being preferable. In the case of wines, only a small portion should be filtered, say one sixth of the whole, and this is to be added to the mass and allowed to stand for a few days ; the simplicity of the operation will be apparent in the first attempt.

In operating in proof spirit, the process consists in rapidly filtering the mass through any substance that contains mucilage that is not precipitated by alcohol—viz. starch and gluten.

Wheat bran, as found in commerce, placed in a barrel filter to the depth of eight or ten inches, and the surface of the bran covered to the depth of one or two inches with slippery elm bark, and the filtration maintained with rapidity, yields a superior liquor, of a fine, dry taste. Liquor prepared by this process, cannot be used for a great length of time; the difficulty of fining down, &c., has caused this plan to sink into disuse. Where a sufficient time is allowed for the color extracted from the husk to subside, no finer spirit can be produced, when we keep in view the economical and simple plan used for attaining such desirable ends.—The most common process is filtration through oatmeal and rice—in some instances the mixture is favored with a small portion of wheaten flour; in all large manufactories, the spirit runs from the charcoal through the rice filters. These filters are made to suit convenience. A common barrel, etc., will answer every purpose, and is made in every respect that the charcoal filters were; the first layer at the bottom is of sand, varying in depth from four to twelve inches. This sand rests on a perforated bottom, a few inches above the main bottom, and is covered with a blanket—that is to say, the sand has a blanket at the top of it and another beneath it, and next comes a bed of oatmeal or rice flour, with a proportion of one tenth of the whole added in wheaten flour—either the oatmeal or the rice flour are embedded to the depth of from twelve to fifteen inches. Where the rice flour is used, chopped straw should be used in layers alternately with the flour—otherwise, the flour would become one impenetrable mass, by the addition of fluid. The durability of either oatmeal or rice flour in filtering, can only be obtained by close observation, and ascertaining when the starch is being near exhausted.

The use of chopped straw in layers, greatly facilitates the filtration of fluids through glutinous masses. Some operators run the spirit through one bed of ground rice or oatmeal, and one of whole rice to the depth of twelve to twenty inches—and then through the usual depth of sand. The different plans are offered to the operator rather with the view of furnishing all information that might be at all desirable ; not that any formula has any decided advantage over the other, but that plan that appears the most *convenient*, from circumstances, may be adopted.

All the different formulas in this work are in practical operation in different parts of the country ; and yet the proprietors would not be able to give an opinion, what advantages his recipe possessed over any other, or why so many different modes were adopted to obtain the same results. The choice is often the result of circumstances, and from long usage a formula becomes almost sacred with some operatives.

It will be noticed that this plan of filtering is remarkable for its economy and simplicity, and the general directions for the novice are few and simple. Keep the filtering substancees from lying too compact by a few layers of chopped straw, and also apply the straw in any instance where the filtration progresses slowly, or appears choked. All substances to be acted upon by filtration should be separated from each other by suitable and secure coverings of close-grained fabrics. Blankets are generally preferred, owing to the long nap, which becomes entangled and prevents the escape of the particles.

Slippery Elm stands deservedly high with manufacturers on the continent. It yields a mucilage that combines freely with alcohol, and enters into many extemporaneous receipts. The decoction is prepared by boiling in water, and is used to give the appearance of age to liquors. It is the most serviceable, however, used by infusing it in the spirit, or placing the bark over the surface, or mixing through in the place of straw, to allow the filtration to progress freely through the filters.

Sugar, Honey, Syrup, &c., are all used for the purposes of giving body, age, and other desirable qualities to wines and liquors, and have been noticed under their appropriate heads.

COLORING.

Perfectly transparent liquors can never be obtained with indifferently prepared coloring. Standing first on the list, is brown or brandy coloring (carmel), or burnt sugar. This color is too often prepared from indifferent articles, viz. molasses and filthy sugar, and burnt to suit the convenience of the operator, rather than a standard rule; and when prepared in this manner, the best adapted strainers ever invented would not effectually remove the charcoal (from being over burnt), and other dissolved filthy impurities that are to be found in the scrapings of refineries, sugar-houses, &c. This is the material that the color-maker uses. Molasses, in no instance, should be used in the manufacture of coloring. Clean and fair brown sugar will yield a rich and transparent brown, of great depth and beauty.

The prudent rectifier will never make use of any kind of fluid coloring, without it is perfectly transparent, from filtering and straining. This plan of throwing the ingredients together promiscuously, and relying on finings for transparency, is but a poor one.

To the uninitiated, relative to burning coloring, I might say that one hour and a half will suffice, over a brisk fire, to any given quantity of sugar. When sufficiently burned, may be known by the effervescence ceasing. At this point, you should dash in the same quantity of water that there was of sugar; the water disolves the mass and prevents incrustation, and the heat should be discontinued.

The Preparation of Liquor Coloring.—Red Sanders Wood comes in round or angular sticks, internally of a blood red color, and externally brown from exposure to the air; compact and heavy, of a fibrous texture; it is kept in the shops in the state of small chips, raspings, or coarse powder. It has but little smell or taste, and imparts a red color to alcohol, ether, and alkaline solutions, but not to water. Coloring is obtained from sanders wood, in the proportion of one pound of the wood to one gallon of proof spirit, and allowed to stand for twenty-four hours, and then drawn off and filtered through sand, to the depth of twelve to fourteen inches, or fined with boiled milk. The sanders wood should be subjected to the action of the spirit as long as it continues to yield any color.

This color is used for brandies, combined with burnt sugar, also for coloring cherry bounce, wines, &c.

YELLOW.

Gamboge.—The best gamboge is in cylindrical rolls from one to three inches in diameter, sometimes hollow in the centre, or flattened, or folded double, or agglutinated in masses, in which the original form is not always distinguishable. They are externally of a dull orange color, which is occasionally displaced by greenish stains. In this form, it is sometimes called pipe gamboge. Another variety is imported under the name of cake or lump gamboge; it is in irregular masses, weighing two or three pounds or more. This latter variety only differs from the former, in the greater amount of impurities contained. The inferior kinds of gamboge may be known by their greater hardness and coarser fracture, by the brownish or greyish color of their broken surface, which is often marked with black spots, and by their obvious impurities.

Gamboge, in its pure form, is brittle, with a smooth, shining fracture; the color of the mass, when broken, is a uniform reddish orange, which becomes a beautiful bright yellow when powdered, or when the surface is rubbed with water. From the brilliancy of its color, it is highly esteemed—it has no smell and little taste—it produces after remaining in the mouth a short time, an acrid sensation. So intense is its coloring principle, that one part communicates a perceptible yellowness to ten thousand parts of water or spirit.

Yellow is prepared from gamboge, in the proportion of eight ounces to the gallon of spirit, allowed to stand twelve hours, and the clearest portion of the fluid drawn off and strained through a fine flannel bag, and the gamboge remaining is treated to spirit until the coloring is completely extracted.

Gamboge is used for coloring some fine brands of peach brandy, wines, and cordials, and used in compound colors, viz. orange, green, lemon, &c.

Brown from Alkanet Root.—The root comes to us in pieces three or four inches long, from the thickness of a quill to that of the little finger; somewhat twisted, consisting of a dark red, easily separable bark; it is usually much decayed internally, very light, and of loose, almost spongy, texture. The fresh root has a faint odor and a bitter astringent taste, but when dried, it is nearly inodorous and insipid. Its coloring principle is soluble in alcohol or ether, but is insoluble in water.

The tincture of alkanet has its color deepened by acids, and changed to blue by alkalies, and again restored by neutralizing the latter substances.

Alkanet is prepared by crushing the root, and adding one pound to a gallon of alcohol, standing twenty-four hours, decanting, and fine with boiled milk ; depth of color and transparency are objects sought for, and the finings should be continued until the tincture is bright. If depth of color is sought, add sulphuric acid, drop by drop, until the desired warmth is attained. As in all other instances, the remaining root should be subjected to the action of alcohol as long as the root yields any color.

This color is used for port wine particularly, also for wines and cordials either singly or combined, forming compound colors.

Logwood yields a color well adapted for a certain class of wines, and is very extensively used ; it yields its color to water or alcohol, but in greater quantities to boiling water.

Red beets will produce a fine red color, by mashing or cutting into slices and infusing into the liquid that is to be colored.

When they are to be used for coloring fermented liquors, viz. champagne, wines, &c., the beets should be added before fermentation has begun, that is, while these liquors are being formed by fermentation.

Blue.—The best blue is prepared from indigo ; other blues have been proposed and used with but little success, the objections to them are a want of body and brilliancy. The action of light, and probably some principle that the liquor contains, may be incompatible with the color. These, or some unexplained causes, tend to the decomposition of the color, and hence the dull, cloudy, and faded color of some brands of cordials, &c.

Indigo is insoluble in alcohol or water. It is of an intensely blue color, but assumes a coppery or bronze hue when rubbed by a smooth, hard body, as the finger nail. The solution of indigo is known as chemic blue, and is prepared thus :—

To eight ounces of oil of vitriol, in a glass or earthen vessel placed in cold water, add gradually one ounce of pure indigo in powder, stirring the mixture at each addition with a glass rod ; cover the vessel for twenty-four hours, then dilute with an equal weight of water. Instances may occur, where the acid would be objectionable in the above solution. Carbonate of potash, soda, or ammonia, if added, will neutralize the acid. This, if prepared with clear water, will need no farther preparation as it is beautifully transparent.

Indigo is used for coloring cordials the different shades of blue, also with gamboge in solution, for forming green, and with a solution of red sanders wood or cochineal for forming a purple color.

Rose Pink, &c., is prepared from cochineal. Cochineal has a faint, heavy odor, and a bitter, slightly acidulous taste; its powder is of a purplish carmine color, tinging the saliva intensely red. Cochineal is soluble in water and alcohol, and more so in boiling alcohol. From this formula, the operator can produce any desired shade, from the lightest pink to the deepest carmine.

Boil one ounce each of cochineal and salt of tartar in a quart of water for twenty-five or thirty minutes, then add one ounce cream of tartar and the same of alum; this is intended for bottled cordials, &c. Where it is desirous to color by the barrel, pipe, or hogshead, the cochineal may be inclosed in muslin and thrown into the cask. Two ounces of cochineal will color a hogshead a very fine pink; of course the quantity can be increased or diminished to produce the desired shade. The tints formed by cochineal, in combination with any other color, will have more brilliancy than any other colors used, viz. in orange, gold, purple, fawn, salmon, &c., &c.

VIII.

ON BARRELLING LIQUORS,

GIVING AGE TO NEW BARRELS, AND BRIGHTENING OLD ONES, CLEANSING AND SWEETENING OLD BARRELS, BRANDS AND BRANDING BARRELS, MARKS THAT ARE NOT CUSTOM-HOUSE MARKS.

WHERE old barrels are to be used, the hoops should be well driven and nailed. If the barrels should appear slack, swell them with water. If they are pipes, restore, if needed, the plaster of Paris on the heads, by mixing plaster of Paris with water to the consistence of thin mortar, and apply as necessary. It will set or harden immediately. If the plaster is to be colored, stir in uniformly Venetian red or any color to suit taste (in the plaster while it's being mixed). If the heads of the barrels are to be plain, and they are old ones, examine carefully for the retailer's faucet-opening. Plug this up carefully, allowing the plug to sink about the twentieth of an inch in the head of the barrel, thus allowing a small space to be filled with black putty (this is a mixture of lamp black and putty); bring the whole even and smooth with the head of the barrel, then have a stencil pattern ready with the word COG., or any other word that will answer; and allowing the letter O to cover the putty. The O in the pattern should have the centre left out, thus forming a black circle. The object of this is to completely hide all traces of the faucet hole; and, if done with neatness, it will succeed admirably.

For giving age to new barrels, keep them in a damp, dark cellar, and dash water on them occasionally, or wash them several times, daily, until the desired appearance is obtained, with a solution composed of two gallons of water, three pounds of sulphuric acid, and one pound of sulphate of iron. When this solution is used, it will be useless to keep them in a cellar.

For scrubbing old barrels, use a very strong solution of sulphuric acid, or pure acid will answer best. The barrels should be well rubbed during the application of the acid. The acid acts by corroding the surface of the staves, and the friction or rubbing removes the corroded surface. Barrels subjected to this process soon tarnish.

All barrels, except new ones, and those old ones that yield a fine aroma, should be well cleansed from all odors, or they will, to a considerable extent, injure their proposed contents. Take, owing to a greater or less extent of the fetor, from a half to one glass of sulphuric acid, and pour into the barrel and bung down tightly, and roll the barrel in such a manner that the acid will reach all parts of the inside of the barrel. The acid can be decanted and kept for future use. Recollect to rinse out the barrel first with pure water before the acid is used. Another mode is to smear or saturate strips of cotton fabric with sulphur, rendered fluid by heat. Attach the end of one of these pieces to the under part of the bung, ignite the opposite end, put it in the barrel, and bung tightly.

The manufacturer should pay the strictest attention to the manner in which all of his brands and stencil patterns are executed. Neatness, correct proportion, and delicacy of touch should characterize the mechanical portion of them ; and where instances may arise that the heads should be painted, nothing but the prettiest colors should be used. A few examples are offered. They can be adapted to suit convenience. A beautiful rose pink or peach blossom can be made by adding equal proportions of vermilion and drop lake, well ground together, to white lead, until the shade sought is produced. Paris green, mixed with turpentine and oil, is the most brilliant green. The different shades of yellow are made from yellow ochre or chrome yellow; to be first ground, and then mixed with white lead, and brought to any shade required. These fine colors, for the most part, are used for cordial barrels. Domestic brandies, from long usage, are put up in wood colored heading. The American fancy brands of whiskey are often put up with neatly varnished oak-heads, which makes a very neat appearance. A small portion of burnt amber is added to the varnish to give the heads a darkish hue to be in keeping with the dull and oldish looking staves. The appearance just mentioned is imparted to the staves by sulphuric acid, &c., as above; that is, where the spirit is denominated "old," the manufacturer should have a complete set of brands and branding plates for foreign and domestic liquors. The imitation liquors should, if necessary, have the brands burnt in the head of the barrel; and some dealers have adopted the plan of marking the head of the barrel in the same style as the custom-house marks, and reads something like the following:—"Mary Pell, New York, June 9, 1851." Any other names, of course, would answer. All that is necessary is to have them resemble, as much as possible, what they are intended to represent. It is supposed that the barrels to be used are new ones, which always should be the case where the article has been prepared with great care. It (the spirit) should be offered in neat and bright packages.

For giving age to new barrels, a dilute tincture of muriate of iron with its own bulk of water, and apply with a brush or rag uniformly over the barrel.

ON THE USE OF ACETIC AND SULPHURIC ACIDS IN LIQUORS.

The above acids are added to liquors, under the false impression that they add to the strength, or that they supply the strength of the deficient alcohol. In small proportions (see Formula), acid greatly improves some liquors. In some instances, where a spirit has an unpleasant taste, it acts by destroying the cause; or, where a liquor tastes flat, the acid yields quite a pleasant taste. Spirit that contains either a deficiency or an excess of saccharine matter has its peculiarities corrected by acid; in the former instance, the acidulous taste, by the addition of the acid, completely covers the deficiency; and in the latter instance, an excess of acid destroys (to the taste) the saccharine matter.

Acids should be used whenever a pleasant vinous, acidulous taste is desired in liquors. Where economy is sought, use sulphuric acid. Acetic acid or strong vinegar yields a taste and smell. The combined odor of the acid and the spirit is similar to acetic ether, and would be a desirable flavor for any liquor.

The discussion would digress from the object of this work to inquire into the propriety of the use or disuse of a mineral acid in this business. The argument that proscribes the use of it in this instance would apply with equal force to its use in the manufacture of soda and mineral waters ; and as found in some brands of lemon syrup and the acidulated beverages that are prescribed by the medical faculty. The proportion used in spirit is comparatively small to that used for other manufacturing purposes, as a glassful of the spirit does not contain a greater quantity than one drop!

IX.

ON THE USES OF SUGAR, MOLASSES, AND HONEY

IN THE MANUFACTURE OF

WINES AND LIQUORS.

THERE are two modes presented to the operator for giving a body, age, and a mucilaginous, oily appearance to liquors,—the first process consisting in charging the fluid with a given amount per gallon of saccharine matter. The application of this process will not answer where the manufacture of low proof or low priced liquors is contemplated, as it would incur an additional expense varying from twelve to twenty-five per cent. The second process consists in charging the liquid with starch by filtration. This process is fully detailed in another chapter on that subject; and it will be seen that the same ends can be attained by the latter process that are by the former, and at a comparatively trifling cost. To give to neutral spirits the attributes of a fine distilled and aged liquor would be to apply the principles of both processes, viz. to subject it to the starch filtration, and to charge the spirit with a small per centage of honey or sugar.

The honey has a decided preference, owing to its peculiar, though feebly aromatic taste, which is followed by a slight prickling or sense of acrimony in the throat. It is better adapted to the manufacture of wines, fine gin, brandies, champagne, cordials, &c., &c.

In some instances, the honey may need clarification; for which, full instructions will be found under the head of "Clarifying Honey." When used, either the honey or sugar should be dissolved in perfectly clean, clear water, for if either should contain any filthy impurities they will, in a proportionate degree, render the fluid containing them muddy; and, for this reason, molasses should never be used, not even in the most minute quantities. Neither is molasses suited for coloring when burned; this is owing to the excessive amount of caramel or burnt sugar that the molasses contains—this caramel being the obvious effects of evaporating the cane juice from direct heat.

The filtering process presents innumerable advantages in preparing low proof or cheap liquors, as the fixtures necessary are remarkable for their simplicity; and the filtration, if properly managed, will give to the spirit a luscious taste and a fine bead. The only difficulty to guard against is to prevent the color of the liquor becoming heavy. This is derived from the husks of bran that the wheaten flour contains. For this reason, rice flour is extensively used, though inferior to wheat. The heaviness alluded to above will, in the course of time, subside.

One part of wheaten flour to six of rice flour. and three parts of whole grains of rice thoroughly mixed, will be found the most expeditious formula for packing filtering stands.

TO CLARIFY HONEY.

The clarification is only necessary when the honey is intended for bright, transparent champagne, gin, &c. Gently heating the honey, and straining through muslin, will generally remove the impurities ; or mix six eggs with two gallons of water, and add the water to ten gallons of honey ; mix well, thin, and apply heat, but do not bring it to the boiling point ; then skim, and if necessary, strain.

Heat renders honey perfectly fluid, so that the wax and other light impurities which it contains, rise to the surface, and may be skimmed off, while the heavier substances, which may have been accidentally or fraudulently added, such as sand or other earth, sink to the bottom.

