The French wine and liquor manufacturer : a practical guide and receipt book for the liquor merchant being a clear and comprehensive treatise on the manufacture and imitation of brandy, rum, gin and whiskey with practical observations and rules for the manufacture and management of all kinds of wine by mixing, boiling, and fermentation, as practiced in Europe including complete instructions for maufacturing champagne wine, and the most approved methods for making a variety of cordials, liqueurs, punch essences, bitters, and syrups ... / by John Rack.

Contributors

Rack, John.

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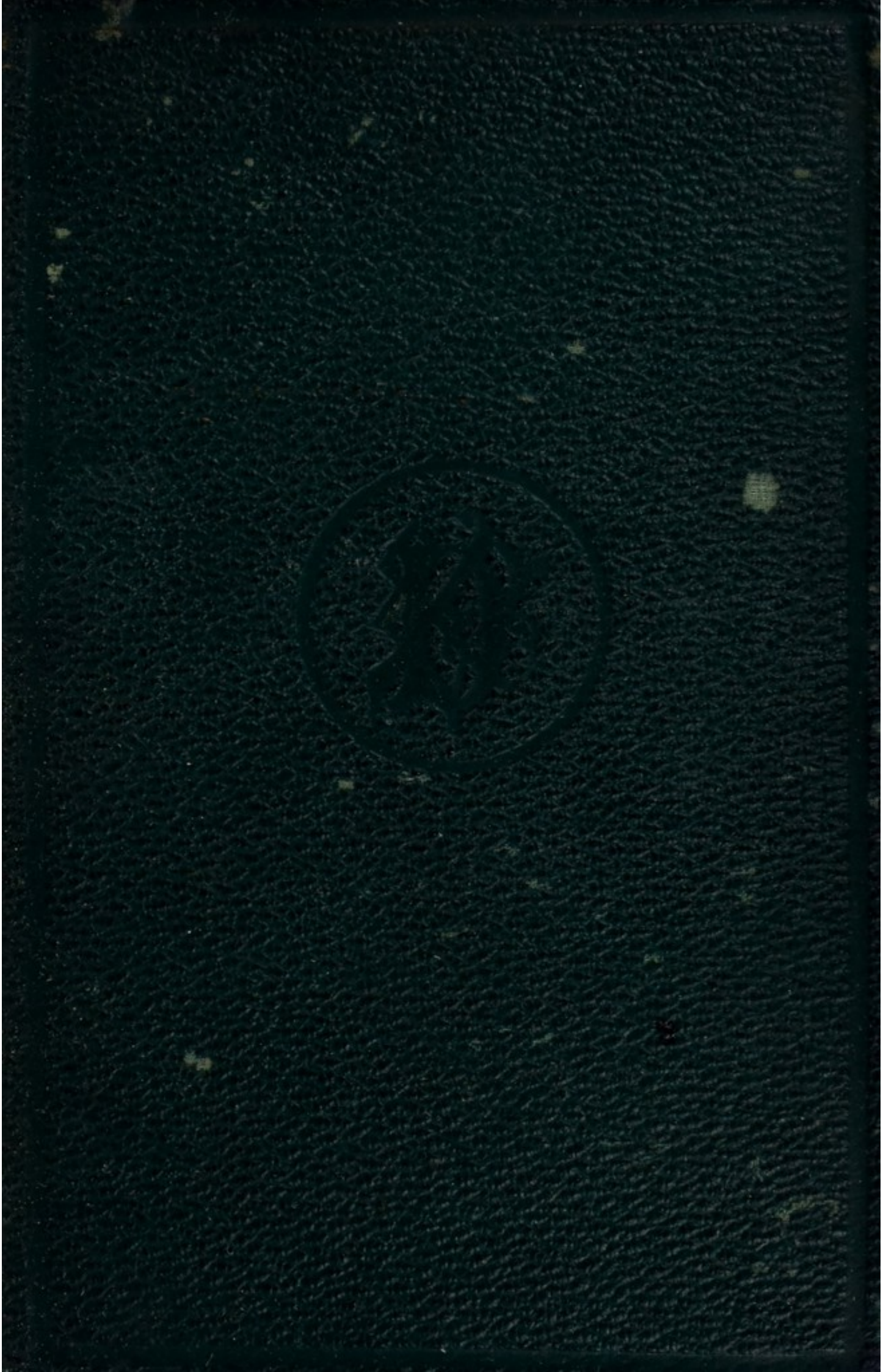

THE FRENCH

WINE AND LIQUOR

MANUFACTURER.

A PRACTICAL

GUIDE AND RECEIPT BOOK FOR THE LIQUOR MERCHANT

BEING A CLEAR AND COMPREHENSIVE TREATISE ON THE MANUFACTURE AND IMITATION OF

Brandy, Rum, Gin and Whiskey:

WITH PRACTICAL OBSERVATIONS AND RULES FOR THE MANUFACTURE AND MANAGEMENT OF ALL KINDS OF WINE, BY MIXING, BOILING, AND FERMENTATION, AS PRACTICED IN EUROPE:

INCLUDING COMPLETE INSTRUCTIONS

FOR

MANUFACTURING CHAMPAGNE WINE,

AND THE

MOST APPROVED METHODS

FOR MAKING A VARIETY OF

CORDIALS, LIQUEURS, PUNCH ESSENCES, BITTERS, AND SYRUPS

TOGETHER WITH

A Number of Recipes for Fining, Flavoring, Filtering, and Coloring Wines and Liquors, and Instructions for Restoring and Keeping Ale and Cider. Also Containing the Latest Improvements for Manufacturing Vinegar by the Quick Method. To which is added a Collection of Descriptive Articles on Alcohol, Distillation, Maceration, and the Use of the Hydrometer; with Tables, Comparative Scale, and Fourteen Important

RULES FOR PURCHASING, REDUCING, AND RAISING THE STRENGTH OF ALCOHOL, ETC.

ILLUSTRATED WITH DESCRIPTIVE DIAGRAMS AND ENGRAVINGS.

THE WHOLE ADAPTED FOR THE USE AND INFORMATION OF THE TRADE IN THE UNITED STATES AND CANADA,

BY JOHN RACK,

PRACTICAL WINE AND LIQUOR MANUFACTURER.

FOURTH EDITION. REVISED AND CORRECTED.

NEW YORK:

DICK & FITZGERALD, PUBLISHERS,

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INTRODUCTION.

THERE have been several works published upon the manufacture of imitation or domestic Brandy, and other liquors. All of these have a certain degree of merit; but they are incomplete and very erroneous. In some, the recipes are incorrect, either from the formula not being graduated to the result desired, or from a misconception of the effects of certain materials. Others are little liable to this charge, but leave important omissions. And a few, again, recommend the use of ingredients which are deleterious, if not poisonous. The author of this book, whose practical experience of twenty years on both continents is some warrant for his ability, has endeavored to prepare a work which shall avoid these errors and deficiencies, and be standard authority on the subjects of which it treats. He has availed himself, in addition to his own knowledge, of a reference to all reliable information upon collateral points, which are to be found here and there through numerous volumes, and brought to bear the results of the labors of the most conscientious and careful chemists.

The manufacture of factitious liquors is, and will continue to be, practiced. It has its foundation in the impossibility, at times, of obtaining the genuine article, and in the cupidity of

man. To prevent it is simply impossible. With this fact in mind, the author thinks that he does good service in pointing out clearly how an imitation may be made that will be no more injurious than the original, and in demonstrating that it is more profitable to make factitious liquor which shall contain the actual ingredients of the genuine, than to make it from noxious materials. It is well settled that, when an imitation of French Brandy is properly made, with pure alcohol for its basis, avoiding poisons or poisonous compounds, and using only those materials found by analysis to exist in the liquor sought to be imitated, it is fully as wholesome as the liquor which it purports to be. Dr. Ure, the celebrated English chemist, from whom "*Recipe No.* 13" is derived, says that "Brandy, made after that formula, will afford a spirit *free from the deleterious drugs too often used to disguise and increase the intoxicating power of domestic brandies; one which may be reckoned as wholesome as alcohol, in any shape, can ever be.*"—[*Vide* "BRANDY," *in* URE'S DICTIONARY.] And Dr Cooley, the author of "*The Anatomy of Quackery*," says, "The only method to obtain perfectly pure Brandy is either to take it direct from the bond-store, without allowing it to *enter* a private cellar even for an hour, or to buy it of some known respectable party, and to pay a price that offers no inducement to dishonesty. When this can not be done, *domestic Brandy* had better be at once purchased, *by which money will be saved, and a more wholesome article obtained.*" There is one thing more in that connection. Dr. Cooley speaks of obtaining it "direct from the bond-store." Unfortunately, that is not a perfect guaranty Large quantities of corn whiskey are annually exported from this country to

France, from whence it returns as French Brandy; and so close is the imitation as to deceive the best judges. But corn whiskey contains large quantities of fusil or grain oil, which makes its use in that state improper. Brandy made with corn whiskey for a basis is deleterious; while Brandy made with pure alcohol for a base, after the recipes which follow, is as wholesome, in all respects, as that regularly made from the grape.

A word or so of caution may be inserted here, by way of emphasis, although it occurs in the body of the book. Be careful not to fall into the error of using *too many kinds of flavor in making your Brandy, nor too much of any one kind.* The novice is very apt to spoil good alcohol, through ignorance of the powerful aromatic qualities of Cognac and other essential oils. A good thing in excess may not be a good thing at all. Until long experience gives you the power of attaining the *juste milieu*, the operator had better trust implicitly in the exact proportions and combinations recommended by us in the work.

As even the most experienced may be deceived in regard to the purity of oils and other flavoring matters, it will be observed that, in the proper place, we give tests, to enable the detection of adulterations in these ingredients.

We call the especial attention of the reader to our article headed "*A New Process by which to Make Cheap Wines, by Fermentation.*" This, we think, is one of the most valuable chapters in our book, as it contains the important secret, by the use of which several large manufacturers in this and other cities are *annually making large fortunes.*

We also give some very valuable articles on the use of the

Hydrometer, with Tables on Distillation, on Infusion and Maceration, on Filtering and Fining, with everything of interest or use to the Liquor Merchant. All this is so arranged and classified as to enable the reader to obtain the information sought for with the least possible trouble.

It is unnecessary to say anything in farther recommendation of the work. An *experienced man* will see, from a perusal, that it is written by one who is master of his subject; an inexperienced one will discover its value by carefully following the instructions it imparts.

THE FRENCH

Wine and Liquor Manufacturer

PART I.

ON ALCOHOL, DISTILLATION, AND THE STILL—ON CLARIFICATION OF LIQUIDS BY FILTRATION AND FINING, AND ON THE DIFFERENT WAYS OF EXTRACTING THE FLAVOR AND AROMA FROM SUBSTANCES WHICH CANNOT ADVANTAGEOUSLY BE DISTILLED, BY THE PROCESS OF INFUSION, MACERATION, AND DIGESTION.

Alcohol.

PURE alcohol is the basis of all manufactured liquors. It is a limpid, colorless liquid, of a hot pungent taste, and having a slight but agreeable smell. It is the characteristic ingredient of fermented drinks, and gives them their intoxicating quality. Dilute alcohol may be procured by the ordinary process of distillation, from *all* fermented liquors: when drawn from wine (as in France) it is called brandy, when from rice (as in the East Indies) it is called arrack or *toddy*, when from grain or malt (as in the United States or Great Britain) it is called whiskey, and when from molasses or the juice of the sugar-cane (as in the West Indies) it is called rum. Thus we see, that all spirituous liquors are identical, when the extraneous bodies from which such liquors are obtained have been removed, with this exception, that a variable amount of water is present in them; they are more or less concentrated solutions of *alcohol*, whose properties have been fully given: thus, the alcohol from rum, wine, malt, pota-

toes, carrots, beets, grasses, and various other sources, is the same in quality, provided all the other solid and liquid impurities be removed. A single distillation of the spirituous portions of those liquids will not effect their purification, and where volatile oils are present, distillation merely, how often soever repeated, will not separate them, for these volatile impurities pass over during distillation; hence, the spirit procured from wines by simple distillation will have their peculiar flavor; beer, when distilled, will, for the same reason, yield alcohol possessing the abominable taste of the yeast; malt spirit will have the disagreeable qualities of faints from the presence of an oil of an acrid, bad taste; and potatoe spirit the physical characteristics of fusil oil, or oil of potatoes. Thus, the disagreeableness or fragrancy of distilled products is, as in the case of malt and potatoe spirit, due to the presence of an essential oil, derived from the source of the alcoholic liquid. This and other impurities may be driven off by redistillation or by rectification through maple charcoal. (See article "*On Distillation.*") The chief object of the distiller in rectifying spirit is the removal of these oily bodies in order to procure a pure alcohol, from which, by the aid of other ingredients, he can fabricate liquors imitating those more costly products which are formed naturally, such as the better varieties of brandy, gin, whiskey, and all the other kinds of liquors and cordials which are in daily request as favorite beverages with the community. Common spirits, as brandy, gin, whiskey, etc., generally contain 50 or 52 per cent of alcohol, in other words, they are about half water and half absolute alcohol, and are associated with coloring matter, volatile oil, and various acids, salts, ethers, and other flavoring matter. *Proof spirit*, which is the standard by means

of which all mixtures of alcohol and water are judged, contains 50 per cent by volume, and 42.52 per cent by weight of alcohol. The specific gravity of proof spirit is 0.933 and when a spirit is "*above proof*," it denotes that it contains an excess of alcohol; thus if 100 volumes of a spirit require 20 volumes of water to reduce it to "proof standard," it is said to be "20 over proof," while the term "*under proof*" has reference to a less strong spirit than the standard. Thus, if 100 volumes of a spirit require 20 volumes of spirit of a specific gravity of 0.825 to raise it to the "proof" standard, the sample is said to be "20 *under proof*." The manner of determining the strength of alcohol by the hydrometer is clearly described under the head of "*Alcoholometry and the Hydrometer*."

The great affinity of alcohol for water is the cause of its poisonous action on the system, since it destroys the vital functions of the tissues by abstracting their constitutional moisture with avidity; these violent effects are not produced when alcohol, in a diluted state, is taken in small quantities—only a pleasant hilarity follows, though larger draughts are succeeded by stupor and intoxication. Still, even a small quantity of alcohol when taken as a beverage tends to produce thirst, by absorbing some of the moisture of the tissues: this is the reason why persons who have been drinking any kind of alcoholic liquor, crave water afterwards.

Alcohol when thoroughly rectified and cleansed is called pure neutral spirit, and is the basis of all the domestic manufactured imitations of foreign brandies, gins, cordials, etc.

The high wine, or neutral spirit, distilled and rectified in the United States, and sold as French Pure Spirit, is free from all deleterious substances, and when sweetened,

colored, and properly flavored, will compete favorably with imported brandy or gin.