French Method of Clarifying Honey.—Take of honey 3,000 parts, water 750 parts, carbonate of lime, powdered and washed, ninety-six parts; mix them in a suitable vessel, and boil for three minutes, stirring constantly, then add ninety-six parts of fresh burned bone black, in powder, and boil for a few minutes; lastly, add the whites of three eggs, beat up with 500 parts of water, and bring the liquid to the boiling point; withdraw the vessels from the fire, and after the mixture has cooled for fifteen minutes, strain through flannel, and repeat the straining until the liquid passes perfectly clear; should it not be of the proper consistence, it should be concentrated sufficiently by quick boiling. The use of the carbonate of lime is to saturate any acid in the honey which might favor the formation of glucose, and thus increase the tendency to granulation.

Second Process for Clarifying Honey.—Boil twenty-five pounds of honey, to which half the quantity of water has been added, with a pulp obtained by stirring three sheets of white blotting paper, with water, over a slow fire, till the pulp is reduced to minute fibres; when the mixture cools, put it into a woollen filtering bag, previously moistened, and allow the honey to pass. It comes away perfectly clear; the paper pulp may then be washed, and the dark wine-colored liquid subjected to a second process.

Honey clarified by the first process described, is as clear and colorless as syrup made with refined sugar, but still retains its flavor.

TO ASCERTAIN THE PURITY OF FRENCH BRANDY.

On analysis pure brandy has been shown to contain alcohol, water, volatile oil, tannin, heavy oil of wine, acetic ether, and coloring matter.

An imitation of brandy is composed of alcohol, with various proportions of grain oil, starch, sugar, honey, tannin, coloring, acetic ether, raisin spirit, or heavy oil of wine, &c., &c.

The sugar, honey, pepper, &c., will be perceptible to the taste, if the liquid be evaporated to dryness, the tannin will be known by the liquid forming a dark line, by the addition of the sesquioxide of iron; the starch will be known by the addition of iodine in solution, and the presence of grain oil will be denoted by nitrate of silver.

TESTS, ETC.

Nitrate of Silver Test for Detecting Grain or Fuse

Oil in Liquors.—Take of nitrate of silver, ten grains; pure water, one ounce; dissolve the nitrate of silver in the water; to half a glass of the liquid supposed to contain grain oil, add twenty-five drops of the solution of nitrate of silver; if there be any grain oil, it will be converted into a black powder, and will be seen floating on the surface of the liquid.

The action of the silver is not always immediate; the glass should be exposed to a strong light, the better to enable the operator to observe any of the powder that might be floating on the surface of the liquid. It has been observed, that the action of the oxide of silver is not immediate; from one to twenty-four hours is sometimes necessary in testing a sample that may have been well rectified, either by distillation or filtration.

Iodine Test for Starch in Liquors.—Iodine, one ounce; alcohol, five ounces; dissolve. To half a glass of spirit, add a few drops of the solution of iodine, if starch is present the product will be purple, and dark purplish spots or specks.

Now it must be obvious, that when the tests mentioned fail in denoting the presence of these articles mentioned, the spirit is unadulterated, as the articles sought for by these tests, viz. sugar, honey, and starch, are those that are used both in America and Europe, by all classes of manufacturers, in adulterating liquors.

TO ASCERTAIN THE QUANTITY OF ALCOHOL IN WINE, BEER, CIDER, CORDIALS, ETC.

Take of the liquid to be examined, one hundred parts, and a solution of subacetate of lead, formed by taking litharge, fifteen parts; acetate of lead, twelve parts; water, two hundred parts; boil for twenty minutes, or until reduced to one half. Take of this twelve parts, agitate together, and strain through muslin; then take potash, that has been brought to red heat in a ladle, and add it in powder to the liquid, as long as it continues to dissolve; the alcohol will be seen floating on top of the mixture. The quantity of spirit can be estimated by means of a graduated tube.

The most certain way to determine the quantity of alcohol contained in a given quantity of any liquid, is to separate it from the non-volatile constituents by distillation. Any kind of small still can be made available for this purpose. Take for the purpose three hundred parts of the liquid to be examined, measured in a glass tube carefully, and slowly distil over one hundred parts, or one third of the liquor in the still, making use of a graduating tube as the recipient of the distilled liquid, and stopping the operation when the distilled liquor reaches the hundredth degree; then obtain the amount of alcohol the distilled liquor contains, by means of the hydrometer, and dividing the result by three, you have the per centage of alcohol that the liquid contains. If, for example, the hundred parts of distilled liquor contained thirty parts of alcohol, the liquid submitted to distillation contains ten per cent. of alcohol; but if, from want of attention, there should be distilled over more than one hundred parts of the liquor, it will not answer to divide the alcoholic strength of the product by three to obtain the per centage of the alcohol of the liquor submitted to distillation. You must employ as a divisor the number which expresses the relation of the volume of the distilled product to the bulk of the wine. If, for example, you have one hundred and six parts of distilled liquor, containing (by the hydrometer) thirty-three parts of alcohol, you divide 300 by 106, which gives 2·83, and then divide 33 by 2·83, which gives 11·66; the last number expresses the per centage of alcohol of the liquor submitted for examination.

CHARCOAL AS A DECOLORIZING AGENT.

Owing to a variety of causes,—the fluctuations of the market, an over stock of one particular kind of unmerchantable liquor, or a quantity of liquor too highly colored, or to point to the emergency that might arise, would be impossible ; and hence the necessity of a knowledge of the articles used in decolorizing liquors, viz. animal charcoal or bone black. Animal charcoal by no means necessarily possesses the decolorizing property, as this depends upon its peculiar state of aggregation. If a piece of pure animal matter be carbonized, it usually enters into fusion, and from the gaseous matter which is extricated, becomes porous and cellular. The charcoal formed has generally a metallic lustre, and a color resembling that of black lead. It has little or no decolorizing power.

The most powerful of all the charcoals for discharging colors, are those obtained from certain animal matters, such as dried blood, hair, horns, &c., &c., by first burning them with carbonate of potassa, and then washing the product with water. The next most powerful decolorizer is bone black, in which the separation of the carbonaceous particles is effected by the phosphate of lime present in the bone. Vegetable substances may be made to yield a good charcoal for destroying color, provided before burning they be well mixed with pumice stone, chalk, flint, calcined bones, &c., &c.

It results from the foregoing facts that the decolorizing power of charcoal depends upon a peculiar mode of aggregation of its particles, the leading character of which is they are isolated from one another, and thus enabled to spread over a greater extent of surface. It is on this principle that certain chemical substances act in developing the property in question, when they are ignited in a state of intimate mixture with the substances to be charred. Thus it is perceived that there is no necessary connexion between animal charcoal and the decolorizing power; as this charcoal may or may not possess the peculiar aggregation of its particles, on which the power depends.

Bone black, for instance, has this property, not because it is an animal charcoal, but in consequence of the phosphate of lime present in the bone, the favorable state of aggregation is induced.

Animal charcoal will, by digestion and filtration, remove the bitter principles from infusions, &c. Its power of acting on chemical compounds and solutions is much more decided in its purified state.

Bone black is composed of phosphate and carbonate of lime, charcoal, and carburet of iron.

Bone black, when used for decolorizing, should be deposited in a filter to the depth of from five to fifteen feet. On a small scale, a common forty gallon barrel can be used for the same purpose. (For further particulars see Filtering Apparatus.)

Boiled Milk possesses decolorizing properties, and is very useful in wines. A pint of boiled milk added while warm to a pipe of red wine, will discharge the color completely, rendering it transparent. The action of the milk is mechanical; the particles of milk, combining with the minute particles that constitute the coloring, fall to the bottom or subside.

TANNIN.

As tannin is extensively used in one form or another, viz. as tanning oak bark, catechu, and terra japonica, for the bitter and astringent principle and coloring matter that it yields, which is well adapted to brandies, whiskey, and some wines—it requires that it should have more than a passing notice. The term tannin was originally applied to a principle existing in many vegetables having a very astringent taste, and the property of producing a white, flocculent precipitate, with a solution of gelatine and black precipitate, with the salts of the sesquioxide of iron. As obtained, however, from different plants, it was found to exhibit some difference of properties, and chemists have recognised two kinds ; one exist ing in oak bark, galls, &c., and the other in Peruvian bark, catechu, &c. One striking peculiarity of the tannin of galls is its facility of conversion into gallic acid, which is wanting in the other varieties.

Pure tannic acid is solid, uncrystallizable, white or slightly yellowish, inodorous, strongly astringent to the taste, without bitterness; soluble in water, much less in alcohol and ether, and insoluble in the fixed and volatile oils. It can be kept unchanged in the solid form, but its aqueous solution, when exposed to the air, gradually becomes turbid, and deposits a crystalline matter, consisting chiefly of gallic acid. Tannic acid precipitates solutions of starch, albumen, and gluten, and forms with gelatin an insoluble compound which is the basis of leather.

Tannin, in the form of oak bark and catechu, or terra japonica, is the form best suited to the purposes of the manufacturer of liquors. A spirit formed by filtration, that is, a liquor that has had a body given to it by starch, &c., will receive but little assistance from tannin, and an excess of tannin would precipitate the starch. Tannin generally enters into extemporaneous formulas for liquors—and some manufacturers use oak bark for coloring domestic brandies, which adds considerably to the taste.

Where tannin or catechu would be incompatible with a liquid, alum should be substituted. Catechu is suited to brandies, whiskeys, Port wine, &c. Alum to the astringent wines, as the water the wine contains will hold the alum in solution. The quantities and proportions of tannin necessary in the manufacture of liquors, will be mentioned in the various receipts throughout this work.

The operator will recollect that, where a transparent liquor requires an astringent property, alum will be the best suited for the purpose, as the color of the tannin would render it objectionable. The alum should be first dissolved in water before adding it to the spirit.

SUGAR OF MILK.

Sugar of milk, or *lactin*, is found only in milk, of which it forms about five per cent. It is manufactured largely in Switzerland, as an article of food. In preparing it, milk is first coagulated, by the addition of sulphuric acid, and the resulting whey is evaporated to a syrupy consistence, and set aside in a cool place for several weeks, to allow a deposit of crystals. The crystals are then decolorized by animal charcoal.

Sugar of milk is a hard, somewhat gritty, white substance, possessing a somewhat sweet taste. In commerce it sometimes occurs in cylindrical masses, in the axis of which is a core, around which the crystals have been deposited. It dissolves slowly in six parts of cold, and three of boiling water, without forming a syrup; it is but slightly soluble in alcohol. Sugar of milk is not susceptible of the vinous fermentation by the direct influence of yeast; but after the action of dilute acids, which first convert it into grape sugar, it is capable of furnishing a spirituous liquor by distillation. It is well known that both mares' and cows' milk, after becoming sour, are capable of forming an intoxicating drink by fermentation.

Sugar of milk is used to prevent fermentation in syrups, in the proportion of thirty-two parts to one thousand. See Syrups.

X.

THE PROCESS

OF THE

MANUFACTURE OF SULPHURIC ACID.

THERE is scarcely any article that is used for such a different variety of purposes, and one, too, that is so highly useful, of which there is so little known of its production, as oil of vitriol. Although it may not belong to the peculiar province of the manufacturer of liquors to manufacture this acid, yet a knowledge of its formation and general properties is necessary to a complete practical knowledge of the manufacture of wines, liquors, &c.

Sulphuric acid is obtained by burning sulphur, mixed with one eighth of its weight of nitre, over a stratum of water, contained in a chamber lined with sheet lead ; if the sulphur was burned by itself, the product would be sulphurous acid, which contains only two thirds as much oxygen as sulphuric acid ;

the object of the nitre is to furnish, by its decomposition, the requisite additional of oxygen.

The leaden chambers vary in size, but are generally from thirty to thirty-two feet square, and from sixteen to twenty feet in height; the floor is slightly inclined to facilitate the drawing off of the acid, and covered to the depth of several inches with water. There are several modes of burning the mixture of sulphur and nitre, and otherwise conducting the process, but that pursued in France is as follows: near one of the sides of the chamber, and about a foot from its bottom, a cast iron tray is placed over a furnace, resting on the ground, its mouth opening externally, and its chimney having no communication with the chamber; on this tray the mixture is placed, being introduced by a square opening, which may be shut by means of a sliding door, and the lower side of which is level with the surface of the tray; the door being shut, the fire is gradually raised in the furnace, whereby the sulphur is inflamed, and the products already spoken of are generated. When the combustion is over, the door is raised, and the sulphate of potassa removed; a fresh portion of the mixture is then placed on the tray, and the air of the chamber is renewed by opening a door and valve situated at its opposite side; next, the several openings are closed, and the fire is renewed. These operations are repeated, with fresh portions of the mixture, every three or four hours, until the water at the bottom of the chamber has reached the sp. gr. of about 1·5, it is then drawn off, and transferred to leaden boilers, where it is boiled down until it has attained sp. gr. 1·7. At this density it begins to act on lead, and therefore its further concentration must be conducted in large glass or platinum retorts, where it is evaporated as long as water distils over. This water is slightly acid, and is thrown back into the chamber. When the acid is fully concentrated, opaque, greyish-white vapors arise; the appearance of which indicates the completion of the process. The acid is allowed to cool, and is then transferred to large demijohns of green glass, called carboys, which, for greater security, are surrounded with straw or wicker work, and packed in square boxes, inclosing all the carboy, except the neck.

Another method of manufacturing this acid consists in spreading the mixture on iron or leaden plates, resting on stands of lead within the chamber, placed at some distance from each other, and a foot or two above the surface of the water; the sulphur is then lighted by means of a hot iron, and the doors are closed. If the sulphur and nitre be well mixed, the combustion will last for thirty or forty minutes, and in three hours from the time of lighting, the condensation of the gases having in that interval been completed, the doors are thrown open for from fifteen to twenty minutes, to admit fresh atmospheric air, and to allow time for the residuary nitrogen to escape. Preparatory to the next burning, the operations are repeated with fresh charges of the mixture, every four hours, both night and day, until the water has attained the requisite acid-impregnation. When it is transferred to leaden boilers, and otherwise treated, as just explained, the quantity of the charge for each burning is determined by the size of the chamber, allowing one pound of the mixture for every three hundred cubic feet of atmospheric air which it may contain.

As in the manufacture of sulphuric acid, the nitre is the most expensive material. Many plans have been resorted to for the purpose of obtaining the necessary nitrous acid at a cheaper rate. One plan has been to treat molasses, or starch, with common nitric acid. In this case the manufacturer obtains oxalic acid as a collateral product, which serves to diminish his expenses.

In some manufactories of sulphuric acid nitrate of soda is substituted for nitre; the advantages of the former salt are its greater cheapness, and the circumstance of its containing a larger proportional amount of nitric acid.

A new method is now practised by some manufacturers, for making sulphuric acid ; it consists in filling the leaden chamber with sulphurous acid, by the ordinary combustion of sulphur, and afterwards admitting into it nitrous acid and steam ; the nitrous acid is generated from a mixture of sulphuric acid with nitrate of potassa, or nitrate of soda, placed in an iron pan, over the burning sulphur, in the sulphur furnace, where the draught serves to conduct the nitrous acid fumes into the chamber ; as under these circumstances sulphurous and nitrous acid, and the vapor of water, are intermingled in the chamber, it follows, that all the conditions necessary for generating crystalline compounds, already alluded to, are present. Of course, the rationale of this new process is the same as that already given.

What has been said above relates to the mode of preparing common sulphuric acid ; but there is another kind known on the continent of Europe by the name of the "Fuming sulphuric acid of Nordhausen," so called from its properties, and a place in Saxony, where it is largely manufactured. This acid is obtained by distilling sulphate of iron in large stone ware retorts, heated to redness, and connected with receivers of glass, or stone ware ; the acid distils over, and sesquioxide of iron is left in the form of colcothar.

The process for making sulphuric acid by the combustion of sulphur with nitre, was first mentioned by Lemry, and afterwards put in practice by an English physician, of the name of Ward. As practised by him, the combustion was conducted in very large glass vessels. About the year 1746, the great improvement of leaden chambers was introduced by Roeback, an eminent physician of Birmingham, where the first apparatus of this kind was erected. In consequence of this improvement, the acid immediately fell to one fourth of its former price, and was employed for many purposes for which, previously, it could not be used, on account of its high cost.

Properties.—Sulphuric acid, or, as it is commonly called, "oil of vitriol," is a dense, colorless, inodorous liquid, of an oleaginous appearance, and possessing strong corrosive qualities; on the living fibre it acts as a powerful caustic. In the liquid form, it always contains water, which is essential to its existence in that form. When pure, and as highly concentrated as possible, as manufactured in the leaden chambers, its sp. gr. 1·845, a fluid ounce weighing a small fraction over fourteen drachms; when of this specific gravity, it contains about 18 per cent. of water; whenever its density exceeds this, the presence of sulphate of lead, or some other impurity, is indicated. The commercial acid is seldom of full strength, and it generally is of the sp. gr. of only 1·8433, an contains 22 per cent. of water. This acid acts po erfully on organic bodies, whether vegetable or animal, depriving them of the elements of water, developing charcoal, and turning them black. This acid will absorb ninety-five per cent. of carbonic acid. When diluted with distilled water, it ought to remain limpid. When this acid is present in small quantities in solution, it is detected unerringly by chloride of barium, which causes a precipitate of sulphate of baryta. The most usual impurities in sulphuric acid, are the sulphates of potassa and lead; the former derived from the residue of the process, the latter from the leaden boilers in which the acid has been concentrated.

Occasionally nitre is added to render dark samples of acid colorless; this addition will give rise to the impurities of sulphate of potassa; these impurities often amount to three or four per cent. The commercial acid cannot be expected to be absolutely pure, but when properly manufactured, it ought not to contain more than one fourth of one per cent. of impurity. The fixed impurities are discoverable by evaporating a portion of the suspected acid, when they will remain. If sulphate of lead be present, the acid will become turbid on diluting with an equal bulk of water. This impurity is not detected sulphuretted hydrogen, unless the sulphuric acid be saturated with an alkali. If only a scanty muddiness arises, the acid is of good commercial quality.

Other impurities occur in the commercial sulphuric acid. Nitrous acid is always present in a greater or less amount, and may be detected by gently pouring a solution of green vitriol over the acid, when the solution at the line of contact will acquire a deep red color due to the sesquioxidation of the iron by the nitrous acid. The commercial acid is not to be rejected on account of the indications of this test, unless it shows the presence of nitrous acid in unusual quantities. The mode of removing this impurity by the aid of sugar, consists in heating eight fluid ounces of the acid, with twelve grains of refined sugar, at a temperature not quite sufficient to boil the acid, till the dark color at first produced, shall have nearly or altogether disappeared.

The dangerous impurity of arsenic is often present in sulphuric acid, and the test is so simple and economical, that no manufacturer should make use of this acid, without first testing for arsenic.

SOLUTION OF AMMONIA—NITRATE OF SILVER.