For numerous important facts and hints about alcohol, see articles headed, "*The Art of Imitating and Manufacturing Brandy without Distillation*," "*Alcoholometry and the Hydrometer*," "*How to make Gin*," "*Useful Rules for Liquor Merchants*," and "*On Distillation and the Still.*"

Fusil Oil in Liquors.

AN EASY METHOD TO DISCOVER THE PRESENCE OF FUSIL OIL IN ALCOHOL AND LIQUORS.

As it is absolutely necessary to use pure rectified spirit as a basis for imitating brandy and gin, and making fine cordials, it is very often requisite to employ some unerring test to determine the presence of fusil or grain oil. In order to accomplish this result, the following simple experiment may be tried with success:—Dissolve ten grains of nitrate of silver in one ounce of pure distilled water. Then take half a tumblerful of the suspected liquor and drop into it twenty-five drops of the above solution; and if the liquid should contain any grain oil, it will assume the form of a black powder and float on the surface. The action of this test is not always immediate, for it is sometime necessary to wait from one to thirty hours when testing a sample of alcohol which has been well rectified, before any evidence of the oil or powder can be perceived floating on the liquid, and even then it is necessary to expose the glass to a strong light before the powder can be discovered.

On Distillation and the Still.—(SEE APPENDIX.)

The Alembic, or still, is one of the most ancient of

chemical instruments; so old is it, that the name of its inventor is lost in the lapse of time. Our word "still" is given to the instrument from the Latin *stillare*, to drop, to trickle down, to distill.

The principle of action of the still, whether of the oldest or most modern form, is identically the same; but the development of its use is ever progressive from age to age, and in our day it is utterly impossible to set a limit to its value as an instrument of progress and civilization.

The vapor of water rises from the earth during the warmth of the day, and is condensed during the cold of the night upon the surrounding plants and flowers; these are the dewdrops that sparkle in the morning. This is a process of Nature's distillation.

The object of distillation is to separate one substance from others with which it may be mixed. For example, as alcohol is transformed into vapor at the temperature of 176°, while water remains, at this temperature, in a liquid state, it is only necessary to heat the mixed liquids to 176°, when the alcohol rises in vapor, and the water is left behind. The vessel in which the liquids are heated is closed by an air-tight cover, and from this cover a pipe is led and coiled through a cask of cold water; as the alcoholic vapor enters this cold pipe it is condensed to the liquid form. This process of evaporating and condensing a liquid is called distillation; the apparatus is called a still, and the coiled pipe is the "worm of the still."

It is not possible by this process to completely separate the alcohol and water, for, though water is wholly converted into steam only at the temperature of 212°, it is partially volatile at lower temperatures, and a portion of it is consequently carried over with the alcohol.

There is also mingled with the alcohol another ingredient which for some purposes it is desirable to remove. This is properly an ether, though it is called by some chemists and by most distillers an essential oil, which gives the peculiar flavor to the different kinds of spirit; one oil being produced from sugar and giving the flavor to rum; another from corn and giving the flavor to corn whiskey; another from rye and giving the flavor to rye whiskey—each kind of spirit deriving its flavor from its peculiar ether. It so happens that charcoal has the property of absorbing all of these ethers (the quantity of which bears a very small proportion to that of the spirits). and consequently they are eliminated by simply leaching the spirits through charcoal. This process is called rectifying.

In practice, it is customary for distillers in the grain-growing regions of the West to manufacture an article called "high wines," which is alcohol mingled with considerable water and with ethers. This article is sold to refiners—located in New York and other places—who redistill it to separate it from a portion of the water and leach it through charred bone-dust to eliminate the essential oil.

In distilling cordials, the object is to extract or separate the odorous and aromatic principle from the roots, flowers, seed, or spices used to impart the characteristic taste to the liquor, and it is usual to macerate such ingredients in strong alcohol several days before distillation. (See "*Infusion, Maceration, and Digestion,*' *page* 28.)

With respect to the practical part of distilling cordials, we shall observe that *the heat should, in all cases, be as gentle and uniform as possible.* Accidents may be effect

nally prevented by distilling spirits in a water bath, which, if sufficiently large, will perform the operation with all the dispatch requisite for the most extensive business. The vessel in which the distillation is effected ought to be immersed in another filled with water up to the neck. The process will thus be managed as expeditiously as if the vessel were placed over an open fire, and without the apprehension of being disappointed by having your spirits burned ; nor will it be necessary at any time to raise the water in the bath to a boiling heat. As distillation is only recommended in this book for some few cordials, we shall simply describe a small still suited to that purpose.

Description of the Still and Water-Bath.

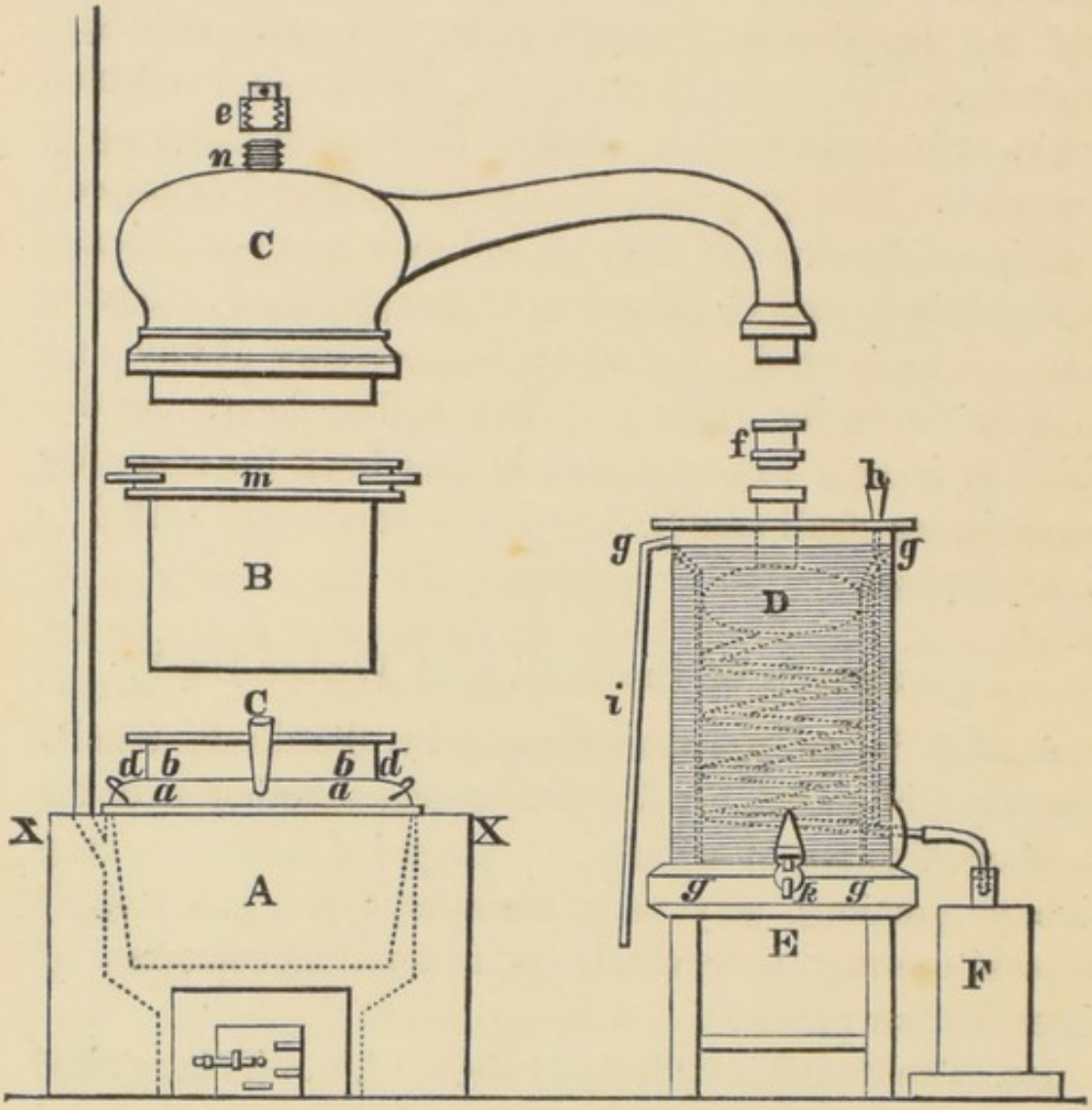
A still is an apparatus used in distilling, usually composed of metal, the form of which, together with the number of parts of which it is composed, and their relative proportions, may vary considerably. The still in general use may, however, be considered as composed of three or four parts :

1st. The cucurbit or body of the still, A. This portion of the apparatus receives the direct action of the fire, and contains the liquid to be distilled when the process is to be conducted by a naked fire. It is in the form of a truncated reversed cone, A, mounted on a rounded portion, *a a*, which rests on the furnace, X X, and terminated at the top by a collar of somewhat smaller diameter than the lower part.

C is a hole, by which the liquid is introduced into the body of the apparatus ; *d d* are the handles.

2d. The water-bath, B, a cylindrical vessel of tin or tinned copper, which is placed in the cucurbit, A, closing

it lightly by means of the collar, *m*, which rests on the collar, *b b*.



When, instead of distilling by the naked fire, the water-bath is employed, water only is put into the cucurbit, in which the water-bath is placed containing the liquid to be distilled.

3d. The head of the capital, G. This part may be placed either on the cucurbit, or on the water-bath, care having been taken to make both openings of the same size; it is very nearly the shape of the upper part of a retort, and is furnished with a large pipe by which the vapor is to be carried off to the worm or cooler.

n. A hole, which during the operation is kept closed by a screw top, and its use is to introduce fresh liquid into the water-bath without having to disconnect the apparatus.

4th. The cooler or worm, D. This is a long tin pipe, bent in the form of a screw, and enclosed in a copper or wooden vessel full of cold water. The upper part of the pipe, which is often enlarged in a globular form, receives from the beak of the capital the vapors arising from the cucurbit, or water-bath, and the lower portion which opens below the vessel; the condensed liquid flows into a vessel placed underneath.

All the joints of the apparatus are to be luted with bands of paper soaked in paste, except the joint of the cucurbit or water-bath, which must not be tight, in order to allow of the escape of the steam from the boiling water.

g g. Tin rests for supporting and fixing the worm in the vessel.

h. A vertical pipe fixed to the side of the vessel, open at both ends and terminated at the top by a funnel.

The pipe serves to renew the water in the cooler; cold water is poured in at the top which flows to the bottom of the vessel, and being of a lower specific gravity than the hot water, forces it out at the escape pipe, *i.*

k. A tap, by which all the water in the worm tub can be discharged.

f. The end of the connecting pipe between the beak of the capital and the collar of the still. This pipe is of precisely the same height as the collar of the water-bath, *m.* It is only used in distilling by the water-bath: when a naked fire is used this pipe is dispensed with, in order to avoid raising and lowering the worm, which always remains on the same support, E.

F, the recipient.

The French term, "*bain-marie*," meaning water-bath, is a corrupted translation, sanctioned by use, of the Latin words *balneum maris*, sea bath, the ancients expressing, figuratively, water by the sea, in the same way as they indicated by the expression *balneum ventres equini*, the method of conducting digestions by the heat of stable litter.

On the Clarification of Liquids by Filtration.

THE object of filtration is to clarify liquids, and especially those made without the aid of heat. No better way has been found than to make the liquid pass as often as may be necessary through the pores of some substance sufficiently close or impervious to allow the most fluid portion to run through clear and retain the coarser particles or substances, which occasion the cloudy appearance of the liquid.

The filters in most general use, are made of flannel, felt, Canton flannel, and cotton serge.

The article to be employed should be adapted to the kind of liquid to be purified, for if too coarse a tissue be used, the filtration would be too rapid, and therefore imperfect, while on the other hand it would be exceedingly difficult to filter a liquid, highly charged with sugar, through a fine cloth.

When large quantities of liquids are to be filtered, such as brandy, port wine, bitters, etc., wooden vessels, or old casks are used, in which are arranged, layers of sand, charcoal, or cotton, according to the kind of liquors to be filtered. See preparation and arrangement of filters for brandy, port wine, and bitters, etc., pages

Filtering bags and filtering paper for cordials are

noticed in other parts of this work. Agitation or vibration is of great efficacy in quickening percolation, or straining, as it displaces the particles which clog the filter, and opens the pores which have become closed. It is convenient to render the filter self-acting, by accommodating the supply of liquid to the rate of percolation, or trickling, so that the pressure upon the porous surface may be always equally great.

The celerity with which any fluid passes through the filter depends,—1st, upon the porosity of the filtering substance; 2d, upon the pressure exercised upon it; and 3d, upon the extent of the filtering surface. The enlargement of the surface is, generally speaking, the safest and most efficacious plan for increasing the rapidity of filtration, especially for liquids containing much sugar.

We will hereafter show that fermented liquors clarify themselves in course of time.

In order, however, to hasten the process of clarification, white of eggs, isinglass, milk, blood, etc., are occasionally used. See "*Fining*," page 26.

On the Clarification of Liquids by Fining.

Good wines, or any fermented liquors, need no artificial "*fining*," as they always clarify themselves by repose. With those, however, which are "out of condition," or of inferior quality, it is often necessary, as without such a proceeding, they remain unsaleable. The disadvantages resulting from the artificial clarification of fermented liquors are—that they do not afterwards "stand well on draught," that much of the conservative astringent matter which they contain is precipitated with the "finings," that their piquancy and flavor is more or less diminished, and that they are more than usually

liable to become flat and vapid, whether in cask or bottle. The larger the proportion of "finings" used, the more marked are their injurious effects, and the shorter the interval which elapses before the accession of the several symptoms referred to. We have seen the most disastrous consequences follow the injudicious use of "finings," more especially in respect to those liquors in which a certain amount of piquancy, astringency, and briskness is an essential condition. Wines which "refuse" to "fine" or become clear, when treated with "finings" in the usual manner, are called "stubborn" by wine dealers. The substances employed in the clarification of liquids, operate by either mechanically embracing the feculous matter, and subsiding with it to the bottom of the vessel, or by inducing such a change in its nature or bulk, that it subsides by its own density, in each case, leaving the wine or other liquid transparent. Albumen, gelatine, milk, the acids, certain salts, blood, lime, plaster of Paris, gum arabic, alum, heat, alcohol, etc., serve in many cases for this purpose. The first is used under the form of white of egg, for the clarification of syrups, as it combines with the liquid when cold, but on the application of heat rapidly coagulates and rises to the surface, carrying the impurities with it, forming a scum which is easily removed with a skimmer. It is also much used for fining wines and cordials, particularly the *red wines* and more limpid cordials. Gelatine, under the form of isinglass, dissolved in water, or some of the liquid to be "fined," is used to fine white wines, cider, beer, and similar liquors, that contain a sufficient quantity of either spirit or astringent (tannin), to induce its precipitation. Fining with isinglass is, as it were, a mechanical process in this sense, that the isinglass in precipitating forms a