A Test for Arsenic.—Nitrate of silver, forty-four grains ; dissolved in water, one ounce ; add gradually, weak water of ammonia, till a mere trace of the undissolved nitrate of silver remains. A few drops of this added to a solution, composed of two parts of sulphuric acid and one of distilled water, or water entirely free of impurities, such, for instance, as recent rain water, and if any traces exist of arsenic, it will be indicated by a pale, yellow precipitate, or a chocolate red.

If a few drops of the test yield no color, an additional quantity should be added, and then examine closely for traces of arsenic.

Sulphuric acid is largely employed in adulterating vinegar ; for giving to it the necessary sharpness or acidity. Vinegars prepared upon a cheap scale for auctions, in all large commercial cities, will exhibit, upon analysis, an astonishing amount of free sulphuric acid—a small volume of acetic acid being added to conceal a taste peculiar to the sulphuric acid when in solution—and also to furnish the necessary odor of vinegar. This acid is also used in the manufacture of lemon syrup, and the acidulated syrups generally, cherry brandy and cherry bounce, in the different brands of bitters, to prevent the fermentation that would otherwise ensue, owing to a deficiency of alcohol in these bitters when prepared upon a cheap scale.

PURE CONCENTRATED ACETIC ETHER.

Take a long glass case, or arrange any kind of a box that admits the heat and light, and arrange shelves in it a few inches apart, one above the other; on them place plates, or flat earthenware, or wooden dishes—taking care that the dishes are not glazed with red lead—then fill these dishes with alcohol, and suspend over each dish a portion of platina black; then hang strips of porous paper in the case, with their bottom edges immersed in the spirit to promote evaporation. Set the apparatus in a light place, at a temperature of from 68° to 86° Fahr., for which purpose the heat of the sun will be found convenient. In a short time, the fermentation of vinegar will commence, and the condensed acid vapors will be seen trickling down the sides of the glass, and collecting at the bottom. We shall find, during this process, produced by the mutual action of the platina and the vapor of alcohol, there will be an increase of temperature which will continue till all the oxygen contained in the air inclosed in the case is consumed, when the acetification will stop. The case must be open for a short time, to admit of a fresh supply of air, before the operation will re-commence.

With a case of twelve cubic feet content, and six ounces of platina powder, one pound and one eighth of absolute acetic acid can be produced from one pound of alcohol ; and if we estimate the product by the strength of vinegar, the product will be great. From twenty-five pounds of platina powder, and three hundred pounds of alcohol, three hundred and fifty pounds of the pure acid may be produced daily.

The platina powder does not waste, and the most inferior spirit may be employed.

XI.

TOBACCO, CAUSTIC POTASSA,

RED PEPPER,

AQUA FORTIS, AND OIL OF VITRIOL.

A POPULAR error of the day has it that the above-mentioned articles are used in the manufacture of liquors for giving an artificial strength, &c., &c.

An examination of the properties of the articles in question will exhibit to what slight grounds popular opinion is attached to for its expressions of opinions on this subject.

TOBACCO.

The quantity of this article necessary to give a strong and cutting taste to the throat would be detected instantly by the palate. It should be recollected that it is only a few grains that are required for an emetic; but assuming that the tobacco was only added in minute quantities, that the palate alone would be able to distinguish a slight acridness, nausea must ensue. The acridness belonging to tobacco differs materially from the peculiar acridness that belongs to alcohol; and whence arises the necessity of using an ingredient that is in every form incompatible with the interests of the dealer, and that, too, in view of numerous articles that are in every manner better suited to the purpose, and articles, too, in their action on the palate that are analogous to alcohol.

CAUSTIC POTASSA

Is manufactured from potash and lime, and possesses the quality of combining with alcohol. Its action on animal matter is that of a powerful caustic, quickly destroying the parts that it is applied to; and hence the supposition that caustic potassa would produce a biting and stinging sensation in and on the throat and palate when held in solution by alcohol.

Upon testing this experiment it will be found that the spirit containing potassa is nothing more than a miserable tasted alkalized liquor; the potassa, when added in minute quantities, is not perceptible to the taste; and if a spirit contained a vinous taste this alkali would destroy it, owing to the vinosity originating in an acid.

RED PEPPER, ETC.

The insurmountable objection to the use of red pepper is that every person is familiar with its properties (its effects on the mouth and throat); and if added in the most minute portions, it will be perceptible in the throat and palate for several minutes after the spirit has been drunk.

As to the use of acids in liquors, they do not add strength to liquor—they only yield vinosity; and the excessive use of an acid will produce an acidulated spirit unsuited to any purpose.

YEAST,

Used as a ferment in wines, &c., is made in various ways. It is made of mealy potatoes boiled thoroughly soft. They are then skinned and mashed as smooth as possible, when as much hot water should be put on them as will make a mash of the consistency of good beer yeast. Add to every pound of potatoes two ounces of molasses, and when just warm stir in two large spoonfuls of yeast for every pound of potatoes. Keep it warm till it has done fermenting, and in twenty-four hours it will be fit for use. A pound of potatoes will make near a quart of yeast. Another kind of yeast is made as follows :—Take half a pound of fine flour, the same quantity of brown sugar, and a quarter of a peck of bruised malt, boil these over a fire for a quarter of an hour in a half gallon of water, then strain this liquid into a jug, and when cool add one pint of artificial yeast or sour dough. The mixture will soon begin to ferment. It should be kept in a warm place, and when ebullition ceases the yeast will sink to the bottom; pour off the clear liquor, and the yeast will be fit for use.

Artificial Yeast.—Honey, five ounces; cream of tartar, one ounce; malt, sixteen ounces; water at 122° F., three pints; stir together, and when the temperature falls to 65° cover it up, and keep it at that temperature till yeast is formed.

Patent Yeast is made by taking half a pound of hops and two pailfuls of water, mix and boil until reduced to one pailful, and strain the decoction into the seasoning tub, and when sufficiently cool add half a peck of malt; in the meantime put the hops strained off again into two pailfuls of water, and boil to one gallon as before, and then straining the liquor while hot. When the liquor has cooled to about blood heat, strain off the malt, and add to the liquor two quarts. This yeast can be made in about eight hours.

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2. Boil one pound of good flour, two ounces of brown sugar, and half a tea-spoonful of salt in one gallon of water, for half an hour, and when milk-warm bottle and cork it. It will be fit for use in thirty-six hours.

3. A pint of milk-warm water made to the consistency of a batter with wheat flour; to this add a pinch of salt, a tea-spoonful of sugar. Allow it to stand near the fire, or in a sunny position with a piece of glass over the top of the cup. Let it stand thus for nine hours.

XII.

WINES.

WINE is the fermented juice of the grape. The juice of sweet grapes consists of a considerable quantity of grape sugar, a peculiar matter of the nature of ferment or yeast, and a small portion of extractive tannic acid, bitartrate of potassa, tartrate of lime, common salt, and sulphate of potassa, the whole dissolved or suspended in a large quantity of water. This grape juice contains all the essentials to the production of vinous fermentation, and requires only the influence of the atmosphere and a proper temperature to convert it into wine.

Preparation of Wine.—When the grapes are ripe they are gathered and trodden under foot, in wooden vessels with perforated bottoms, through which the juice, called the must, runs into a vat placed beneath. The temperature of the air being about 60°, the fermentation gradually takes place in the must, and becomes fully established after a longer or shorter period. In the meantime the must becomes sensibly warmer and emits a large quantity of carbonic acid, which causes the more solid parts to be thrown to the surface in a mass of froth, called the head; the liquor from being sweet becomes vinous, and assumes a deep red color, if the product of red grapes. After a while the fermentation slackens, when it becomes necessary to accelerate it by thoroughly mixing the contents of the vat. When the liquor has acquired a strong vinous taste, and becomes perfectly clear, the wine is considered formed, and is racked off into casks; but even at this stage of the process the fermentation continues for several months. During this period a frothy matter is formed, which, for the first few days, collects round the bung, but afterwards precipitates along with coloring matter and tartar, forming a deposit which constitutes the wine lees.

Division and Nomenclature.—Wines, according to their color, are divided into white and red, and according to their taste and other qualities are either spirituous, sweet, dry, light, sparkling, rough, or acidulous.

Red wines are derived from the must of black grapes, white wines from white grapes, or from the juice of black grapes fermented apart from their husks. The other qualities of wine above enumerated depend on the relative proportions of the constituents of the must, and on the mode in which the fermentation is conducted. The essential ingredients of the must as a fermentable liquid are water and sugar, and a ferment. If the juice be very saccharine and contain sufficient ferment to sustain the fermentation, the conversion of the sugar into alcohol will proceed until checked by the production of a certain amount of the latter, and there will be formed a spirituous or generous wine ; if, while the juice is highly saccharine, the ferment be deficient in quantity, the production of alcohol will be less, and the redundancy of sugar proportionally greater, and a sweet wine will be formed. When the sugar and ferment are in considerable quantities, and in proper relative proportions for mutual decomposition, the wine will be strong-bodied and sound without any sweetness or acidity, and of the kind called dry ; a small proportion of sugar can give rise to only a small proportion of alcohol ; and, consequently, the less saccharine grapes will generate a comparatively weak or *light wine*, which will be sound and stable in its constitution, in case the ferment is not in excess, but otherwise liable to pass into the acetous fermentation and become acescent. In case the wine is bottled before the fermentation is fully completed, the process will proceed slowly in the bottles, and carbonic acid generated, not having vent, will impregnate the wine, and render it effervescing and sparkling.

The rough, or astringent wines, owe their flavor to a portion of tannic acid derived from the husk of the grape, and the acidulous wines to the presence of carbonic acid, or an unusual proportion of tartar. Several of the above qualities often co-exist; thus a wine may be spirituous and sweet, spirituous and rough, rough and sweet, light and sparkling, &c.

Wines are known in commerce by various names, according to their sources; thus Portugal produces Port and Lisbon; Spain, Sherry, St. Lucar, Malaga, and Tent; France, Champagne, Burgundy, Hermitage, Vin de Grave, Sauterne, and Claret; Germany, Hock and Moselle; Hungary, Tokay; Sicily, Sicily Madeira, and Lissa; the Cape of Good Hope, Constantia; Madeira and the Canaries, Madeira and Teneriffe.

Wines prepared from vinous fermentation, or wines prepared from *saccharine* fermentation, consist of a small portion of saccharine matter, suspended in a large quantity of water, and by the necessary requisites it is fermented, and when in this state it is a pleasantly acidulated liquid, caused by the presence of carbonic acid and alcohol, which is the result of fermentation. The farther progress of fermentation is checked by the addition of alcohol, and the flavoring ingredients are added, which are supposed to add to the fermented liquor a taste and aroma peculiar to wine fermented from the grape. The ingredients consist of aromatics, cane and grape sugar coloring, tannin, alkali, acid, starch, mucilage, perfumes, ethers, &c., with the view to different ends; thus sugar or honey for sour wines, grape sugar for pleasantly sweet wines, aromatics and alcohol for light-bodied wines, tannin for rough wines, and starch mucilage for poor and light wines, etc., etc. The length of time necessary for fermentation, the proportions of water, saccharine, and fermentative matter, and the quantity, quality, and effects of the aromatics, &c., added, are necessary in detail to the end of furnishing a comprehensive view of the manufacturing process generally.

The time of a vinous fermentation commencing is uncertain; much depends on the quality and composition of the liquid to be fermented; on its local situation, and the season or weather—the temperature should be uniform, and of about sixty to seventy degrees, and often the temperature has to be increased.

When fermentation is slow, it is facilitated by agitating or stirring the mass. The commencing of fermentation may be known by the fluid being in a higher temperature than that of the existing atmosphere, and can be distinguished by its taste, smell, and appearance. The length of time necessary for fermentation is from four to ten days. The best plan to ascertain when a fluid has fermented sufficiently, is by that infallible guide, the palate; if the fluid contains carbonic acid, it will be known by the liquid possessing that peculiar, pungent, pleasantly though slightly biting taste to the palate; the fermentation is discontinued by the addition of from five to fifteen per cent. of alcohol, though wines to keep well and prevent acidity should contain from eighteen to twenty-two per cent. of alcohol. Wines that become sour, turbid, or otherwise injured when exposed to the air, is owing to a deficiency of alcohol. Wine thus charged has a fine body, and a pleasant, heating taste to the palate. As a general rule the alcohol should be free from grain oil, as the odor is objectionable, and would tend to the destruction of any other odor that might be added. Alcohol unrectified is only suited for some of the light-bodied wines, where the odor is of no importance; in the cheaper wines, the smell of the grain oil can be concealed by the addition of aromatics.

The aromatics used to give the taste of wine are various; the most prominent are ginger, spice, cloves, calamus; horse-radish, ground mustard, etc., give to wines, liquors, and cordials, a peculiar aromatic, stimulating taste, that is found in pure wine.

Fresh bitter almonds, peach kernels, sweet almonds, give to wines and cordials a rich, nutty flavor. Care should be taken in selecting the fresh almonds, &c., as the rancidity would be clearly perceptible in a clean clear article of wine or cordial.

DIRECTIONS FOR THE MANUFACTURE OF WINES.

Sherry is of a deep amber color. The genuine has a dry, aromatic flavor, and fragrancy without any acidity. It ranks among the strongest white wines, and contains about 20 per cent., by measurement, of alcohol.

English Sherry—pale.—Chopped and mashed raisins, four hundred pounds; soft water, one hundred gallons; clarified sugar, forty pounds; white tartar, three pounds; cider, twenty gallons.

Let the above digest together for twenty days, in an air-tight tun or vat, frequently stirring the mass well, say once every twenty-four hours; then add thirty-five gallons of neutral spirit of sixty per cent.; oil of bitter almonds, dissolved in the spirit, one ounce; oil of cassia, half ounce; tincture and spirit of orris-root, one quart. Add a half dozen each of oranges and lemons, cut in slices; allow it to stand ten days, and fine with one quart of milk. Add the milk while hot.

The raisins contemplated in these formulas are unsound—such as are unmerchantable, and in the last stages of decay.

The operator will recollect that honey is superior to any kind of sugar. One gallon of honey yields ten pounds of saccharine matter, and in all instances the honey should be used in either liquors, wines, or cordials.

Honey, Sugar, Syrup, &c.—Starch mucilage gives to wines the appearance of age, a good body, and a creamy taste. The honey, &c., is added by first dissolving it in water. The starch is added by passing the liquid through a bed of starch, or adding it in the form of flour paste. The mucilaginous quality is given by infusing any vegetable that contains mucilage that is not precipitated by alcohol, as, for instance, slippery elm bark. Raisins, tartar, grape sugar, are added to the ferment all for the same purpose—that of imparting a vinous taste and smell to the liquid. The raisins possess the power to the greatest extent; before use they should be well bruised or mashed, the better to enable the fluid to act on them.

A good imitation of wines can be made from fermenting raisins; the taste and smell that they yield it would be difficult to obtain elsewhere, other than the wine itself.

Tannin is used in the form of catechu for roughening wines; alkali for correcting wines, and forming dry wines, in which neither acid nor sweetness predominates.

The odor is derived from essential oils, heavy oil of wine, raisin spirit, butyric and acetic ether, spirit of prunes, and Jamaica rum. The coloring is derived from burnt white sugar, cochineal, red beets, English saffron, and gamboge.

In Europe, and some parts of the United States, manufacturers ferment turnips with radishes, white sugar beets, currants, gooseberries, &c., &c. These articles can be dispensed with, as they are not always convenient or in season; and thus the manufacturer has been compelled to find substitutes, which has been done at a more economical cost.

The customary formula for using beets and turnips was, three bushels of turnips, one hundred and twenty-five gallons of water, and one peck of radishes, allowed to ferment until pleasantly sour to the taste, and then charged with honey, coloring, etc. Turnips are preferable to beets, as beets leave a somewhat unpleasant taste, though sugar, aromatics, and spirit will conceal it. A very fine champagne is prepared from fermented turnips and radishes, but nothing superior to some other formulas.

2d Sherry.—Wort from pale malt of double strength, one hundred gallons; light brown sugar, sixty pounds; honey, four gallons; ferment in an open vat or cask, then rack and add fifteen gallons neutral spirit; bitter almonds, bruised, four ounces; cassia and cloves, bruised, one ounce each; four ounces orris-root; let these macerate in the wine for two weeks, then fine with a quart of boiled milk.

When this wine is to be bottled, one gallon of Lisbon is added to eight, which greatly improves its taste, &c.

3d Sherry.—Cider, ten gallons; bitter almonds, four ounces; honey, one gallon; mustard, four ounces. Boil for thirty minutes and strain, then add spirit of orris-root (see directions for Preparing Aromatic Spirits), one half pint; essence of cassia two ounces ; and rum, three quarts. Jamaica is preferable, as this wine, when made from this formula, is often prepared for the *auctions*. The amount of neutral spirit added, becomes an important item, owing to its cost. When this is kept in view, the tincture of grains of paradise should be substituted for spirit, and in its use the palate will guide the operator ; but when the addition of spirit is required, it should be added in the proportion of five to fifteen per cent., and the tincture of grains of paradise may be combined with the neutral spirit.

Port Wine is of a deep purple color, and when new, is of a rough, strong, and slightly sweet taste. From long keeping, it deposits a large portion of its astringent matter, and loses a great part of its sweetness and acquires more flavor, and retains its strength. If too long kept, it deposits the whole of its astringent and coloring matter, and becomes deteriorated. Large quantities of neutral spirit are added to it, which causes its heating quality to the palate. It is the strongest of the wines in common use.

Port Wine.—Claret, one hundred gallons ; honey, strained, twelve gallons ; red tartar, one pound ; powdered catechu, twelve ounces ; wheat flour, made into a paste, one pint ; neutral spirit, twelve gallons ;

two ounces each of bruised ginger and cassia, one pint of tincture of orris-root, and color with alkanet root, or dissolve six ounces bruised cochineal in a gallon of the above spirit, and one pint of burnt sugar; this will produce the desired shade of purple. For giving artificial strength, use tincture grains of paradise, and the decoction of strong tea, in quantities to suit the palate.

If this is not perfectly transparent, fine with milk or isinglass. See directions under the head of "Finings," for their use.

Port Wine—Cheap.—Cider or claret, twenty gallons; honey, two gallons; carbonate of soda, twelve ounces; strong tincture grains of paradise, one and a half gallons; powdered catechu, five ounces; color with a strong tincture of logwood and a small portion of burnt sugar. The reader observes that this wine is made without the addition of any spirit, though a small portion would greatly improve it.

The object of the carbonate of soda is to neutralize a portion of acid in the wine or cider, which, if allowed to remain, would present too large a proportion of acid for good port.

Madeira Wine is the strongest of the white wines in general use. It is a slightly acid wine, and when of the proper age and in good condition, has a rich, nutty, aromatic flavor.