kind of cloth which carries down with it all the impurities suspended in the wine. Sulphuric acid is frequently added to weak liquors for a similar purpose, either alone, or after the addition of white of egg, or isinglass, both of which it rapidly throws down in an insoluble form. A pernicious practice exists among some unprincipled parties of using certain salts of lead and potash to clear their liquors; especially those that are expected to sparkle in the glass, as cordial gin and hock wine. For this purpose, a little sugar of lead, dissolved in water, is first mixed up with the fluid, and afterwards a little more than one half its weight of sulphate of potash, also dissolved in water, is added, and the liquor is again "roused up." By standing, the sulphate of lead, formed by this mixture, subsides and leaves the liquor clear. No person should attempt to fine by this process, as the ingredients used are pernicious poisons. Bullock's and sheep's blood is used in the same way as isinglass or white of eggs, for fining red wines, beer and porter. Blood, however, is very apt to communicate a slightly unpleasant odor or flavor to wine. Lime, alum, alcohol, the acids, and heat, act by curdling or coagulating the feculencies or impurities, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts partly like the above, and partly like albumen or gelatine, by enveloping and forcing down the suspended matter. Gum arabic has this advantage over most ingredients used for fining,—it is not liable to putrefaction. Ropy, stringy wine can only be clarified by the addition of tannin, as specially directed in another place. (See "*To Remedy Ropiness in Wine.*")

Infusion, Maceration, and Digestion.

In order to extract the soluble principles in substances which cannot be advantageously distilled, liquor dealers are often obliged to resort to infusion. This consists in submitting them for a greater or less period of time to the action of any liquid, with or without the aid of heat.

This is known by the name of infusion, digestion, or maceration, terms all signifying the same process with different modifications in the way of conducting it.

When the principles to be extracted are soluble in water, and at the same time but slightly volatile, boiling water is poured on the substance of which the infusion is required, the vessel is carefully covered, and the whole allowed to remain untouched for some minutes or even some hours, according to the greater or less penetrability of the substance, and the required strength of the infusion; the result is an INFUSION, properly so called.

If an infusion is required of dried leaves or flowers, they are first moistened with a little boiling water, and a little time allowed for them to swell and soften before adding the rest of the water. Infusions made by adding all the water at once, as is still frequently practiced, are deficient both in flavor and perfume.

MACERATION.—When an infusion is made without the aid of heat, it is termed maceration. This takes a much longer time than an infusion, properly so called; it rarely requires less than a day, sometimes several weeks. Those substances to which heat would be injurious, or which are easily soluble, are treated in this way. In many distillations this method is made use of to soften the substances before putting into the still; and, to facilitate the extraction of their odorous principle, liquor manu

facturers macerate in pure alcohol the plants whose odorous principles they wish to extract, in order to preserve them till they are required for distillation. Compound wines and toilet and table vinegar are prepared by maceration, these liquors being readily decomposed by heat; any other method would be ineffectual.

DIGESTION is a prolonged infusion which is usually conducted at a medium temperature between that required for an infusion, properly so called, and that of a maceration. Its object is usually to impregnate the alcohol with the principles of a substance which would be but slowly extracted without the aid of a certain amount of heat, such as that of the sun, or of hot ashes.

Mixing together two or more liquors and allowing them to stand for some days, is also called digestion.

Infusions, whether made with or without heat, should be made in vessels which cannot be attacked by any of the substances with which they are in contact, and closed sufficiently tight to prevent the loss of the most volatile principles.

The tin cucurbit, with cover, is, in the two respects, best adapted for infusions in water. Maceration and digestion are usually performed in vessels of stoneware or glass, which are placed on the sand-bath* when a regular and uniform heat is required.

Whatever may be the form or nature of the vessels employed, care must be taken not to fill them full, also to cover those which are to be placed on the sand-bath

* The *Sand Bath* is usually an iron pot, or a shallow vessel of sheet iron, capable of holding sand to the depth of four or six inches. It serves to regulate the action of the heat on vessels which do not bear a rapid change of temperature, such as glass or stoneware. It is heated to the required degree by being placed over the fire of a furnace. The sand used in the bath should be good sea or river sand thoroughly washed, to remove all dirt and dried.

with a damp piece of parchment tightly tied round the top, with many pin holes pricked in it. If this double precaution is neglected, the increased volume produced by the heat and also the expansion of the air may burst it. Moreover, the process is never so well conducted in a vessel that is too full.

It is also necessary to break and bruise down, in some convenient way, the substances from which the infusion is required, in order that a large surface may be simultaneously exposed to the action of the liquid, to agitate from time to time the vessel in which it is contained, to present fresh surfaces, to proportion the length of the operation to the degree of consistence of the substances employed ; lastly, to treat each by that particular mode of infusion best adapted to its nature.

In order that the different substances which are to enter into the composition of a liquor, produced by infusion, may all be acted on to the same extent, the infusion must be commenced with the hardest substances, to which those which are softer must be added when the first are considered sufficiently softened. Without this precaution the latter would furnish a great deal too much to the infusion, while the former would not contribute sufficient. In certain cases the substances to be infused must be used whole ; this is when the most important principle is contained in the exterior.

The time employed for an infusion should be proportioned to the character and solubility of the principles to be extracted ; the odorous principle, for instance, being usually the most soluble of all, particularly in alcohol, it is better, when that is principally desired, to shorten the time, in order to get a milder product ; for both cold and hot

infusions give thick and sharp liquors, when carried on too long.

It is therefore usually found that with few exceptions the quicker an infusion is made the better, and this is especially the case with all rectafias or cordials, except those made from sweet fruits.

When it is considered that the infusion has been carried on long enough, the liquor must at once be drawn from the *marc* or residue, either by passing it through a sieve or a wet cloth, if it is necessary to press it. Those substances which absorb much liquid, or those of which the most important principle is not contained in the exterior, are squeezed either by hand or in a press. In other cases this is avoided.

In order to have fine and clear extracts, they are then filtered.

To produce tinctures of high perfumes and not overcharged with color, spirit of 80° per cent must in general be employed, then macerate for a week at a temperature of 65° Fahrenheit. But if a saving of time is an object, stronger spirit may be used, and a heat maintained of 100° Fahrenheit, taking care to stir from time to time to present fresh surfaces to the action of the spirit, then, after letting stand for some hours, it is drawn off with pressure, if necessary, and carefully filtered. Tinctures improve with age by a kind of more intimate combination which takes place between the different principles of which they are composed, but they must be preserved in flasks, well corked, and stored in a place neither too hot nor too cold ; the light ultimately occasions a species of decomposition. It may be observed that tinctures show a degree of strength, as marked by the hydrometer, inferior to that of the spirit originally employed, in the

same proportion as the strength of the tincture, but this change is only due to the substances they hold in solution, and which add to their specific gravity, without there having been any real loss of strength, unless very succulent substances have been macerated in it.

Well prepared tinctures have this advantage over distilled spirits, that they preserve without change the perfume and the flavor of the substances they hold in solution; they retain the aroma of some which yield none by distillation, have no fiery or empyreumatic taste, and lastly, their preparation is less troublesome, and more economical both as regards the process employed and the manufacture.

These processes would therefore be equally convenient and agreeable in the manufacture of fine liquors; all that would be necessary would be to have in stock tinctures of the aromatic substances in most demand, and combine them as wanted, in the proportions necessary to make an agreeable mixture. Liquors, cordials, etc. thus prepared would gain much in perfume, taste and softness; moreover, age would not be so essential to them, and the use of tinctures would be more economical than that of spirits.