Madeira Wine.—Take white wine, ten gallons; honey, ten pints; of equal parts of rum and neutral spirits, ten pints; five ounces of hops, one fourth pound of bitter almonds, mashed; one pint of flour paste; mix and allow it to stand for five days, then fine with a pint of boiled milk.

Madeira Wine—Cheap and good.—Water, twelve gallons; honey, one gallon; clean spirit, five quarts; hops, five ounces; bitter almonds, three ounces. Boil for twenty-five minutes, and allow to ferment by the addition of a quart of yeast; allow the fermentation to continue until the liquor tastes pleasantly acid, then fine with milk, and add three quarts of rum and four ounces of mustard—allow it to stand for a few days—the mustard should be inclosed in a thin piece of muslin and be suspended in the wine. If this wine should need more body, it can be given by the addition of clean spirit, or when it is only to be kept for a short time, the body may be given by the aid of tincture of paradise. Those preferring it, can use for making Madeira, thus:—Sherry, ten parts; port, four parts; raisin spirit or tincture of prunes, one part; and ten drops sulphuric acid for every gallon.

Teneriffe is a white wine of a slightly acid taste, and when of a good quality, of a fine aromatic flavor. Its average strength is about the same as that of sherry. It is made from the same grape as Madeira, to which it bears a close resemblance. The imitations of this wine are the same as those of sherry. By the addition of raisin spirit, one tenth; or acetic ether, five ounces, to twenty gallons; or rum, one gallon, to fifteen of the wine.

Claret, Vin de Bordeaux, is a red wine, and from its moderate strength, is ranked as a light wine. It is of a deep purple color, and when good, of a delicate taste, in which the vinous flavor is blended with a slight acidity and astringency.

Imitation Claret. — Boiled cider, five gallons; spirit, two gallons; clear water, five gallons; catechu, powdered, two ounces. Color with red beets and tincture logwood, to suit taste. When this is not sufficiently acid, add from one to two drops of sulphuric acid to the gallon, to suit taste.

Imitation of Red Wine.—Clean, sour, or hard cider, one hundred gallons; warmed and strained honey, ten gallons; sliced red beets, thirty-five pounds. Allow this to ferment by the assistance of a quart or three pints of yeast, from five to eight days, in a warm or sunny position, then draw off into suitable casks for market; then add two gallons of rum, two grains of ambergris, well rubbed up in a table-spoonful of white sugar; and spirit, five to ten gallons, and five ounces powdered catechu. If the color should be too bright, darken it to suit taste with tincture of logwood, and if not sufficiently sharp, add sulphuric acid by small quantities, until the desired taste is produced.

Imitation of Red Wine—Cheap.—Water, one gallon; sulphuric acid, to the strength of weak vinegar; honey, one pint; powdered alum, one half ounce; one sliced red beet, and half pint strong tincture of logwood; one drop oil of wintergreen, dissolved in a wine-glassful of alcohol; and one half of a grain of ambergris, rubbed up in sugar; one pint tincture of grains paradise. Any kind of bright sugar or syrup, will answer in the place of the honey, and in less quantities. This wine, when prepared on a large scale can be made at a very low price, as the honey is the *only* article that is of value—the tincture of the grains of paradise being substituted for spirit—and any quantity of it can be prepared at the shortest notice, the coloring is kept prepared in barrels for use; when the beets are added, the mixture is allowed to stand for the coloring to become discharged from them for several days.

White Wine Imitations.—Cider, one hundred gallons; warmed and strained honey, seven gallons; clean spirit, five gallons; milk whey, five gallons; hops, eight ounces. Boil, ferment, and fine, with milk. The above milk whey is formed thus: one gallon of sweet milk, and four gallons clear water; stand together for twenty-four hours.

White Wine—Cheap.—Clear soft water, one hundred gallons; honey, eight gallons; yeast, three pints; keep in a warm place in the sun until fermentation causes a pleasant acidity to the taste, then add bruised bitter almonds, five ounces; ground mustard, four ounces; five gallons tincture of grains paradise, four gallons clean spirit, and six ounces horseradish. Allow the mass to stand four days, and then fine with three pints of boiled milk, to be added while hot.

Imitation of White Wine—Cheap.—Clear water, one hundred gallons; sulphuric acid, added to produce the strength of weak vinegar; honey, eight gallons; tincture grains of paradise, five gallons; bruised bitter almonds, five ounces; bruised horseradish, eight ounces; five ounces of hops. This mixture should stand for thirty-six hours, and about one third of the whole should be passed through a common barrel filter. The first bed should be of a mixture of one half of ground, and the other of whole rice, to the depth of eight inches, and then through a bed of white sand to the depth of eight or ten inches; the sand to be packed with alternate layers of straw, the better to enable the fluid to filter with greater rapidity; this filtered portion is to be added to the whole. This filtering process imparts to the wine a good body and a clear white color. This is the most economical mode in use for improving wines, as the process can be applied to any of the wines. The fluid, in its course through the rice, becomes charged with minute particles of starch, &c., from the rice, which, if attempted by digesting them together, would fail, and in its passage through the sand it is deprived of all the coarse particles that could be detected by the naked eye.

The wine that has been filtered through any starch or gelatinous substances, will soon pass into fermentation, unless it contains a large portion of spirit, say from fifteen to twenty per cent. of pure spirit. Those formulas in this work, prescribing filtration, contain an excess of sulphuric acid, which will retard fermentation.

The operator will only "make up" this article as it may be wanted.

Sweet Malaga—Imitation.—Cider, ten gallons; inferior raisins, twenty-five pounds; honey, two gallons; clear soft water, twelve gallons; boil briskly for half an hour; strain and barrel; then, raisin spirit, one quart; or high flavored rum, one gallon; clean spirit, two gallons.

Sweet Malaga Wine—Cheap.—Damaged raisins, fifty pounds; water, one hundred gallons; honey, four gallons; of bruised ginger, five ounces; cassia, three ounces; boil for forty minutes, then strain into clean pipes for market; add four gallons tincture grains of paradise, two gallons of rum, and five ounces bruised bitter almonds.

Sparkling Catawba Wine—Imitation.—Raisins, one hundred pounds; sweet cider, thirty-five gallons; water, one hundred gallons; boil, and add three pints of yeast; ferment for twelve days, then add ten gallons of honey, twelve gallons clean spirit, one grain ambergris, rubbed well with two ounces white sugar, and added; and four gallons Jamaica rum, twelve ounces spirit of orris-root, and fine the whole with three quarts of boiled milk, added while hot.

Muscadel Wine—Imitation—Is a mixture of equal quantities Madeira and claret, by the addition of a pint of honey to every three gallons.

Champagne.—Cider, sixty gallons; clean spirit, three gallons; honey, two gallons and a half; boil and ferment; fine with milk.

2. Water, ten gallons; raisins, ten pounds; honey, one gallon; boil, skim, and ferment with yeast for ten days, using one quart of yeast; after it is drawn off in other barrels, five ounces tincture of orris, one gallon of spirit, and five drops each of lemon and orange oil, dissolved in a wine-glass of alcohol.

CHEAP CHAMPAGNE AND CHAMPAGNE CIDER.

The manufacture of the above articles is well worthy of the exclusive attention of a party who is desirous of making large profits from small investments, the operation requiring little room, and but little attention. The fixtures and appurtenances are few and simple, and the article in question can be manufactured at such a low figure that the most ruinous auction prices will pay a handsome profit.

The best champagne is made from good cider, being fermented with honey. See Formula.

Cheap Champagne.—Water, fifty gallons; honey, two gallons; bruised ginger, five ounces; ground mustard, five ounces; boil the mass for thirty minutes, and when quite cool add a quart of yeast; ferment for ten to fourteen days, first add six ounces of bitter almonds, bruised; spirit, and grains of paradise tincture, to suit convenience. The more spirit the champagne possesses, the greater will be its body. For coloring, use cochineal, half an ounce, to fifty gallons. The cheapest coloring is red beets, sliced, and added to the mass during fermentation. Five or six common-sized beets will color fifty gallons. The best of this coloring will not compare with cochineal.

Large casks, boxes, or vats made of wood, are suited for fermenting the champagne. In bottling, the cheapest plan is, after they are corked and wired, to dip them in a melted solution of one part of turpentine, one of tallow, and five of rosin, rendered fluid by heat; before this is completely dry on the cork and neck of the bottle, lay on gently one of the leaves of Dutch metal, and press it gently all around the neck, by the assistance of three or four layers of a handkerchief. This looks very neat, and can be done at a trifling cost, as the Dutch metal for each bottle could scarcely be estimated; the labels will of course be prepared by the lithographer by the quire. When bottling, if a table-spoonful of white sugar, or honey, be added to each bottle before corking, it will greatly improve it.

A fine aroma is added to the champagne by adding five drops of spirit of orris, or three drops of essence of wintergreen, or essence of vanilla, four drops; or dissolve five grains of ambergris in half a glass of pure alcohol; the alcohol should be kept hot for half an hour; this should, when dissolved, be added to fifty gallons of champagne. For making the above spirits and perfumes, directions will be found in another part of this work.

The drops of perfume above mentioned, are intended for each bottle. This perfume is to be well fined with milk if necessary.

To make this "pink champagne," add two ounces of bruised cochineal.

Sweet Cider—Imitation.—Water, one hundred gallons; honey, five gallons; catechu, powdered, three ounces; alum, five ounces; one quart of yeast; ferment for fifteen days in a warm position in the sun; then bitter almonds, half a pound; cloves, half a pound; burnt sugar, one quart; three gallons whiskey; if acid predominates, correct it by the addition of honey or sugar; if too sweet, add sulphuric acid to suit taste.

Cider—Imitation, Cheap.—Water, thirty-five gallons; sulphuric acid, sufficient to render the water pleasantly sour to the taste; clear brown sugar, fifty pounds; add four ounces of alum, five ounces of ginger, five ounces of cloves, six ounces of bitter almonds; boil these four last ingredients in two gallons of the above fluid for two hours; strain, and add this decoction to the thirty-five gallons; if desired of a deeper color, add burnt sugar. From three to four gallons of whiskey will give this a very good body. Some manufacturers add two gallons of strong decoction of boiled dried peaches to every barrel before sending it off. The above specimen of cider will answer very well for manufacturing wines, &c., &c.

XIII.

CORDIALS.

THE spirit used in the manufacture of cordials should be free of grain oil, or what is denominated clean spirit. The sugar should be refined; but in all instances honey is to be preferred. The same finings apply here as those used for other liquors, and in the same proportion.

Anisette de Bordeaux.—Common whiskey, one gallon; water, one gallon; honey, one gallon; one drachm oil of aniseed, dissolved in a wine-glass of alcohol.

Cheap Anisette de Bordeaux.—Clean clear water, thirty-five gallons; white sugar, thirty-five pounds; tincture grains of paradise, two gallons; common whiskey, five gallons; half an ounce oil of aniseed, dissolved in a pint of alcohol.

Anisette—Common.—Water, thirty gallons; white sugar, twenty-five pounds; tincture grains of paradise, two gallons; caustic potassa, three ounces; to prevent fermentation, one ounce oil of aniseed, dissolved in a pint of alcohol, or well rubbed up with a pound of the sugar.

This last formula contains no spirit, as the tincture is substituted for spirit; the alkali prevents fermentation. The large amount of oil added greatly improves the taste, and conceals any deficiencies that would be otherwise noticed.

For coloring a beautiful rose red, bruise or mash in a mortar, or within the folds of a piece of linen, one and a half ounces of cochineal, add this to forty gallons; for the lighter shades of pink lessen the quantity of cochineal.

For any desired shade of yellow, use gamboge. For particulars, see Coloring, in another part of the work.

For barrelling anisette, thirty gallon pipes (4ths), are used; if the cordial is white, the head is plastered white. The color of the plastering on the head partakes of the color of the contents of the barrel; for example, if the liquid is rose, or pink, use Venetian red, in the plaster of Paris, which is merely mixed with water, and the desired coloring worked in dry, that is, the coloring matter is thrown in dry, and worked up with the plaster, by the addition of water, to bring it to the consistency of batter, and must be mixed and applied with rapidity, as it hardens immediately; never mix more than is needed, for when it sets, it is unsuited for any purpose. For coloring yellow, use yellow ochre. For fawn color, use a small portion of Venetian red and yellow ochre. No liquor or cordial should be colored without first being well fined.

Curaçoa.—Neutral spirit, five gallons; fresh orange peel, four pounds; oil of bitter almonds, one drachm, and oil of cassia, one drachm, dissolved in alcohol; honey, six quarts; Brazil wood, three ounces. Mix. Stir every day for two weeks. If not sufficiently clear, add boiled milk, and a common teacupful of burnt sugar. For a more common article, proof whiskey may be substituted in the above for neutral spirit.

Curaçoa—Common and Cheap.—Tincture of grains of paradise, five gallons; whiskey, three gallons; water, twenty-eight gallons; honey, four gallons; white sugar, fifty pounds; oil of orange, one ounce; bitter almond oil, half an ounce; oil of cassia, one ounce; oil of cloves, two drachms. Cut up or dissolve these oils in a pint of alcohol. The oil of almonds to be dissolved separately from the other oils When dissolved, add the whole of them. For coloring, add eight or ten large red beets cut in slices, and a pint and a half of burnt sugar coloring. Allow the mass to stand until the coloring is exhausted from the beets , then, if not sufficiently clear, fine with a pint of boiled milk.

For making a fine sample of curaçoa, use about four pounds of sugar or a quart of honey per gallon, and color with cochineal and burnt sugar.

Maraschino.—Whiskey, one gallon ; oil of bergamot, one drachm ; oil of cloves, one drachm ; spirit of nutmegs, four ounces ; oil of orange, three drachms ; oil of lemon, one drachm ; oil of bitter almonds, one drachm ; oil of cinnamon, three drops. Mix, by heat, one gallon of honey with six quarts of water ; and when cool, mix with the above. In manufacturing this, as in all other cordials and liquors, the tincture of grains of paradise can be substituted for alcohol.

The operator should bear in mind that all essential oils must be dissolved in alcohol, or their particles minutely separated by being well rubbed up in dry sugar, though the dissolution of the oil by alcohol is to be preferred. The whiskey used in these cordials does not contain spirit sufficient to act on the oils. Quart bottles are the most convenient articles for dissolving essential oils in.

Ratafia d'Angelique.—Angelica seeds, two ounces; blanched bitter almonds, ten ounces; whiskey, ten gallons; twenty pounds of sugar dissolved in two gallons of water. Digest for twelve days, and fine.

Ratafia de Fleurs d'Oranges.—Fresh orange flowers, twelve pounds; clean spirit, five gallons; honey, two quarts, dissolved in one gallon of water. Macerate for two weeks, and strain.

Ratafia de Noyeau.—Bruised bitter almonds, three ounces; whiskey, one gallon; honey, one quart, dissolved in three pints of water; bruised cassia, a quarter of an ounce; bruised cloves, a quarter of an ounce. Mix and digest for fifteen days, and strain.

Rose Cordial.—Honey, eight gallons; water, thirty-three gallons; red rose leaves, four gallons. Put them hot into a cask with a pint of yeast, and ferment. Afterwards add four gallons of clean spirit, one and a half ounces of powdered cochineal, and five ounces of powdered orris root. Allow it to stand one month, and bottle.

Orange Oil.—Oil of orange, dissolved in alcohol, one ounce; oil of lemon, the same quantity; spirit of orris-root, one pint; essence of ginger, three ounces; clean spirit, two gallons; powdered mustard, four ounces; three gallons of honey dissolved in one gallon of water. Mix well, and pass through the filtering bag.

The oils of orange and lemon to be cut up in alcohol, and mixed with the two gallons of spirit; then half an ounce of English saffron for a fine yellow color.

Ratafia.—Take of nutmegs, eight ounces; bitter almonds, six pounds; ambergris, five grains, rubbed up in a small portion of sugar; honey, three quarts, dissolved in three pints of water. Mix the above with seven gallons of clean spirit. The nutmegs and bitter almonds should be mashed or bruised. The bitter almonds should be well mixed with the honey and water before adding it to the mass. When the ingredients are well mixed, pass them through the filtering bag.

Pineapple Cordial.—Clean spirit, one gallon; water, two gallons; honey, two quarts; bruised bitter almonds, six ounces; butyric ether, two ounces. The almonds should be fresh.

Butyric ether is distilled from rancid butter, by first saponifying the butter with alkali, and distilling it with sulphuric acid. This ether possesses a powerful odor of pineapples.

This ether is also used for flavoring common ale, which is known under the name of pineapple ale. It is used in the proportion of six ounces to forty gallons.

Crême de Macarons.—Proof whiskey, one gallon; water, one and a half gallons; honey, one gallon; bruised bitter almonds, half an ounce; powdered cloves, fifty grains; powdered cinnamon, fifty grains; powdered mace, fifty grains. Color to slight violet with turnsole and cochineal. Macerate for ten days.

Crême de Noyeau de Martinique.—Clarified sugar, one hundred pounds; clean spirit, fifteen gallons; orange flower water, half a gallon; bruised bitter almonds, four pounds; essence of lemon, one ounce; water, twenty-five gallons. Macerate the almonds and the essence in the spirit for fourteen days, then add the sugar, previously dissolved in the water Allow them to digest together for one month.

Crême des Barbadoes.—Sliced lemons, two dozen; clarified sugar, thirty pounds; proof spirit, three gallons; water, four gallons; six large citrons, fresh balm leaves, half a pound. Put the fruit in the spirit, and macerate for four days; then pour the water on the balm leaves, and steep for half an hour, and then strain the liquor on the sugar, and lastly add the spirit.

Crême d'Orange.—Sliced oranges, six dozen; orange flower water, one gallon; clean spirit, four gallons; English saffron, half an ounce. Macerate for two weeks, and then add twenty pounds of white sugar, and two gallons of honey dissolved in ten gallons of clean, clear water.

Eau de Melisse.—Spirit of lemon peel, two quarts; spirit of nutmegs, one quart; spirit of coriander, one quart; spirit of rosemary, one pint; spirit of marjoram, one pint; spirit of thyme, one pint; spirit of hyssop, one pint; spirit of cassia, one pint; spirit of sage, one pint; spirit of aniseed, one pint; spirit of cloves, one pint; spirit of angelica, one pint; honey, two gallons; whiskey, four gallons; water, three gallons. Mix the honey and water; then mix the whole mass. Allow it to stand for four days. Color with half an ounce of bruised cochineal.

Eau Divine.—Essence lemon, one drachm ; bergamot, one drachm ; spirit, one gallon ; macerate for four days, frequently shaking the mixture ; then add water, two gallons ; sugar, four pounds ; orange flower water, one pint ; mix and filter through sand.