Notwithstanding these advantages, their usually deep color prevents them from being used for liquors which are required to be perfectly white, or which are to be colored at will. But, supposing that they are not on this account adapted for the making of fine liquors, they can, at least, be useful in the manufacture of spirits; all that has to be done is to make an extract of the required substance, and then distill it by means of a water-bath till nearly all the spirit has come off; what remains in the still is worthless.

The principal advantages of this method over the distillation of substances in their native state, would consist in obtaining better products by only distilling the most delicate portions of these substances, which would require a less extensive apparatus for distilling. In order to thoroughly understand the properties of tinctures, it must be remembered that alcohol, whatever may be its strength, unless it be absolute, is also combined with a certain portion of water. Vegetables, on the other hand, are composed of essential oil, resin, salts, extractive coloring matter, etc., in different proportions, all substances of which the one only dissolves in water and the others in alcohol. Thus, when any substance is macerated in any spirituous liquid, the alcohol only dissolves the essential oils and the resins; the water dissolves the other principles to the fullest extent possible.

It is therefore evident, that if, other things being equal, a large quantity of the same substance is macerated in 90° alcohol, and in ordinary *proof spirit*, the first tincture will be much finer both in smell and taste, while, on the other hand, the other will be more highly charged with color. This simple example will serve to show that the strength of the spirit to be employed is not immaterial, and should be dependent on the nature of the tincture required. Tinctures prepared by simple maceration in the cold are better than those prepared by heat, but very hard substances require that assistance if the spirit employed is rather weak or a speedy result required

Tinctures prepared for the use of liquor manufacturer ought, for convenience of use, to be saturated as much as possible, and prepared with spirits of wine, in order to be more odorous and less colored. As it is better to employ too much than too little of the aromatic substances,

and the first maceration does not exhaust them, a weaker spirit may be poured over the marc to produce an inferior tincture, which, however, will still contain much of the aromatic principles.

It would be useful to specify positively the quantity of aromatic substances that can be exhausted by a given amount of spirit of wine, but as that depends essentially on the quality of the substances employed, the degree of division, the strength of the spirit, and the temperature maintained, only very vague hypotheses could be given.

PART II.

THE HYDROMETER AND ITS USES, WITH EXPLANATORY TABLES, DIAGRAMS, AND COMPARATIVE SCALE, TOGETHER WITH SOME OBSERVATIONS ON THE SACCHAROMETER.

The Hydrometer.

EVERY one is aware that the spirituous liquors known under the name of brandy, rum, etc., are composed of water and pure or absolute alcohol in various proportions. The commercial value of any liquor is therefore in a direct ratio with the amount of alcohol it contains. To ascertain this is of the highest importance both to the manufacturer and liquor merchant.

The per centage of absolute alcohol in any spirituous liquid may be given either by *volume* or weight, but as liquors are sold by measure, not weight, it is generally preferred to know the per centage by volume. The per cent of weight remains the same in all temperatures, but the per cent by volume varies with the temperature or heat of the liquid. Many instruments have been introduced to determine the quantity of absolute alcohol contained in any spirituous liquors, and these are known as hydrometers, or alcoholometers. Hydrometers made by different inventors have come into use in different countries: thus the hydrometer made by Tralles has been adopted by the governments of the United States and Prussia; that made by Gay Lussac has been legally sanctioned in France and Sweden, while that invented by Sikes has been approved and made the Excise standard in Great Britain. Mr. Tralles' hydrometer is the in-

ment used by our government to ascertain the strength of *imported* liquors, and is made of glass. Mr. Tralles has adopted as the standard of comparison pure or absolute alcohol in volume at the temperature of 60° Fah., the strength of which he expresses by a scale divided into 100 degrees or parts, each of which represents $\frac{1}{100}$ part of alcohol. When floated in any spirituous liquor at a temperature of 60° Fah., it immediately indicates the strength. For instance, if in a brandy at that temperature it sinks to 65, it shows that 65 parts of the liquor is absolute alcohol, and 35 parts water: should it sink to 90, it indicates that the liquor is 90 parts or per cent strong, and so on.

An increase of heat causes liquids to expand in volume, and a decrease produces contraction, therefore spirits over the normal temperature of 60° Fah. appear stronger than they really are, and below 60° they are really stronger than they appear to be.* It is therefore evident that the degrees of per centage of this hydrometer, are only correct when the spirit under trial *has* the normal tempera-

* We must always bear in mind one important rule with the hydrometer. It measures, or rather weighs, the densities of fluids, and those fluids are more or less dense as they are colder or warmer. The established standard of temperature from which all calculations are made with the hydrometer is 60°. Ten degrees of heat is about equal to four degrees of density; that is, in alcohol and water—half and half—the hydrometer will stand at 50°, provided the fluid is not more than 60° by the thermometer. Heat the liquid to 70°, and the hydrometer sinks to 54°; cool it to 50° (therm.) and the hydrometer stands at 46°, and so on. And it must be remembered that the stronger the liquid is to the taste, and also in its intoxicating effects, the lighter it is also—the more rarefied; and hence the instrument will almost swim in the punch of a clergyman, and find deep sea-soundings in the punch mixed by a jolly sea-dog who believes only in the three L's, that is, in the log, the lea', and the longitude.—Cozzens.

ture of 60° Fah. When the temperature varies from 60° the per centage can only be ascertained by a long and tedious calculation. To avoid this Mr. Tralles has constructed a simple table by which the real per centage of alcohol is found in liquids of different temperatures from the results exhibited by the instrument. This we herewith give and will designate it as Table I. The horizontal line at the top shows the various temperatures given by the thermometer; the column of figures under 60° shows the *true* per centage of strength at the normal or standard temperature of 60°; the figures under the other degrees of temperature show the *observed* or *apparent* degrees of strength as indicated by the hydrometers.

As an example of the simple manner by which this table may be used, we will suppose that the temperature of the spirits to be tested is at 75°, Fah., and that the hydrometer sinks to 53° on the scale, this would be the *observed* or apparent degree or per centage of strength. Now to find the *real* per centage of strength at 60°, we turn to Table I., and find the upright or vertical column of figures headed 75°, we then run down the figures until we arrive at 53.0; having ascertained this, we then trace the horizontal line to the *left* until we find the column headed 60°, and at the point when the horizontal line running from 53.0 meets the vertical column headed 60°, will be found the number 50. We thus ascertain that a spirit at 75° having an *observed* strength of 53 has only a *real* per centage of 50 at the normal or established temperature of 60°.

Suppose that another sample of brandy, instead of being at 75° is at 50°, and the instrument still sinks to 53. In the same way we select the column headed 50°, and run down the figures until we find 53.0 then by tracing the

horizontal line running to the *right* until we arrive at the column headed 60°, we find the number 55, which is the true per centage of the brandy at 60° Fah.

Again, if an alcoholic liquid at a temperature of 30° be found to contain 23.5 per cent, by volume, by reference to the table 30 will be found to express its actual strength at 60° Fah.

We might multiply examples, but the above are sufficient to show the simple manner by which the table may be worked.

TABLE I.

To find the true per centage of absolute Alcohol by volume in a liquid at 60° from the observed per centage indicated by a Glass Hydrometer at any other temperature.