Elephants' Milk.—Benjamin, four ounces ; alcohol, two gallons ; balsam of tolu, one ounce. Dissolve—then add sugar, twenty pounds, dissolved in three gallons of water ; mix well, and strain through a filtering bag.

Almond Milk.—Sweet almonds, one ounce ; bitter almonds, three ounces ; white sugar, one and a half pounds ; clear water, two pints.

Remove the husks from the almonds by steeping them in hot water for a few minutes ; by rubbing them together, the husk will rub off ; then beat them in a mortar with the sugar, and add the water gradually. Lastly, strain, and add half a glass of orange flower water, or the same of nerolia. For instructions in manufacturing essences, spirits, and perfumes for liquors and cordials, look under their appropriate heads in this work.

English Frontignac.—Water, six gallons ; white sugar, twelve pounds ; mashed raisins, six pounds.

Boil these together for one hour, then add one peck of elder flowers, and put them in the liquor when it is nearly cold. The next day put in a tumbler of good vinegar, and a pint of good yeast; then put it in a clean cask, with twelve pounds of raisins, and bottle in three months.

Gold Cordial.—Angelica root, four pounds; oil of orange, fifty drops; raisins, five pounds; bruised coriander seeds, half a pound; bruised caraway seeds and cassia, each half a pound; bruised cloves, two ounces; English saffron, two ounces; sliced liquorice root, two pounds; clean spirit, fifteen gallons. Macerate for twelve days; add sugar, thirty pounds, dissolved in five gallons water; mix, and fine with egg or milk.

Ratifia à la Violette.—Orris-root powder, four ounces; archil, four ounces; neutral spirit, two gallons. Digest for one week, then add honey, three quarts, dissolved in four pints of water. Mix and strain; color with turnsole to suit taste, by allowing the coloring matter to digest with the liquor several days.

Sunny South (*Cordial*).—Water, five gallons; honey, three gallons; mix. Take three gallons of whiskey, and digest three pounds of prunes in it for a week, and dissolve ten drops of oil of sassafras, five drops of oil of partridge-berry, and fifteen drops of oil of lemon in half a pint of alcohol ; and to the above three gallons of whiskey with the prunes, add one pound of nutmegs, half a pound of cloves, and four ounces of ginger, all well bruised ; also, one ounce of cochineal. Allow the whole of the above, along with the prunes, to digest for one week, and then strain through flannel, and mix the whole. This will be of a deep red color.

Cream of Juleps.—Refined sugar, two pounds ; sweet almonds, blanched, one pound. The almonds are blanched by being heated in warm water a few moments, and then rubbing them through the hands, until the husks rub off. Work the almonds to a paste with an addition of the sugar and water. This should be done in a mortar ; then strain through a linen cloth, and mix the remainder of the sugar with one and a half pints of water ; then add half an ounce of essence of peppermint.

Milk of Juleps.—Benjamin, one quarter pound clean spirit, two gallons ; balsam of tolu, one ounce ; dissolve ; then add refined sugar (in three gallons water) twenty pounds ; essence of peppermint, one-quarter ounce ; essence of cloves, ten drops ; essence of ginger, twenty drops.

Peach Juice Cordial.—Honey, two and a half gallons, dissolved in one gallon water ; sulphuric acid, half an ounce ; rum, four pints ; powdered mustard, four ounces ; powdered catechu, one ounce ; cinnamon bark, broken to small pieces, three ounces ; digest these last named articles in the rum for thirty-six hours, and then strain ; to this add acetic ether, one ounce ; spirit of vanilla, two ounces ; tincture of cochineal, four ounces.

Sarsaparilla Cordial.—Honey, two gallons ; water, two gallons—mix ; whiskey, three quarts ; calamus, two ounces ; cloves, three ounces ; powdered liquorice root, eight ounces ; digest these three last named articles in the three quarts of whiskey for twenty-four hours ; then strain and add ; then dissolve in four ounces of alcohol, oil of sassafras, oil of anise, each twenty drops ; oil of partridge berry, six drops. Color with tincture of cochineal four ounces, burnt sugar coloring five ounces, if necessary ; fine with five eggs.

Strawberry Juice.—Honey, two gallons ; water, one gallon ; tartaric acid, two ounces ; strawberries, two gallons ; clean spirits, half gallon.

The strawberries are put in a bag and subjected to pressure ; the expressed juice is then added to the honey and water.

Raspberry Juice.—Same as strawberry.

Jessamine Cordial.—Clarified sugar, twenty pounds; water, three gallons ; decoction of strong tea, one quart ; half gallon whiskey ; sweet almonds, husked or blanched by standing in hot water, and rubbing them through the hands until the husks are removed, one pound ; they should be worked to a stiff, fair paste in a mortar, by the addition of a quart of water ; then strain through a linen cloth, and add the strained liquid to the above. Spirit of jessamine, two ounces ; ambergris, two grains, rubbed well with sugar (about two ounces). This cordial is colored yellow, with a tincture of saffron or gamboge. The whiskey mentioned in the text should be uncolored.

Aromatic Cordial.—Digest in five gallons of whiskey for five days, one quart of orange peelings ; four ounces of cloves ; six ounces of bruised ginger ; half pound of ground mustard. Strain off the spirit, and add to this, dissolved in alcohol, one-quarter ounce of cinnamon ; same of oil of cloves ; twenty drops oil of sassafras ; ten drops oil of orange ; one-quarter ounce oil of lemon ; five drops oil of anise. Then dissolve twenty-five pounds of refined sugar in one and a half gallons of water, and add it to the whiskey as above. This is colored by the addition of one-quarter pint of burnt sugar coloring.

Almond Cordial.—Honey, two gallons ; clean spirit, two quarts ; water, to dissolve honey, three quarts ; blanched sweet almonds, worked into a stiff paste in a mortar, four pounds. This paste is washed on a fine sifter, with one quart of water. The water is passed through the paste repeatedly, and is then added to the honey and spirit, with twenty drops oil of almonds, dissolved in one ounce of alcohol. The spirit used should be colorless. Color with two ounces tincture of gamboge, and one ounce of burnt sugar.

XIV.

THE MANUFACTURE OF SODA, MINERAL,

AND OTHER

CARBONATED WATERS,

WITHOUT THE USE OF ANY APPARATUS, AND ALSO FOR THE MANUFACTURE OF ALL KINDS OF ACIDULATED BEVERAGES BY FERMENTATION.

SODA WATER.

FILL two thirds full, a soda fountain or a well hooped oaken keg; this keg may be of any convenient size and well bound with iron hoops, and should be air-tight, to prevent the escapement of gas; the keg should be arranged, in every respect, that it would be if any other fluid was to be drawn from it, with the exception that a VENT-HOLE will be unnecessary. Fill this two thirds full of clean soft water, and to every gallon add of super-carbonate of soda and tartaric acid, of each from one to three ounces. The more acid and alkali that is added, of course will generate a greater quantity of carbonic acid gas, and hence the briskness and effervescence will be increased in a greater ratio.

The soda and acid should, in separate parcels, be coated with sugar ; this will be easily done by stirring them into hot melted sugar, and allowing it to cool. The object of this is to prevent the too rapid dissolution of these articles at the moment that they are added to the water in the keg.

This being concluded, the keg or fountain should be closed immediately.

The syrups for this beverage will be found under the proper head.

Carbonic Acid Water is commonly called "Soda Water" and "Mineral Water." The former name originally applied to the preparation when it contained a small portion of carbonate of soda, being from habit continued since the alkali has been omitted, and as this water is largely consumed as a beverage, a sketch of the apparatus employed in its manufacture may prove interesting to the non-professional reader.

This consists of a generator, gasometer, forcing-pump, reservoir or fountain, and refrigerator. The generator is usually formed of a wooden tub something like a churn, into which the diluted sulphuric acid is put; on this is luted a small cylindrical wooden vessel, through the bottom of which passes a wooden stirrer ; this vessel is filled with marble dust, which, by the movement of the stirrer, is made gradually to fall into the acid below, generating the carbonic acid, which, by a lead pipe, is conducted into a gasometer ; this is a large cylindrical tub, in which another is inverted, suspended by a pulley. As soon as the gasometer is full, which should have five or six times the capacity of the reservoir, the operation of condensing the gas into the latter is commenced. This is effected by a condensing pump, the chamber of which is made to communicate by leaden tubes on opposite sides with the gasometer and reservoir. The latter, usually called the fountain, is a very strong cylindrical copper vessel, with hemispherical extremities, tinned on the inside, and before receiving the carbonic acid, it is nearly filled with water. When the water has been duly charged with the acid gas, it is drawn off as it is wanted, by means of a stop-cock, connected with a tube which passes to the bottom of the reservoir. The tube may be of any desired length, so as to draw off the water at a distance from the reservoir, or the fountain can be placed under the counter, allowing the water to pass through a serpentine or worm, which is packed with ice. This serpentine terminates in a tube provided with a stop-cock above the counter.

The acid gas for the impregnation of the water, is always obtained from marble dust by the action of sulphuric acid, these being the cheapest materials for the purpose. Chalk may also be used, but is objectionable on account of its communicating an unpleasant smell to the carbonic acid. When sulphuric acid is employed, sulphate of lime is formed, which interferes with the action of the acid, and hence it is necessary to stir the mixture to render the decomposition of the carbonate complete.

EFFERVESCING SARSAPARILLA.

Take a keg similar to that mentioned under the head of Soda Water, and to every gallon of clean rain water, add one pint of the decoction of liquorice root, which is formed by boiling three ounces of the root for one hour in a pint of water, then proceed to add to every gallon of the water, white or brown sugar, one quarter of a pound ; oils of sassafras and aniseed, of each, ten drops ; oil of wintergreen, six drops ; brandy coloring or burnt sugar, one quarter of a pint ; infusion of ginger, one pint. This infusion is prepared by boiling for one hour, four ounces of bruised ginger to every pint of water, and then straining. Having added to the keg the water, the decoction of liquorice root, the sugar—having first worked the oils up well in a small portion of the sugar—the burned sugar, the infusion of ginger, then add to every gallon of the water, two ounces each of tartaric acid and super-carbonate of soda. To make this very brisk, double the quantity of the soda and acid. These two articles must be inclosed in sugar the same as for soda water

RULES TO BE OBSERVED IN THE MANUFACTURE OF FERMENTED BEVERAGES.

Fermentation. — Under favorable circumstances, among which may be enumerated a uniform and proper heat, a sufficiency of fermentable matter, as yeast, saccharine matter, &c., the necessary amount of fermentation may be effected in a space of time varying from twelve to seventy-two hours. When fermentation sets in, it will be indicated by a frothy, foamy matter floating on the surface of the liquid. Usually, this froth is skimmed off, and when it discontinues rising, the fermentation is checked by the formation of alcohol. When the fermentation has reached this point, a sufficiency of carbonic acid has been generated in the liquid for the purposes of a beverage. The liquid will have a lively, sparkling, frothy appearance, and will be of a pleasantly biting and acid taste. At this point, it should be drawn into a fresh cask or bottle, and when the liquid is to be kept for any length of time, it should have from five to fifteen per cent. of proof spirit added, which prevents the farther progress of fermentation.

HONEY, SUGAR, MOLASSES, AND LIQUORICE ROOT.

The advantages resulting from the use of honey in fermented beverages, are to be found in its feebly aromatic taste, and a peculiar quality that honey possesses when suspended in water, of commencing and sustaining a rapid fermentation, and hence a beverage that is to be formed or fermented immediately, should be composed of water, honey, yeast, &c.

Refined sugar is most generally used when the liquid is to be colored. The sugar contains no impurities that are liable to dissolve and render the liquid cloudy and heavy, which would be the case if brown sugar or liquorice root were made use of.

Brown sugar should be used in liquids that are to be of a brown or dark color, as ale, &c.

Liquorice root should be used when a sweet after taste is required, that is, a sense of sweetness remains after a liquid containing liquorice root has been swallowed. This taste is one of the peculiarities of the different preparations of sarsaparilla, porter, ale, and some cordials.

Molasses will only suit for manufacturing ale and porter, and also for any fermented beverage that is made without regard to color, as liquids fermented from this source will be of a muddy color.

FALSE STRENGTH FOR BEER, &C.

Besides checking fermentation, spirit in the form of alcohol, neutral spirit, or whiskey in small quantities, gives to fermented liquids a desirable taste and an excellent body, *i. e.* a spirituous body.

When cheap liquids are to be formed as a substitute for spirit, grains of paradise are made use of. They should be ground and infused in the liquid during fermentation, or the infusion may be obtained by digesting the grains in whiskey. It must not be understood that the grains will check fermentation; their infusion only leaves impressions on the palate after being drunk, that are analogous to alcohol or spirit. Thus a beverage may be formed that will exhibit all of the sensible properties of alcohol to the palate, without any of its intoxicating influence.

Pellitory is sometimes combined with the grains, but the tingling, disagreeable impressions left in the throat and mouth after the liquid has been swallowed, render the use of this acrimonious substance objectionable.

Ground mustard or horseradish are both used for the same purpose as the articles just mentioned. The properties of mustard and horseradish are identical —these properties are destroyed by heat—as boiling water, &c.

The use of Bitters in Ale and Porter.—Ale and porter are considered to be the healthiest of all of the fermented beverages, owing to the tonic and nutritive properties that these liquids derive from the presence of starch, and the bitter principle of the hops.

To avoid the costly price of the hops, the small dealers and bottlers of ale and porter, as a substitute for the bitter of the hop, make use of quassia, nux-vomica or strychnin, aloes, catechu, pellitory, long pepper, wormwood, gentian ; and for a false strength, similar to alcohol, cocculus indicus, copperas, and grains of paradise.

Clarification can be effected by filtration through sand and charcoal. These consist of alternate layers or beds of sand and powdered charcoal ; each bed or layer is six to eight inches deep, and may consist of five or six layers of each, and can be packed in a wine pipe or other convenient vessel. The fragments of charcoal for this purpose should be of the size of a garden pea.

The most convenient plan for clarifying, is by the aid of finings, such as eggs, milk, and isinglass. The milk should be added while it is boiling, and the isinglass should be bruised to shreds before adding. The use of eggs will be mentioned under the head of Coloring.

COLORING.

No fluid can be successfully colored that is not perfectly clear and colorless of itself; and when it is charged with coloring matter, the fluid will always retain its transparency. The first step then towards coloring these beverages, will be to clarify the water while it is boiling, with the articles that are usually added; to every three gallons of water add one egg, whisked to a froth.

The coloring substances, which are most commonly used, are red, yellow, and brown. The red is obtained by infusing bruised cochineal, sanders wood, or logwood; the yellow from gamboge, or saffron, and the brown from burned sugar, and a purple from turnsole. The necessary coloring substance should be added to the water while it is boiling, and should remain in the liquor until it has yielded the necessary quantity of coloring, or the coloring substances can be digested in proof spirit, and added to the liquor until the required shade has been produced.

Molasses and brown sugar should not be used in the formation of liquors that are to be colored. Effervescing liquors that have a dull, heavy appearance, after being colored, will be rendered quite transparent by passing them through a filter, composed of alternate layers of charcoal and sand.

BOTTLING FERMENTED LIQUIDS.

The two most important objects to be effected in bottling these fluids, will be to prevent them from passing into the acetic fermentation, and for them to open briskly. The fermentation spoken of can be checked by the addition of from five to fifteen per cent. of alcohol. And to cause it to open briskly, add to each bottle one tea-spoonful of yeast, and a table-spoonful of honey, or a lump of white sugar of the size of a nutmeg. In filling the bottles, leave a space of one or two inches in the neck of the bottle, *i. e.* never fill the bottle to the cork.

When fluids that are rendered effervescent from acids and alkalies are to be bottled, the alkali should be coated with sugar to prevent its too rapid dissolution, and the consequent effervescence; the sugar coating is performed by dropping the alkali in melted sugar.

Sarsaparilla Beer, for Bottling.—Infuse six ounces of bruised ginger, half a pound of bruised liquorice root, in five gallons of boiling water until cold, strain through flannel, then dissolve in the liquor six pounds of brown sugar, then add half a pint of yeast and three ounces of cream of tartar; in cold weather this should be kept near the fire, so as to excite brisk fermentation; as soon as this subsides rack off the clear liquor, return it into the cask previously washed out, and allow it to work for two days longer. Then add oil of sassafras, twenty-five drops; oil of aniseed, ten drops; oil of wintergreen, twenty-five drops; these oils should be rubbed up well with a handful of dry sugar before adding, then add half a pint of brandy coloring, or burned sugar, then bottle it; this will open very fine.

Effervescing Spirit of Pineapples, for Bottling.—Infuse three ounces of bruised ginger, one drachm cochineal, one drachm gamboge, in five gallons of boiling water, until cold; then dissolve in the liquor five pounds of refined sugar, and add half a pint of yeast, and three ounces of cream of tartar; as soon as brisk fermentation has set in, drain off, and strain the liquor through flannel; it should be allowed to work for two days longer. It is then ready for bottling; previous to which add, the moment before filling each bottle, one table-spoonful of butyric ether, or in the absence of this, the same quantity of acetic ether may be substituted, and two table-spoonfuls of honey to every bottle.

To manage this receipt successfully, the water made use of should be perfectly clear, the sugar refined, and when prepared for commerce, it should be bottled in clear glass, and appropriately labelled.

Effervescing Spirit of Oranges, for Bottling.—Infuse eight ounces of sweet orange peeling in five gallons of boiling water, until cool, then add half a pint of yeast, three ounces of cream of tartar, and five pounds of loaf sugar; ferment in a warm place for three days, then strain through flannel; then add one drachm of oil of orange, well rubbed up in a couple of ounces of sugar, tincture of gamboge or saffron (see the preparation of these colors), until the liquid has assumed an orange color. Sometimes a small portion of cochineal will heighten this color, then bottle and label.

Effervescing Spirit of Strawberries.—Infuse three ounces of green tea in five gallons of boiling water, along with two drachms cochineal, and six ounces of logwood chips, four ounces of hops, until cold, then stir in five pints of honey, four ounces of cream of tartar, and half a pint of yeast; ferment in a warm place for three days, then strain through flannel; allow it to work two days longer, and then bottle; add to each bottle, before filling, one table-spoonful of acetic ether.

Effervescing Spirit of Vanilla, for Bottling.—Infuse two ounces each of bruised ginger, liquorice root, and six ounces of hops, in four gallons of boiling water, along with three ounces of vanilla, cut small, until cold; then add five pounds of refined sugar, half a pint of yeast, three ounces of cream of tartar, ferment for four days, and then strain through flannel, and bottle; add to each bottle a table-spoonful of the essence of vanilla. See Essences.

Effervescing Peach Juice, for Bottling.—Infuse five pounds of mashed raisins, two ounces of bitter almonds, in five gallons of boiling water, until cold; then add five pounds of refined sugar, three ounces of cream of tartar, one pint of yeast, and half an ounce of gamboge; ferment in a warm place for four days; strain through flannel, then allow it to work one day longer; then add spirit of orange flowers, a pound and a half; oil of bitter almonds, fifteen drops; oil of lemon peel, one drachm, being first dissolved in half a pint of alcohol. The color of this should, when bottled, be of a bright yellow either from the gamboge, or from English saffron.

Effervescing Grape Juice.—Infuse five pounds of mashed raisins, three ounces of green tea, in five gallons of boiling water, till cold; then dissolve six pounds of refined sugar in the liquor, and one and a half pounds of logwood chips, four ounces of cream of tartar, and one pint of yeast; ferment for four days in a warm place, and strain through flannel; then add nitric ether, three ounces, in which ten drops of oil of wintergreen has been dissolved (the ether dissolves the oil immediately), and five pints of proof spirit (whiskey), in which four ounces of bruised nutmegs have been infused for four days; the nutmegs should be separated from the spirit by straining. This should be bottled as soon as the ether has been added to it, to prevent the too rapid evaporation of the ether; this is improved by age.

Effervescing Spirit of Aromatics, for Bottling.—Infuse three ounces of bruised ginger, one ounce of bruised cloves, in five gallons of boiling water, till cold, and strain; dissolve in the liquor four pounds of sugar, half a pint of yeast, keep in a warm place for five days, and add oil of sassafras, twenty drops;

oil of lemon, fifty drops; oil of bergamot, twelve drops; these oils should be well rubbed up in dry sugar before adding. This can be colored to suit fancy.

Effervescing Spirit of Roses, for Bottling.—Boil for twenty minutes two drachms of cochineal, two ounces of hops, and two pounds of mashed raisins, in four gallons of clear rain water; when nearly cold stir in four pints of honey, half a pint of yeast, and set the vessel in a warm position, and ferment for five or six days, and then strain through flannel; at the moment of bottling, add to each bottle one table-spoonful of white sugar, and the same of essence of rose, or rub up well in the sugar five drops oil of lemon, and half a grain of ambergris for each bottle. When this spirit is prepared on a large scale, the sugar should be quite dry, and should be worked with the oil of lemon and ambergris, in a mortar.

Ginger Beer.—Ginger sliced, one ounce; dried orange peel, half an ounce; tie these in a bag, and boil in two gallons of water, and strain; add three fourths of an ounce of tartaric acid, twenty-five drops of essence of lemon, and two pounds of refined sugar; when near cool add a tea-cupful of yeast; let it work for twelve hours, and bottle.

2. Ginger sliced, one ounce; essence of lemon (rubbed with sugar), thirty drops; sugar, one pound; boiling water, one gallon; infuse till cold, and strain; then three table-spoonfuls of yeast; ferment four or five days, and then bottle.

3. Boil two and a half ounces of bruised ginger, and three pounds of sugar, in three and a half gallons of water for twenty minutes; put into a large pan, one ounce of cream of tartar, and the juice and rind of two lemons; pour the boiling liquor over them, and stir the whole well together; when milk-warm add a tea-cupful of yeast; cover it, and let it work for three days, skimming off the froth as it may rise, then strain through flannel into a cask, add half a pint of whiskey, bung down close, and in three weeks bottle.

4. Prepare a decoction or infusion of ginger with sugar and lemon, as above, but instead of fermenting with yeast, charge it with carbonic acid gas.

5. *Imperial Pop.*—Cream of tartar, three ounces; ginger, one ounce, white sugar, two pounds; lemon juice, one ounce; boiling water, one gallon and a half. When near cool, add half a tea-cupful of yeast, and bottle.

Giramhing or Limoniated Ginger Beer.—Boil five ounces of ginger with three gallons of water, beat four eggs to a froth, and add them with ten pounds of sugar to the water; take nine lemons, peel them carefully, and add the rind and juice to the foregoing. Put the whole into a barrel with a tea-cupful of yeast, bung down, and in about twelve days bottle it. In fifteen days it will be fit for drinking. Age improves it.

2. To ten gallons of water add ten pounds of refined sugar, and the whites of ten eggs well beaten, and boil till the scum rises, and add six ounces of bruised ginger; boil for twenty minutes, then pour the hot liquor on the rinds of twelve lemons thinly peeled. When cold, put into a barrel the juice of twelve lemons, one ounce of isinglass cut or bruised small, a tea-cupful of whiskey, a pint of yeast, and fill the barrel with the liquor. Let this ferment six days, and bottle.

Ginger Beer Powders.—Fine powdered ginger, five drachms; bicarbonate of soda, three and a half ounces; refined sugar, one pound; essence of lemon, thirty drops. Mix, and divide in sixty powders (or four or five grains of ginger, twenty-eight of bicarbonate of soda, one hundred and twelve of sugar, and half a drop of the essence of lemon in each powder). In the other powder put thirty-two grains of tartaric acid, or thirty-five grains, if a more decidedly acidulated beverage is required, or from thirty to thirty-three grains of citric acid.

Other formulas give the following :—

Bicarbonate of soda, thirty grains ; white sugar, one drachm ; powdered ginger, five drachms, in each blue paper ; and twenty-five grains of tartaric acid in each white paper. This is less agreeable, but perhaps more friendly to the stomach than when the acid is in excess.

Another formula is : Sugar, two drachms ; sesquicarbonate of soda, two scruples ; ginger, five grains ; essence of lemon, two drops, in each blue paper with thirty-three grains of tartaric acid.

Ginger Beer Powder in one bottle.—The soda, acid, and sugar must be carefully dried separately.

Finely powdered ginger, five drachms ; bicarbonate of soda, three and a half ounces ; refined sugar, one pound ; essence of lemon, thirty drops ; tartaric acid, four and a half ounces. The acid and the soda should not be too finely powdered. Mix the powders recently dried in a warm mortar, and immediately put the mixture in to dry. Bottle and cork securely. A measure holding three drachms should accompany each bottle.

Effervescing Lemonade.—This is made by putting into each soda water bottle one and a half ounces of syrup of lemons, and filling up with aerated water from a machine. The syrup of lemons is formed by dissolving thirty ounces of refined sugar in sixteen ounces of fresh lemon juice, by a gentle heat, and adding thirty drops of essence of lemon.

Effervescing Lemonade without a Machine.—Put into each bottle two drachms of sugar, two drops of the essence of lemon, half a drachm of bicarbonate of potash, and water to fill the bottle; then drop in thirty-five grains of citric or tartaric acid, and cork immediately. Two scruples of sesquicarbonate of soda, two drachms of sugar, four drops of the essence of lemon, and half a pint of water; lastly, a drachm of tartaric acid. Care must be taken to avoid accidents from the bursting of these bottles. They should be kept in a cool place.

Milk Lemonade.—Dissolve one and a half pounds of refined sugar in a quart of boiling water, add a quarter of a pint of lemon juice, and the same of sherry; and, lastly, two thirds of a pint of cold milk. Stir together, and strain. Grate nutmeg over the surface.

Dry Lemonade, or Acidulous Lemonade Powder.—Citric acid, three quarters of an ounce; essence of lemon, thirty drops; refined sugar, eight ounces. The sugar should be saturated with the essence.

Effervescing Lemonade Powders.—Bicarbonate of soda, three and a half ounces; refined sugar, fourteen ounces; essence of lemon, sixty drops. Sometimes twelve or more grains of the powdered yellow rind of the lemon peel are added to color with. Mix, and divide into sixty powders, or one hundred and forty grains in each blue paper. In the white papers put thirty grains of citric acid, or the mixed alkaline powder; and the acid may be put into separate bottles furnished with measures holding the proper quantity each.

Effervescing Lemonade Powders in one bottle.—The powders must all be separately and carefully dried at a moderate temperature before mixing; and when mixed, be carefully secured from the air.

1. Bicarbonate of soda, one ounce; refined sugar, three and a half ounces; tartaric acid, one and a quarter ounces; essence of lemon, thirty drops. Mix, and put into well corked bottles.

2. Mix three and a half ounces of bicarbonate of soda, fourteen ounces of refined sugar, sixty drops of the essence of lemon, and four ounces of tartaric acid.

3. Sesquicarbonate of soda, eight ounces; tartaric

acid, eight ounces; refined sugar, two pounds; essence of lemon, one hundred drops. Mix.

Orangeade or Sherbet.—Juice of four oranges, thin peel of one orange, four ounces of lump sugar, three pints of boiling water. Mix.

2. Juice and peel of one large orange, citric acid, half a drachm; sugar, three ounces; boiling water, one quart.

Aerated Sherbet Powders in one bottle.—Double refined sugar, one pound; powdered orange peel, twelve grains; bicarbonate of soda, three and a half ounces; essence of cedrat, twelve drops; oil of orange peel, sixty drops; tartaric acid, four ounces. The powders must be carefully dried, mixed quickly, and afterwards kept dry and securely corked. A measure holding near three drachms of the powder should accompany each bottle.

Soda Powders.—Thirty or thirty-two grains of bicarbonate of soda in each blue paper, and twenty-five grains of tartaric acid in each white paper.

MEAD.

Boil three and a half gallons of honey for a moment, and add it, together with five gallons of boiling water, to twenty gallons of cold water; then add a pint of good yeast, half an ounce of oil of nutmeg, a tea-spoonful of oil of lemon, ten drops of oil of wintergreen. Rub each one of these oils up well in separate parcels of sugar. The quantity of each parcel should be about two ounces, and add the whole. To check the fermentation, add three gallons of neutral spirits or four gallons of proof whiskey.

It is not necessary for the operator to always keep the quantity of honey mentioned in the text in view. Any quantity of honey will commence fermentation by the assistance of yeast.

Mead, as found in the shops, consists of a tumbler filled two thirds full of water, sweetened pleasantly with honey, and then filled with plain soda water from the fountain.

The length of time necessary for the fermentation of the mead, in the above recipe, will be from twelve to thirty-six hours. This must be regulated by the palate.

CHEAP PORTER AND ALE.

Porter for bottling.—Boil a peck of wheat bran for one hour, together with one pound of hops, in twelve gallons of water, and while warm strain through flannel, to separate the bran from the liquor. Then stir in one gallon of molasses, one fourth of a pint of burnt sugar, one and a half pints of yeast, and one ounce of powdered aloes. Set the vessel aside in a warm place to ferment. This will be known by the froth that arises to the surface of the liquor. This should be skimmed off when the froth ceases to rise to the surface. It should be bottled.

If this is for immediate use, say within six weeks, add a lump of sugar, and a tea-spoonful of yeast to every bottle before filling.

2. Boil four quarts of wheat bran, four ounces of grains of paradise bruised or mashed, and one ounce of calamus, two ounces of quassia rasped, in twelve gallons of water for thirty minutes; when near cold, add three quarts of molasses, a quart of yeast, and half a pint of burnt sugar coloring. Ferment as above; then strain through flannel, and add two gallons of whiskey; and to each bottle, before filling, add a lump of sugar of the size of a nutmeg, and a tea-spoonful of yeast.

3. Boil three quarts of wheat bran, one and a half pounds of hops, eight ounces of bruised ginger, in twelve gallons of water for one hour; then strain through flannel; and while warm, add two gallons of molasses, one quart of yeast, half a pint of brandy coloring, and half a gallon of tincture of grains of paradise, which will be formed by digest

ing eight ounces of the grains in half a gallon of whiskey. The grains should be either ground or mashed.

Pineapple Ale.—Four pounds of brown sugar, one pound of hops, and two ounces of quassia, and twelve gallons of water. Boil for three quarters of an hour; then add one gallon of molasses, one pint of yeast, and continue the fermentation until the froth ceases to rise to the surface; then add tincture of grains of paradise, half a gallon, and strain through flannel; then add three ounces of butyric ether, and bottle immediately.

2. Boil two pounds of wheaten flour well worked into a paste, with ten pounds of brown sugar, and one pound of hops; six ounces of ground cinnamon, three ounces of bruised ginger, six ounces of grains of paradise ground, two ounces of quassia, in twelve gallons of water for forty minutes; when near cold, add one and a half pints of yeast. Ferment until it quits frothing, then strain through flannel; add eight ounces of ether, and then bottle.

It may be necessary to state for the benefit of the uninitiated reader when and how this kind of porter and ale is disposed of to form a remunerative investment.

This consists in bottling and labelling this *Fluid* witn neatness. The labels should be obtained from the lithographers, and should be executed in the highest style of the art. The same articles are sold under the names of London porter; and the ale receives all the names of the different varieties of that article, that have acquired any celebrity in commerce, such as Scotch ale, India pale ale, pineapple ale, &c., &c. The bottles are packed in barrels or boxes, and are disposed of at auction. This ale is usually manufactured at cost varying from four to eight cents per gallon.

It is not an unusual occurreuce to meet with in commerce, porter (or so called), that has been made from the fermentation of molasses, yeast, and water. This, after becoming sufficiently acidulated from fermentation, has the further progress of the fermentation checked by the addition of alcohol, and a small portion of ground mustard seed. It is then strengthened with aloes, pellitory, pepper, quassia, catechu, and burnt sugar, and has a rough, bitter, acidulous, taste, and leaves a disagreeable *after* taste in the mouth.

Flour of Corianders, for Beer and Ale.—Coriander seed, three pounds; quassia, two pounds; aloes, one pound. Allow these articles, after being powdered, to digest for five days in six gallons of whiskey. This is added to suit taste.

The following articles are for giving strength and body to beer and ale:

1st. Quassia, two pounds; gentian, bruised, two pounds; aloes, one pound; water, ten gallons, and boil to five gallons; then add copperas, one pound, and boil to four gallons. This is added to suit taste.

2nd. Quassia, rasped, two pounds; liquorice root, two lbs.; sulphate of iron, one pound; boil for two hours, in six gallons of water, or until reduced to four gallons. The quantity of this fluid necessary for imparting a false strength to beer, must be regulated by the palate.

The following recipe is the least harmless of the whole in the list:

3rd. Grains of paradise, ground, one pound; quassia, two pounds; bruised ginger, six ounces; coriander seed, two pounds; calamus, bruised, six ounces; aloes, one pound. Boil the mass in ten gallons of water, until reduced to seven gallons; then strain. This should be infused in the water a few days, before boiling.

XV.

THE PROCESS

OF THE

MANUFACTURE OF VINEGAR

IN TWENTY-FOUR HOURS, BY THE CONVERSION OF ALCOHOL INTO ACETIC ACID.

THIS process of manufacturing acetic acid, or pure vinegar, has superseded that of all others, both in Europe and America. This is owing to the many advantages that it presents. Among the most prominent may be noticed its rapid formation or acetification. The *rationale* of the conversion of whiskey and water into vinegar may be necessary to explain.

Liebig supposes that it takes place in consequence of the formation of a new substance, called aldehyd, into which the alcohol is changed by the loss of a part of its hydrogen. The alcohol, consisting of four equals of carbon, six of hydrogen, and two of oxygen, loses two equals of hydrogen through the influence of the atmosphere, and becomes aldehyd, composed of four equals of carbon, four of hydrogen, and two of oxygen. This, by the absorption of two equals of oxygen, becomes four equals of carbon, four of hydrogen, and four of oxygen, that is, hydrated acetic acid. Thus the conversion of alcohol into acetic acid, consists in, first, the removal of two equals of hydrogen, and afterwards the addition of two equals of oxygen. Aldehyd is a colorless, very inflammable, ethereal liquid, having a pungent taste and smell. Its density is 0·79. It absorbs oxygen with avidity, and is thus converted into acetic acid, as just described. Its name alludes to its relations to alcohol—ALCOHOL dehydrogenated.

Having stated one of the most important considerations in the economy of the manufacture of vinegar, viz. its rapid formation, the minor considerations will be briefly noticed. And probably this could not be more effectually performed than by contrasting the two processes.

Take a well arranged vinegar manufacturing establishment of the old style, one that is capable of turning out forty barrels of vinegar daily, and from seven to ten operators will be necessary to conduct the process, to say nothing of the appurtenances, in the form of vats, tuns, cisterns, coolers, heaters, hydrometers, thermometers, kettles, boilers, furnaces, &c.,

&c., and to fully comprehend the amount of space (house room), requisite for these fixtures, to manufacture forty barrels of vinegar daily, it will be necessary to remind the reader that the vinegar that was sent into the market to-day, has been undergoing the process of manufacture, or of acetification, for several months.

By the proposed method, forty barrels of vinegar can be manufactured daily, requiring only two operatives and two large generators, or a series of small ones. The quantity of vinegar manufactured will be proportioned to the capacity of the generators. The generator that acetifies ten thousand gallons daily, is governed by and acts upon the same principle as the generator of the capacity of ten gallons.

Unlike the old process, the new is unaffected by external influences or chemical changes. Neither is its management invested in a chemical knowledge; the generators being once charged, the labor for the operatives becomes entirely mechanical.

Persons desirous of engaging in this business, and from a want of confidence in their abilities, and fearful that the directions here prescribed may be deficient in all of the details of the process—details that are necessary to success—that it would prevent them from engaging in the business; and in view of this the whole plan can be tested at a trifling cost, on a small scale, by the use of a keg, arranged on the same principle that the generators are. This experiment will be required, as proof of favorable results, which will inspire confidence in the investment.

DIRECTIONS FOR PACKING VINEGAR GENERATORS.

This comprehends the preparation of the vessels for the production of vinegar.

Any vessel in the form of a barrel or cistern will answer for a generator. Thus tubs, kegs, whiskey or wine barrels, can be rendered available for this purpose. The operator will recollect that the more extended the surface is for the action of the fluid, the greater the benefit.

We will suppose the vessel to be packed is a wine pipe, of the capacity of one-hundred and twenty gallons. It should be provided with a false bottom, composed of any kind of wood that will not yield a taste to the vinegar. This bottom should be secured about fifteen inches above the main bottom. The space thus formed is merely a reservoir for the vinegar, and its size should be controlled by the discharging capacities of the faucet, or stop cock.

This false bottom should be pierced with quarter-inch auger holes, allowing one hole to each square inch of the heading. The stop cock or faucet should be inserted about one inch above the main bottom;

the false bottom is then to be covered with one layer of gunny bagging. This is to prevent any particles from filtering through the false bottom. About twelve inches above the false bottom, bore a one inch hole in every stave, following a horizontal line, that is, following the direction of one of the hoops round the barrel. In large generators, these holes should be four feet apart, lengthwise of the cistern. Thus a generator twenty feet high, would require five circles of these holes, each circle being four feet apart. It has just been stated that one hole should be inserted in every stave. This is not imperatively necessary; the holes are usually from four to eight inches apart.