30°	35°	40°	45°	50°	55°	60°	60°	65°	70°	75°	80°	85°
—0.2	—0.4	—0.4	—0.5	—0.4	—0.2	0	0	+0.2	+0.6	+1.0	+1.4	+1.9
+4.6	+4.5	+4.5	+4.5	+4.6	+4.8	5	5	5.3	5.8	6.2	6.7	7.3
9.1	9.0	9.1	9.2	9.3	9.7	10	10	10.4	11.0	11.6	12.3	13.0
13.0	13.1	13.3	13.5	13.9	14.5	15	15	15.6	16.3	17.1	18.0	19.0
16.5	16.9	17.4	17.8	18.5	19.2	20	20	20.8	21.8	22.8	23.8	24.9
19.9	20.6	21.4	22.2	23.0	24.1	25	25	25.9	27.0	28.2	29.4	30.5
23.5	24.5	25.7	26.6	27.7	28.8	30	30	31.1	32.2	33.4	34.5	35.7
28.0	29.2	30.4	31.6	32.7	33.8	35	35	36.2	37.3	38.4	39.5	40.6
33.0	34.2	35.4	36.7	37.8	39.0	40	40	41.1	42.2	43.3	44.3	45.4
38.4	39.6	40.7	41.8	42.9	43.9	45	45	46.1	47.1	48.2	49.2	50.3
43.7	44.7	45.8	46.9	47.9	49.0	50	50	51.0	52.0	53.0	54.0	55 1
49.0	50.0	51.0	52.0	53.0	54.0	55	55	54.9	56.9	57.9	58.9	59.9
54.2	55.2	56.2	57.1	58.1	59.0	60	60	60.9	61.9	62.9	63.8	64.9
59.4	60.3	61.2	62.2	63.1	64.0	65	65	65.9	66.8	67.7	68.6	69.6
64.6	65.5	66.4	67.3	68.2	69.1	70	70	70.8	71.7	72.6	73.5	74.5
69.8	70.7	71.5	72.4	73.3	74.2	75	75	75.8	76.7	77.6	78.4	79 3
75.0	75.8	76.6	77.5	78.4	79.2	80	80	80.8	81.7	82.4	83.2	84.1
80.3	81.1	81.8	82.6	83.5	84.3	85	85	85.7	86.5	87.3	88.0	88.8
85.6	86.4	87.1	87.9	88.6	89.3	90	90	90.7	91.4	92.0	92.7	93 4

The following table gives the *richness* or the per cent of alcohol by volume, in reference to the volume of the liquid at the temperature when tested; it therefore requires that the liquid should be tested exactly at the same temperature at which it was measured.

TABLE II.

To find the true per centage of absolute Alcohol in a liquid of any temperature from the observed per centage indicated by the Glass Hydrometer at the same temperature

True per ct. of Alcohol by Volume.	Observed per cent indicated by the Glass Hydrometer.										
	30°	35°	40°	45°	50°	55°	65°	70°	75°	80°	85°
0	—0.2	—0.4	—0.4	—0.5	—0.4	—0.2	+0.2	+0.6	+1.0	+1.4	+1.9
5	+4.6	+4.5	+4.5	+4.5	+4.6	+4.8	5.3	5.8	6.2	6.7	7.3
10	9.1	9.0	9.1	9.2	9.3	9.7	10.4	11.0	11.6	12.3	13.0
15	13.0	13.1	13.3	13.6	14.1	14.5	15.6	16 3	17.1	18.0	19.0
20	16.5	16.9	17.4	17.9	18.5	19.2	20.8	21.8	22.9	23.9	25.0
25	19.8	20.5	21.3	22.2	23.0	24.1	25.9	27.1	28.3	29.5	30.7
30	23.3	24.3	25.5	26.5	27.6	28.8	31.2	32.3	33.5	34.6	35.9
35	27.7	28.9	30.2	31.4	32.6	33.8	36.3	37.5	38.6	39.7	40.9
40	32.5	33.8	35.1	36.5	37.7	38.9	41.2	42.4	43.5	44.6	45.8
45	37.8	39.1	40.3	41.5	42.7	43.8	46.2	47.3	48.5	49.6	50.8
50	43.1	44.2	45.4	46 6	47.7	48.9	51.1	52.2	53.4	54.5	55.6
55	48.3	49 4	50.5	51.6	52.8	53.9	56.1	57.2	58.3	59.4	60.5
60	53.4	54.5	55.6	56.7	57.8	58.9	61.1	62.2	63.3	64.4	65.5
65	58.4	59.5	60.6	61.7	62.8	63.9	66.0	67.1	68.2	69.3	70.4
70	63.5	64.6	65.7	66.8	67.9	69.0	71.0	72.1	73.2	74.3	75.4
75	68.6	69.7	70.7	71.8	72.9	74.0	76.0	77.1	78.2	79.2	80.3
80	73.7	74.8	75.8	76.9	78.0	79.0	81.0	82.1	83.1	84.1	85.2
85	78.8	79.8	80.9	81.9	83.0	84.0	86.0	87.0	88.0	89.0	90.0
90	84.0	85.1	86.1	87.1	88.1	89.1	91.0	91.9	92.8	93.7	94.6

TABLE III.

Table of comparison between the per cent of Alcohol by volume at 60° (*Tralles'*) *and per cent by weight.*

Per Cent by Vol.	Per Cent by Weight.	Per Cent by Vol.	Per Cent by Weight.	Per Cent by Weight.	Per Cent by Volume.	Per Cent by Weight.	Per Cent by Volume.
0	0.	55	47.29	0	0.	55	63.97
5	4.00	60	52.20	5	6.25	60	68.97
10	8.05	65	57.25	10	12.42	65	73.79
15	12.15	70	62.51	15	18.52	70	78.40
20	16.28	75	67.93	20	24.57	75	82.80
25	20.46	80	73.59	25	30.55	80	86.97
30	24.69	85	79.50	30	36.45	85	90.88
35	28.99	90	85.75	35	42.25	90	94.46
40	33.39	95	92.46	40	47.92	95	97.61
45	37.90	100	100 00	45	53.43	100	100.00
50	42.52			50	58.79		

Thus, if the Hydrometer indicated 59.4 per cent in a liquid at 80° Fah., the table would give its true per centage (richness) to 55 per cent; that is, 100 volumes of the liquid at 80° contains 55 volumes of alcohol. Tralles' Hydrometer gives the *per cent* by volume only. If it be

desired to know the *per cent* by *weight*, it may be ascertained from the *per centage* in volume of the liquid at 60° Fah. by Table III., on preceding page.

We have already stated that Tralles' Hydrometer is the instrument used by the United States Government to ascertain the strength of *imported spirits;* but, by the Tax Law recently passed by Congress, the amount of revenue which will flow into the National Treasury annually from the trade in *domestic* liquors, renders it a matter of some importance to ascertain the real strength or per centage of alcohol, with expedition and accuracy; besides, the manufacturers and liquor merchants have always been accustomed to buy and sell their spirits at a *proof* standard, and it has, therefore, been deemed necessary, if possible, to adopt some instrument with a proof scale in harmony with the scale of Tralles' hydrometer. It has, also, been urged against the hydrometer of Mr. Tralles, that being made of glass it is too liable to be broken when carried around by the inspectors of Internal Revenue.

The *Standard Hydrometer and Thermometer*, made by Messrs. W. T. and T. V. Gendar, of this city, seems to answer all the above requirements. It is graduated in conformity with Tralles' instrument in 200 parts above and below proof. Therefore, one part or degree of Tralle's scale is just equivalent to two parts of Gendar's scale. This hydrometer has a thermometer that accompanies it, which is graduated so as to show at a glance the *true* per centage of spirits at any temperature,—the use of tables may, therefore, be dispensed with. Gendar's hydrometer is made of silver; another advantage it has over the glass instrument.