The success of the whole process depends entirely upon the free circulation of the air throughout the generator. These holes allow a free passage for the air, which passes off at the top, in this manner: from four to eight canes of one or two inches in diameter, and from twelve to twenty inches in length: the joints should be removed from the inside, thus forming hollow tubes. These canes are intended to establish a current of air from the holes on the side, to these canes at the top of the generator. The canes project one inch above the false head, while the other extremity penetrates the contents of the generator.

Glass tubes are employed, instead of the canes just alluded to, but they are rarely found, and the cane ones will answer every purpose.

The next process consists in packing or charging the generators; and this consists in simply filling the generator to within four or six inches of the top, with beech chips and shavings. These two articles are to be of no peculiar shape; as they fall from the axe and plane, under ordinary circumstances, are the kind that are made use of. The chips and shavings should not be packed too solid or densely, as this would prevent the free circulation of the air; neither should the chips be packed too solid, in the vicinity of the holes in the sides of the generator.

The generator being filled as described, a head is to be fitted, and is to rest on the chips. This head is to be made in the same manner as the false bottom, viz. in having one hole to every square inch of the head. Each one of these holes is to have a piece of packthread, two or three inches in length, unravelled at one end, and with a knot tied on the other end. This knot prevents the packthread from slipping, or being forced through the holes, and the other end being unravelled, assists in a degree in minutely separating the particles that form the liquid that is to be acetified. The liquid by falling on this head spreads uniformly throughout the mass of chips.

The next step in the process consists in acetifying the chips, &c. This consists in passing pure vinegar through the generator, until every chip and shaving is perfectly saturated with vinegar. This object will be fully obtained by pouring and repouring the vinegar as fast as it runs through, some eight or ten times.

It is highly essential that the vinegar used in acetifying the chips, should be pure, or free, at least, from the mineral acids. The most common adulteration of sulphuric acid can be detected by saturating strips of glazed writing paper with the vinegar. If when the paper becomes dry and is of a purplish color, it will denote sulphuric acid. For the detection of the usual adulterations of vinegar, look under the proper head.

The last step in the process consists in preparing the liquid that is to be converted into vinegar. To forty gallons of rain water, add twelve gallons of proof whiskey, and one and a half pints of honey. This mixture is allowed to fall from a cock in the barrel that contains it on to the head of the generator, and by the aid of the holes in the head, this liquid becomes uniformly divided over and throughout the chips.

The particles of fluid becoming so minutely divided, is the cause of the rapid acetification.

This liquid escapes at the cock at the bottom of the generator. The liquid will have to be passed through the generator several times, before the acetification will be complete, which will occupy from twenty-four to thirty-six hours. After the generator has been in use for a short time, the use of the honey may be dispensed with in the alcoholic solution.

It would be difficult to explain why beech wood chips are required in the process. The chips of oak, ash, &c., have been used, but with indifferent success. Beech wood can be found in the form of "billets of wood," or plank, in every city of the Union. They need no other preparation but being cut to the ordinary size of common chips.

If the vinegar should pass from the generator not perfectly clear or transparent, this will be effected by placing a bed of white sand on the false bottom, to the depth of fifteen inches. This sand will of course have to be packed in before the chips are, in the following order: first, to prevent the sand from falling through the holes in the false bottom, cover it with a layer of gunny bagging, then lay on a bed of sand to the depth of five inches, then cover this with two layers of gunny bagging, and this with five inches of sand, and so on until the whole of the sand is laid in. The sand thus packed, will admit of a free passage for the vinegar.

Straw is frequently used in the sand, to admit of free passage of the fluid. The decomposition of the straw soon sets in, thereby imparting an unpleasant taste to the vinegar.

And in some instances, shells are mixed with the sand, which prevents it from becoming too densely embedded, which better enables the fluid to filter through it.

Persons preparing to engage in this business, can have a series of generators, one arranged above the other. A two or three story house will be necessary for this. The generators may be made of 120 gallon wine pipes, one resting on the other, and the barrels on each floor can be connected with each other by the aid of pipes ; and after the chips have become thoroughly saturated with vinegar, the generators will only be required to be fed with the whiskey or alcoholic solution, which will be converted into vinegar on its first passage through the chips, though it may be necessary to pass the liquid through the generator until it does become sufficiently acetified.

Sulphuric acid is the most economical acid for adulterating vinegar, being from two and a half to three and a half cents per pound. The quantity of this acid to be added, will have to be governed by the palate. Sulphuric acid, diluted to the strength of common vinegar, leaves in the mouth a metallic, salty taste. This taste is removed by forming a weak solution of sulphuric acid and water, then reducing it to the strength of good vinegar by the addition of pure vinegar.

Analysis will prove that all of the different varieties of vinegar offered at the public auctions, are nothing more than dilute solutions of sulphuric acid ; the fine acetic odor and taste being the result of the addition of a small portion of acetic acid or pure vinegar, such as that formed by the generators just described.

The operator will recollect that these "generators" possess no decolorizing properties, and hence, vinegar intended for white wine vinegar, should be made of colorless whiskey. That which is made from colored whiskey, is sold under the names of crab-apple vinegar, clarified cider vinegar, malt vinegar, &c., &c.

Vinegar containing excessive quantities of sulphuric acid, will sometimes leave a metallic taste, which can be corrected by adding a small quantity of the infusion of grains of paradise and pellitory. This metallic taste just alluded to, is sometimes perceptible upon the addition of minute quantities of sulphuric acid, and the taste is difficult of concealment. This is an evidence of impurities in the acid, and accordingly it should be rejected.

The infusions of pellitory and grains of paradise, are made by adding four ounces of bruised pellitory and one pound of the grains, ground to a powder, to three gallons of whiskey, and infusing for four days and then strain. This is used for giving a body to and for removing unpleasant tastes from vinegar. The manner in which this infusion should be used, will be left entirely to the judgment of the palate. This vinegar may be sufficiently "sharp," and be deficient in body; or a peculiar taste may exist from sulphuric acid. These objections will be removed upon the addition of a glassful of the infusion just mentioned, to every forty gallons of the vinegar.

The clear, or white wine vinegar, should always be sent into market in neat wine or brandy casks, of any kind; each head should be freshly plastered with plaster of Paris. This consists of mixing the plaster of Paris with water to the consistency of common mortar, and applying it to the heads of the barrels immediately.

Vinegar is colored with the same materials that liquors are. Colored vinegar has never acquired any celebrity, and is not much sought after by consumers. The operator will find the most remunerative investment in the manufacture of white wine vinegar. The generators having the sand filtering attachments, as described, will be enabled to produce an article of a fine color. Instances often arise that the water made use of, is rain water that has flowed from shingle roofs, and is of a dirty, yellowish color. Usually, this color disappears after being passed through the generator the second or third time, but when this fails to remove the color, it is usual to cover the false bottom of the generator to the depth of five inches, with rice, and then packing on this the usual quantities of sand, as before described. The liquid that has been filtered through rice, is beautifully transparent, but when the rice filtration is not practicable or cannot be made available without difficulty, this objectionable color in the vinegar will have to be concealed by coloring it with burned sugar, same as for cider vinegar. The novice will recollect to add the coloring in minute quantities, otherwise the vinegar might become too highly colored.

What has been said about adulterating vinegar, only applies to the CHEAP vinegar. Pure vinegar can be manufactured by the use of the generators, at such an astonishing low price, that adulteration would appear useless.

Colored and flavored vinegars have but recently appeared in commerce. They are usually made of sulphuric acid diluted with water, and colored to suit the fancy. The aromatizing articles consist of the oils of wintergreen, lemon, orange, almonds, vanilla, ambergris, oil of roses, &c., &c. Perfumed vinegars are generally colored, and are usually found in five to ten gallon kegs.

Adulterations of Vinegar.—The principal foreign substances which vinegar is liable to contain are sulphuric and sulphurous acids, certain acrid substances, copper and lead derived from improper vessels used in its manufacture; muriatic and nitric acids are but rarely present. Chloride of calcium will detect free sulphuric acid when boiled with the vinegar, without causing the least precipitate with the minute quantity of sulphates always present in the liquid. Chloride of barium is not a suitable test here, as it will cause a precipitate with these sulphates, when no free sulphuric acid is present. Sulphurous acids may be detected and estimated by first precipitating the sulphates and free sulphuric acid, by baryta water, next acting on the vinegar with arsenic acid, which converts sulphurous acid into sulphuric acid; and, finally, precipitating the newly-formed sulphuric acid by chloride of barium from the sulphuric acid in the last precipitate. Its equivalent of sulphurous acid is easily calculated. Muriatic acid may be discovered by adding to a distilled portion of the suspected vinegar a solution of nitrate of silver which will throw down a curdy white precipitate, if nitric acid be present—an improbable impurity. It may be detected by its producing a yellow color when boiled with indigo. The acrid substances usually introduced into vinegar are red pepper, long pepper, Guinea pepper, pellitory, and mustard. These may be detected by evaporating the vinegar to an extract, which will have an acrid, biting taste, if any one of these substances should be present.

By far the most dangerous impurities in vinegar are copper and lead. The former may be detected by a brownish precipitate on the addition of ferrocyanuret of potassium to the concentrated vinegar. The latter by a blackish precipitate with sulphureted barium, and a yellow one with iodide of potassium.

Pure vinegar is not discolored by sulphureted hydrogen.

The essential ingredients of pure vinegar are acetic acid and water; but, besides these, it contains various other substances derived from the particular vinous liquor from which it may have been prepared. Among these may be mentioned coloring matter, gum, starch, gluten, sugar, a small portion of alcohol, and frequently malic and tartaric acids, with a minute proportion of alkaline and earthy salts.

The method pursued in making Wine Vinegar in France, where it is manufactured in the greatest perfection, is as follows: Casks are employed of about the capacity of eighty-eight wine gallons; those being preferred which have been used for a similar purpose. They are placed upright in three rows, one above the other; each cask having an opening at the top of about two inches in diameter. In summer, no artificial heat is required; but the wine intended to be converted into vinegar is kept in separate casks containing beech shavings, on which the lees are deposited. Twenty-two gallons of good vinegar, boiling hot, are first introduced into each vinegar cask, and at the end of eight days about two gallons of the wine, drawn off clear, are added; and the same quantity is added every eight days until the casks are full. After this the vinegar takes about fifteen days to form. At the end of that time only half the contents of each cask is drawn off; and it is filled up again by the addition of two gallons of wine every eight days as at first. In some cases, however, the quantity of wine added, and the intervals between the successive additions, are greater or less than those here indicated. The variations in this respect depending upon the progress of the fermentation to determine this point, the operator plunges a stave into the cask, and upon withdrawing if they find it covered with froth, they judge that the fermentation is going on properly, and accordingly add more wine.

When the infusion of malt is employed in the manufacture of vinegar, the process is as follows: The infusion of malt, when properly cooled, is put into large fermenting tuns, and by the addition of yeast the liquid is fermented for four or five days. It is then distributed into smaller vessels, and placed in a room heated by means of a stove, and kept there for about forty days, or until the mass has soured. It is then transferred to common barrels, which are placed in the open air, the bung-holes being covered with a tile to keep out the rain. In this situation they are allowed to remain for several months, or until vinegar is formed.

The process is then completed in the following manner: Large tuns are prepared with false bottoms, on which is put a quantity of the refuse of raisins and other fruits, technically called *rape*. These tuns are worked in pairs, one being filled with the vinegar from the barrels, and the other tun only three fourths filled. In the latter, the fermentation takes place more rapidly, and the process is rendered more active, alternately, in one or the other tun, by filling up each daily from the other until the process is completed.

Vinegar is often made from cider. The cider is placed in barrels with their bung-holes open. These barrels are exposed during the summer to the heat of the sun. The acetification is completed in the course of about TWO YEARS. The progress of the fermentation must be watched, and as soon as perfectly formed it should be drawn off into clean barrels.

Without this precaution the acetous fermentation would pass into the putrefactive, and the whole of the vinegar would be spoiled.

Malt Vinegar has a yellowish-red color. The strongest kind, called "Proof Vinegar," contains from four to five per cent. of acetic acid; that of British manufacture usually contains sulphuric acid. The law allows the addition of the one thousandth part of this acid.

Wine Vinegar is nearly one sixth stronger than pure malt vinegar. It is of two sorts, the white and the red, according as it is prepared from white or red wine.

TO DISTINGUISH WHITE WINE FROM MALT VINEGAR.

Add one ounce of water of ammonia to the same quantity of the vinegar, which, if it is white wine, will produce a purplish muddiness, and a purplish precipitate; and malt vinegar produces either no effect, or a dirty brownish precipitate.

XVI.

BITTERS.

STOUGHTON'S, BOKER'S, BERLIN, GOULEY'S, AND BRANDY.

Stoughton's Bitters.—Water, six gallons; whiskey, two gallons; gentian-root, three pounds; Virginia snakeroot, one pound; orange peel, two pounds; calamus-root, eight ounces; Guinea pepper, twelve ounces. Infuse the whole of the ingredients in the two gallons of whiskey for eight days. All solid substances, viz. roots, plants, &c., &c., should be well bruised or mashed before adding to the spirit. Color the above bitters with eight ounces of bruised alkanet-root.

After the mass has digested for eight days, strain through a filtering or muslin bag.

Boker's Bitters.—Whiskey, one gallon; water, six gallons; rasped quassia, three ounces; powdered catechu, three ounces; calamus, three ounces; cardamom, two ounces. Macerate the above in the whiskey for one week, and strain. Forty ounces of tincture of cochineal, and five ounces of burnt sugar for coloring.

Berlin Bitters.—Whiskey, one gallon; water, seven gallons; Guinea pepper, twelve ounces; catechu, two ounces; gentian, two pounds; calamus, eight ounces. Digest for six days, and strain. Color with three ounces of burnt sugar, and four ounces of tincture of cochineal.

Gouley's Bitters.—Whiskey, one gallon; water, six gallons; Guinea pepper, one pound; orange peel, two pounds; rasped quassia, eight ounces; gentian, one pound; calamus, eight ounces. Digest the solids in the whiskey for eight or ten days, and then strain. Color with tincture of sanders wood, five ounces; and burnt sugar coloring, four ounces.

Chandler's Aromatic Bitters.—Whiskey, two gallons; water, six gallons; take of bruised ginger one pound; calamus, eight ounces; cloves, six ounces; cinnamon, five ounces; nutmegs, six ounces; grains of paradise, twelve ounces; cardamom, six ounces ; then dissolve in one pint of alcohol the following : oil of cloves, twenty drops ; oil of cinnamon, twenty drops ; oil of nutmegs, one drachm ; oil of bergamot, one drachm ; oil of orange, one drachm ; then add to infuse with the mass half an ounce of cochineal, digest the whole for one week, and then strain. The essential oils should not be added until the liquid is strained.

Brandy Bitters.—Spirit, one gallon ; bruised gentian, eight ounces ; orange peel, five ounces ; cardamom, three ounces ; cassia, one ounce ; cochineal, a quarter of an ounce ; digest for one week, and strain ; and then digest the dregs with four pints of water for four days, and then mix the two tinctures together.

Howard's Spiced Bitters.—Whiskey, one gallon ; nutmegs, three ounces ; cloves, five ounces ; calamus, two ounces ; bruise and digest for six days, and strain ; then add sulphuric acid, half an ounce ; and oil of cloves, thirty drops ; oil of lemon, one drachm ; the oils to be dissolved in two ounces of alcohol. Color with four ounces of burnt sugar, and one ounce of tincture of cochineal.

Stomach Bitters.—Proof whiskey, five pints ; senna, five ounces ; guaiacum, red sanders, dried elecampane root, seed of aniseed, coriander, and caraway, and root of liquorice, of each two ounces and a half ; raisins, eight ounces ; digest in the spirit for eight days, and strain off the liquid for use ; half a wine-glassful taken one hour before each meal. These bitters correct a tendency to constipation, and improve the digestion, and increase the appetite.

The preceding formulas will serve to furnish the practical information necessary for the manufacture of the various popular bitters of the day for commerce. To render this class of liquids profitable to the manufacturer, the ingredients made use of should be few and simple, *and of an insignificant value.*

The value of the spirit used is often of the most important consideration in the manufacture of bitters on a large scale. The object of the spirit is to extract the bitter principles from the ingredients, and to prevent fermentation and putrefaction, which must necessarily ensue, from the watery infusion of the plants made use of.

The fermentation can be prevented by using the alkalized water, which is formed by the addition of two ounces of carbonate of soda to each gallon of water, or one and a half ounces of sulphuric acid to every ten gallons ; and in some instances from six to twelve per cent. of spirit is added with the above quantity of sulphuric acid. When an excessive quantity of water is used in the formation of bitters, ground mustard is largely used, owing to its anti-fermenting qualities ; three ounces per gallon is the quantity usually made use of.

The manner in which these fluids are put up controls their commercial success. Neat bottles, labels of artistic patterns, and a perfectly transparent liquid, are the requisites for success ; and of these, the two first can be obtained by the skill and ingenuity of the glass-ware manufacturer and lithographer, and the latter by filtration through sand. For this, see Directions for Making an Economical Sand Filter.

The directions for filtering are simple. Pour the fluid into the filter, and if it does not pass off clear, increase the depth of the sand several inches, and continue the filtration.

FOR MAKING FROM ONE TO TWO GALLONS OF BITTERS, FROM THE MOST APPROVED FORMULAS IN USE.

The article of spirit contemplated in denominating proof spirit, is the whiskey usually found in commerce. Some formulas prescribe French brandy. It must be obvious that, aside from the alcoholic stimulus of the brandy, that its weak, and almost inert medicinal properties, would necessarily become lost in the combination with the powerful aromatics, and hence the use of the brandy would only entail an unnecessary expenditure.

Stoughton Bitters, for Making One Gallon.—Gentian, three ounces; Virginia snakeroot, two ounces; dried orange peel, two ounces; calamus root, half an ounce; cochineal, one drachm; cardamom seed, two drachms; whiskey, two pints; bruise or mash the ingredients, and digest in the spirit for five days, and strain; then add six pints of water, and bottle for use.

Boker Bitters, for Making One Gallon.—Rasped quassia, two ounces; catechu, half an ounce; snakeroot, half an ounce; calamus, one ounce; cardamom seed, half an ounce; bruise and macerate for one week in two pints of proof whiskey, and strain. Color with two ounces of burnt sugar, and add six pints of water.

Berlin Bitters, for Making One Gallon.—Gentian, two ounces; calamus, one ounce; cardamom seeds, one ounce; quassia rasped, one ounce; bruise, and digest the above for five days, in three pints of whiskey, then strain, and add five pints of water.

Gouley's Bitters.—Orange peel, three ounces; cinnamon, one ounce; gentian, two ounces; cochineal one drachm; cardamom seed, one ounce; bruise and digest for one week in two pints of whiskey, and then strain; then add three ounces of burnt sugar, and six pints of clear water.

Chandler's Aromatic Bitters.—Cinnamon, one ounce; cloves, two ounces; rhubarb root, one ounce; senna leaves, three ounces; cardamom seed, one ounce; ginger, two ounces; cochineal, one drachm; calamus, one ounce; infuse the mass, after bruising, in two pints of whiskey for five days, and then strain; then add, dissolved in four ounces of alcohol, five drops of oil of rosemary, and ten drops oil of lemon peel. This is a fine dyspeptic bitter.

Howard's Spiced Bitters.—One gallon.—Nutmegs, three ounces; cloves, one ounce; cardamom seed, one ounce; ginger, two ounces; orange-peel, two ounces. Bruise and macerate in three pints of spirit for one week; then strain and color with three ounces of burnt sugar coloring; then add fifty drops of sulphuric acid, and five pints of clean clear water.

Chandler's Stomach Bitters.—Ginger, fresh, two ounces; cardamom, one ounce; rhubarb root, half ounce; Virginia snakeroot, two ounces; rasped quassia, one ounce; senna leaves, three ounces; calamus, one ounce; English saffron, two drachms. Bruise and digest in clear or colorless whiskey, two quarts, for one week; then strain and add of the oils of sassafras and of lemon each, twenty drops, dissolved in half a glass of alcohol; then add two quarts of water.

These are fine bitters for weak stomachs, and have effected many cures of dyspepsia; the dose is the same as the aromatic bitters—one teaspoonful before each meal.

Wilson's Bitters.—Senna, five ounces; guaiacum shavings, three ounces; red sanders wood, three ounces; dried elecampane root, two ounces; anise seed, two ounces; coriander, one ounce; caraway, one ounce; liquorice root, two ounces. Bruise and infuse, for one week, in one quart of whiskey; then strain and bottle for use.

Brown's Horseradish Bitters.—Fresh sliced horse-radish, six ounces; calamus, one ounce; ginger, one ounce. Bruise and digest for five days, in three pints of whiskey, and then add five pints of water and color to fancy.

The above bitters are prepared on a large scale thus—

Bruised or ground Guinea pepper, one pound; ground mustard, eight ounces; bruised ginger, two pounds. Digest the above in two gallons of colorless whiskey for five days and strain, and digest the strained refuse in a gallon of water for twenty-four hours and strain, and mix the whole; then add five gallons of clear water. These bitters are colorless. Flavor with twenty drops wintergreen.

Gin Bitters.—Oil of cubebs, three ounces; oil of juniper, one ounce; alcohol, four ounces; common gin, two pints. Dissolve the oils in the alcohol, and then add the gin. These bitters are uncolored, and they are known under the name of MEDICATED GIN BITTERS. They are used by gin drinkers in the same manner that other bitters are used, and by *persons who need the curative properties of gin.*

The action of these bitters is directed to the urinary organs.

The following is extensively used in the cafés an saloons of Paris:

French Medicated Gin Bitters.—Of powdered cubebs, one ounce; common gin, two pints; oil of juniper, half an ounce; oil of sassafras, one drachm;

oil of peppermint, ten drops; nitric ether, two ounces. Digest the cubebs in the gin for four days, and strain; dissolve the oils in nitric ether for twenty minutes, and mix together the gin and ether. Used in the same manner as other bitters.

French Medicated Gin Bitters, prepared for commerce. —Powdered cubebs, eight ounces; oil of juniper, three ounces; powdered pellitory, two ounces; oil of peppermint, two drachms; alcohol, two gallons. Digest for five days, the cubebs in one gallon of the alcohol, along with the pellitory, and then dissolve the essential oils in the other gallon of alcohol; then mix the two gallons, with five of clear, clean water. Usually *these bitters are uncolored.*

In the manufacture of the French medicated bitters, strong inducements are offered to the enterprising manufacturer; for the first who introduces them must certainly reap a rich reward; for in commerce, medicated bitters of this particular class are entirely unknown. We find any quantity of medicated bitters for the digestive, but none for the generative organs. Why these have been neglected, is somewhat singular. Of the decided utility of this class of medicated bitters, certainly none will question. The market has become overstocked with bitters. Bitters of every imaginable name and conceivable color

—old friends with new names. Your bitters manufacturers possess no originality, unless it consists in giving half a dozen new names to that time-honored recipe for Stoughton bitters.

XVII.

SYRUPS.

In the manufacture of syrups, the quality and quantity of the sugar employed are points of importance. Refined sugar should always be employed, as it often saves the necessity of clarification, and makes a clearer and better flavored syrup than the impure kinds. In relation to the quantity of sugar, if in too small proportion fermentation is apt to occur ; if too abundant crystallization will ensue. The proper proportion is about two parts to one of the liquid. A somewhat smaller quantity will answer, where an acid such as lemon juice, &c., is used.

Syrup is apt to become scorched, or brown, by a continued application of heat; therefore, syrups should boil briskly over a lively fire, so as to accomplish the object as quickly as possible. It is important to be able to ascertain positively when they have attained the due consistence. An operator skilled in their preparation, can judge with sufficient accuracy by various signs, such as the slowness with which the parts of a drop of syrup part or break; for instance, if a stick is plunged in the syrup and withdrawn and waved around in the air a couple of times, then, if upon studying it, the particles of syrup should hang in large, round, heavy tears, and fall from the stick in long, *ropy* threads, this is an evidence of its having been boiled sufficiently. A pellicle forming upon the surface of the syrup when it cools, indicates that it has been too much boiled.

The easiest method of ascertaining the proper point of concentration is by the use of Baume's hydrometer—called a *saccharometer*. This should stand at 30° in boiling syrup (30½ in hot weather), and at 35° when the syrup is cool.

When carefully prepared with the best double refined sugar, syrups usually require no other clarification than to remove any scum which may rise to the surface upon standing, and to pour them off from any dregs which may subside; but as the sugar employed is not always free from impurities, it would, as a general rule, be best to remove the scum as it rises, during the heating process, and, if required, to strain them while hot through muslin or flannel. Should they at any time want the due degree of clearness, they may be warmed and filtered through flannel, raw cotton, &c., or clarified by the whites of eggs.

Syrups are liable to undergo various alterations, according to their nature and mode of preparation. The acid syrups, when too much boiled, often let fall a copious white precipitate, which is said to be a saccharine matter, analogous to the sugar of grapes, produced by the reaction of the acid upon the sugar. At an ordinary temperature, acids slowly convert common sugar into grape sugar, which being less soluble than the former is gradually deposited in the form of crystalline grains. Syrups which contain too little sugar are apt to pass into the vinous fermentation, in consequence of the presence of matters which act a ferment. Those which contain too much deposit a portion in the crystalline state, and the crystals, attracting the sugar remaining in solution, gradually weaken the syrup and render it liable to the same change as when originally made with too little sugar. The want of a due proportion of sugar frequently gives rise to mouldiness, when air has access to the syrup.

Syrups bottled while hot are apt to ferment, owing to the watery vapor or steam rising to the surface and condensing, which diminishes the proportion of sugar so as to produce a commencement of chemical action, which gradually extends throughout the whole mass. If the bottles are well shaken, the result is obviated, and the syrup will generally keep better when thus treated. When syrups undergo the vinous fermentation, their surface becomes covered with froth, produced by the disengagement of carbonic acid, and acquire a vinous odor from the presence of alcohol, while their consistence is diminished by a loss of a portion of the sugar which has been converted into that liquid. When the alcohol has been increased to a certain point, the fermentation ceases or goes on more slowly, owing to the preservative influence of that principle, and as the active ingredient of the syrup may have undergone no material change, the preparation may be recovered by boiling so as to drive off the alcohol and carbonic acid, and sufficiently concentrate the liquid.

A syrup thus revived, is less liable afterwards to undergo fermentation, because the principles which acted as ferments have been diminished. It is obvious that syrups which depend for their virtues upon a volatile ingredient, or one readily changed by heat, cannot be restored to their original condition.

At best, syrups are apt to change, and various measures have been proposed for their preservation. A small portion of sulphate of potassa or chlorate of potassa, which is tasteless, prevents their fermentation, and sugar of milk has been effectual to the same end. The proportion employed, is thirty parts of sugar of milk, one thousand of syrup; but the best plan for the preservation of syrup, is to keep it excluded from the air, in well closed vessels, and packed in a cold place.

SYRUP OF ALMONDS OR ORGEAT.

Take of sweet almonds, sixteen ounces; bitter almonds, four ounces; water, three pints; refined sugar, six pounds. Having blanched the almonds or removed the husks by soaking them in warm water for a few moments, and rubbing them through the hands until the husk comes off; having blanched the almonds, rub them in a mortar to a very fine paste, adding during the trituration, three fluid ounces of water and a pound of sugar. Mix the paste thoroughly with the remainder of the water, and then strain the mass through a common coarse linen cloth. Add the remainder of the sugar to the strained liquor, and dissolve it by the application of a gentle heat. Having become perfectly cool, bottle it, which must be well stopped and kept in a cool place; half a pint of orange flower water greatly improves the above. This syrup will not keep long, as it is liable either to ferment or become rancid. This syrup is prepared in a cheap manner, for auctions, &c., by adding any convenient quantity of the mucilage of slippery elm bark. This is prepared by boiling ten ounces of the bark, in a gallon of water, for one hour; if allowed to cool when the mucilage is deposited, any given quantity of the syrup is increased in quantity by the addition of any desired quantity of the mucilage. Orgeat can be colored any desired color, but owing to its heavy consistency, its natural color is preferable. When it is to be colored, the water is first colored the desired color.

ADULTERATING SYRUPS.

Syrups, like every other commodity in commerce, should be manufactured to suit the views of all grades of purchasers.

The adulterations consist of mucilage of slippery elm bark and gelatine, as the finest "book isinglass," and pure bone glue, known as "Cooper's gelatine;" these to be used should be tasteless and odorless, otherwise they are unsuited. One hundred grains of book isinglass dissolve in ten ounces of water, forming a tremulous jelly when cold. The mucilage of the elm bark is obtained upon boiling from six to ten ounces of the bark, to one or one and a half gallons of water for one hour. The bark will answer for subsequent boilings, as it does not always yield its mucilage upon the first boiling. The adulterated syrup will soon sour ; this can be delayed to a great length of time by the use of sugar of milk ; one part of sugar of milk to thirty-one of the syrup, to prevent fermentation in all kinds of syrups. This is the only reliable article that we have.

Sugar of Milk is a hard, somewhat gritty substance, crystallized in four-sided prisms, and possessing a slightly sweet taste ; it is prepared from milk. When intended for use, it should be dissolved in the water intended for the syrup, in the above-mentioned proportion. This will be found highly useful in the preservation of light-bodied syrups, and also for syrups that are to be kept for any length of time.

Aromatic Syrups.—Take refined sugar, five pounds ; clean clear water, two pints ; boil for two hours in the two pints of water ; one ounce of bruised ginger, one half ounce cloves, one half ounce calamus root, bruised ; nutmegs, one ounce. Dissolve the sugar in the water by the aid of a gentle heat. The amount of sugar can be lowered to two and a half pounds to two pints, if desired. The water, after boiling as above mentioned, should be strained. When this syrup is near cool, add four drops oil of bitter almonds, fifteen drops essence of cinnamon, one tablespoonful of essence of nutmegs, twenty drops essence of lemon. Stir the syrup well, to enable the essence to combine ; this can be colored to taste.

Syrup may be known when it has been sufficiently boiled, by the stirrer being withdrawn from the hot syrup with rapidity, and holding it on a horizontal line and observing if the syrup flows on the side of the stirrer with a thick body, and if it falls from it in the form of shot ; and when these round particles of the syrup are ropy, viscid, falling from the stirrer in threads, or suspended by thread or hairy-like attachments, are evidences of its having been boiled sufficiently. The use of the saccharometer will indicate the proper density ; this should stand at 30° in boiling syrup, and 30½° in hot weather, and at 35° in the syrup when it is cool. Syrup boiled to this density is very heavy, and weighs about twelve and a half to thirteen pounds to the gallon. It has a fine body, and is the heaviest that is made.

Blackberry Syrup.—Expressed juice of blackberries, one pint ; clarified sugar, two and a half pounds ; whiskey or brandy, half a glass. Dissolve the sugar by the aid of heat, in the juice, in the same manner as for other syrup. When the syrup is cool, add the spirit.

The juice is expressed from fruit by placing it in a bag of suitable size, and submitting it to pressure.

When the juice is too thick, dilute it with water. It is customary to make a pint of syrup from a pint measure of the fruit.

Pineapple Syrup.—This can be made in the same manner as blackberry, or by slicing the fruit, alternating the slices with layers of powdered sugar, permitting them to stand twenty-four hours, and then expressing the syrup formed. Each pound of the pared fruit, with thirty ounces of sugar, should yield, with the requisite quantity of water, two pints of syrup.

These syrups will have their aromatic aroma greatly impaired by heat.

SYRUPS PREPARED FROM FRUITS.

Those syrups that are prepared from fruits, should be made with great care. The fruit should be fully ripe, and freed from all its natural attachments, as stems, leaves, &c., and from all other impurities, without being previously crushed. It should be put into canvas or woollen bags, which should be about two thirds full when placed under the press; the expressing force should be gradually increased so as to effectually remove the juice with as little of the fibre of the fruit as possible. It is customary to make a pint of syrup from a pint measure of the fruit, and if the expressed juice is insufficient for the purpose, to dilute it with water.

In dissolving the sugar, as short an exposure to heat as possible is desirable. Some dissolve the sugar in a portion of the juice with heat, and add the remainder a few minutes before removal from the fire. Some fruits contain so much pectin, that their syrups are apt to gelatinize; this is particularly the case with currants and raspberries. To prevent this, the strained juice must be allowed from eight to fifteen hours, according to the temperature, in order to ferment. The juice separates into two portions, the upper thick, the lower clear. The latter is to be separated by straining, and made into a syrup with the usual proportion of sugar; and another method of preventing this result is by pressing the juice through a cloth.

Syrup of Mulberries.—Take of mulberry juice, strained, one pint; refined sugar, two pounds and a half; whiskey, brandy, or neutral spirit, half a glass; dissolve the sugar in the mulberry juice, with a gentle heat, and set aside for twenty-four hours, then remove the scum, and pour off the clear liquor from the dregs, if there be any, and lastly, add the spirit.

Strawberry Syrup.—Take of strawberry juice, strained, one pint; refined sugar, two pounds and a half; spirit, half a glass; prepared as mulberry syrup, and when the syrup cools, add a tea-spoonful of acetic ether, and bottle tightly.

Raspberry Syrup.—Same as the last, only substituting rum for whiskey; the rum yields an agreeable aroma.

Raspberry syrup is apt to gelatinize; the strained juice should be allowed to stand from eight to fifteen hours, according to the temperature, in order to ferment. The juice separates into two portions; the upper thick, the lower clear; the latter is to be separated by straining, and made into a syrup, with the usual proportion of sugar.

Lemon Peel Syrup.—Strong tincture of lemon peel, one ounce; simple syrup, fifteen fluid ounces: mix.

Syrup of Ginger.—Simple syrup, seven ounces and a half; essence of ginger, half an ounce; mix by stirring well together

Syrup of Orange Peel.—Strong tincture of orange peel, one ounce; simple syrup, eight ounces; mix.

Syrup of Vanilla.—Simple syrup, fifteen ounces ; spirit of vanilla, one ounce ; mix.

Syrup of Neroli.—Simple syrup, pint and a half ; essence of orange, one ounce ; spirit of orris-root, half an ounce ; this is made by digesting four ounces of orris-root, powdered, with five ounces of neutral spirit, for thirty-six hours. Any of these articles can be found at the druggists. One grain of musk dissolved in an ounce of alcohol greatly improves the above. The whole of the above, to be well mixed, should be warmed something above blood heat.

Syrup of Jessamine.—Simple syrup, pint and a half ; spirit of orris-root, one ounce ; essence of bergamot, two drachms ; essence of lemon, one drachm ; essence of cinnamon, five drops ; slightly warm the syrup, and add the essences.

Syrup of Cologne.—Simple syrup, pint and a half ; warm the syrup, and add while stirring, oil of bergamot, two drachms ; oil of lemon, thirty drops ; oil of rosemary, fifteen drops ; pure alcohol, three ounces ; allow the oils to dissolve in the alcohol for one hour.

Syrup of Peach Blossoms.—Simple syrup, quart and a half; blanched bitter almonds, half a pound; sweet almonds, blanched, one pound; rub the almonds to a paste in a mortar, with five ounces of orange flower water, and strain the mass through a coarse linen cloth; add to this strained product four ounces essence of lemon; half an ounce balsam of Peru; half an ounce spirit of nutmegs; warm the syrup and mix.

This syrup is sometimes colored a peach blossom color, with cochineal; when this is desired the syrup will have to be made with water colored with cochineal, and the ingredients added while the syrup is cooling. The other plan is to color the syrup by the addition of red rose syrup, or by a strong tincture of cochineal in spirit.

Syrup of Sarsaparilla.—Simple syrup, one gallon, well burnt sugar, two ounces, dissolved in water, three ounces; then dissolve in half a glass of alcohol, oil of sassafras, oil of aniseed, of each eight drops; oil of partridge berry, four drops; mix, by adding the spirit containing the oils, and the burnt sugar, and stir well. This syrup is not medicated, and will not create an unpleasant sensation in the weakest stomach, and yet it contains all that is perceptible to the palate of the medicated formula.

Syrup of Wine.—White sugar, six pounds ; water, three pints ; dissolve the sugar, by the aid of heat, in the water ; add half an ounce of catechu to four pints of raisin spirit, or spirit of prunes. This is made by digesting one and half pounds of prunes in half a gallon neutral spirit for several days, and mix the mass. Some manufacturers use Jamaica rum and brown sugar for this wine. Whiskey is sometimes used, and a flavor imparted to it by the addition of one ounce of acetic ether to the above.

The preceding syrups are employed for flavoring drinks, soda water, &c.

Simple Syrup.—Take refined sugar, two pounds and a half ; water, one pint ; dissolve the sugar by the aid of heat in the water, and remove the scum, if any rises, and strain the solution while hot through a flannel bag.

Syrup of Violets.—Take of fresh violets one pound ; boiling water, two pints and a half ; infuse the flowers for twenty-four hours in the water, in a covered glass or earthenware vessel, and strain the water from the violets without squeezing, and dissolve six pounds of sugar in the filtered liquor, and proceed as for other syrups. This syrup, when prepared in pewter-lined vessels, is of a beautiful blue color This color will, in the course of time, fade.

Syrup of Red Roses.—Take of dried red rose petals, two ounces; infuse the roses in a pint of water for twelve hours; the water should be boiling when the roses are added; after they have infused, strain the liquid, and dissolve two ounces of sugar in it, and proceed as for other syrups.

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