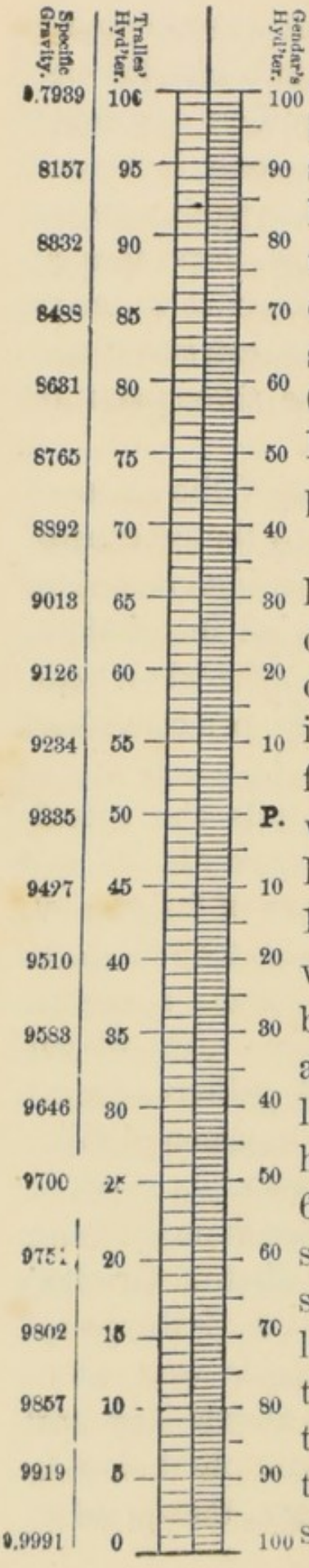
This hydrometer is certified to be in accordance with

the laws of the State of New York. It was adopted by the State of Pennsylvania, June 15th, 1861, and has been used since April 5th, 1851, by all the distillers, inspectors and dealers in liquor in this city, as the only instrument by which they would buy and sell. It was again adopted, October, 1862, and is now used by the inspectors appointed by the collectors of Internal Revenue under the new National Tax Law of 1862. This instrument may, therefore, be said to be in general use throughout the whole country.

Annexed we give a comparative view of the scales of Tralles and Gendar,—the former used by the revenue officers of the United States for *imported liquors*, and indicating the per cent by volume of alcohol in spirituous liquors, and the latter used throughout the whole country for *domestic liquors*, determining the per cent above and below *proof*.

The first column of the table exhibits the specific gravities at 60° Fah., for *mixtures* of pure alcohol and water ;—taking water at the temperature of its greatest density, at 4° centigrade scale, or about 39.5° Fah., as 1.0000, and, therefore, having at 60° Fah., a specific gravity of 0.9991. Of the above mixtures, each 100 gallons or measures contain the number of gallons or measures of alcohol indicated in the second column (Tralles' Hydrometer scale), if measured at 60° Fah.

In the Tralles' hydrometer scale there is no reference to proof of any denomination ; and in that of Gendar's there is but one proof, marked P. on the Hydrometer ; the others, such as 2d, 3d and 4th proofs, were, at all times, incorrect and deceptive. The National Tax Law, of August 1st, 1862, says, that, " the term proof shall be construed, and is hereby declared to mean, that proof of



a liquor which corresponds to 50 degrees of Tralles' hydrometer at the temperature of 60 degrees Fah." Proof spirit is, therefore, by law, of the alcoholic strength of 50 per cent by volume, having a specific gravity of 0.933, or a mixture of equal quantities of absolute alcohol at the specific gravity of 0.793, and distilled water at 60° Fah. In other words, proof spirit is one-half pure water and half absolute alcohol.

To ascertain what strength any liquor above proof by the Gendar hydrometer would be by the Tralles hydrometer, add 100 to the given proof if above proof, or deduct if below proof, from 100 on the Gendar scale, and divide by 2. Say a liquor is at 40 above P. on the Gendar scale, you then add 100, making 140, and divide by 2, which will show 70 on the Tralles scale. If below P. deduct the proof from 100 and divide the remainder by 2. Say a liquor is 35 below P., consequently you have a remainder of 65, and divide the 65 by 2, which will show 32½ on Tralles' scale. Having ascertained the degree of strength of any liquor by volume on Tralles' scale above 50 (which is proof), multiply the degrees by 2, and cut off the two right hand figures, and it will show the degrees above proof on Gendar's scale. Thus we will suppose the spirit to

show 70 per cent strength on Tralles' scale. We, therefore, multiply 70 by 2, which gives us 140 ; we now cut off the two right hand figures thus, 1.40, and find that the liquor is 40 above proof, on Gendar's scale.

Or suppose a liquor is below 50 on Tralles' scale (which is below proof). To find what degree it is below proof on Gendar's scale : multiply the degrees on Tralles' scale by 2 and add a number sufficient to make 100 ; the number required to be added will show the degree below proof.

For example, we will suppose the liquor to be 45 per cent on Tralles' scale, we multiply 45 by 2, this gives us 90, we then add 10 to make that number 100, and we thus ascertain that the liquor is 10 below proof on Gendar's scale.

Nothing can be more simple than this. Annexed we give a diagram of Gendar's hydrometer, which represents it at about one-half its actual size. (See Fig. I.)

Directions for using Gendar's Hydrometers.

P. on the stem of the hydrometer is the mark for proof, when the liquor is 60° Fah., at which temperature the instrument is graduated.

Every line above the P. is one per cent above proof.

Each line below the P. is one per cent below proof.

It will be observed that the hydrometer has a stationary weight on the stem, and is also furnished with a sliding weight. The latter is always required when the liquor to be tested is not more than 50 above proof, using the scale on the left side of the stem, which runs from 50 below to 50 above proof. When the liquor is stronger than 50 above proof, the sliding weight must be removed, and the scale at the other side of the stem used, this scale

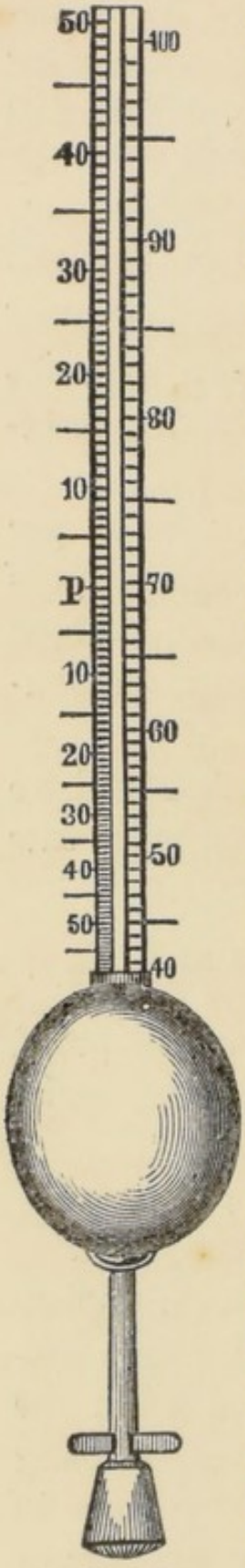


Fig. 1.

runs from 50 above proof up to absolute alcohol.

Liquors ranging from 10 below to 50 below proof, add to the indication on the hydrometer, at the ratio of 8 per cent for every twenty degrees temperature Fah. below 60 ; or deduct at the same ration for every twenty degrees above 60

Liquors ranging from 10 below to 25 above, 7 per cent must be added or deducted for each twenty degrees.

Liquors ranging from 25 above to 100 above, add or deduct 6 per cent for each twenty degrees.

Directions for Using the Thermometer.

We have before stated that the thermometer which accompanies this instrument is graduated to show at a glance the *true* per centage of spirit at any temperature, therefore there is no necessity to use tables, but careful attention must be given to the above as well as the following instructions for using the instrument.

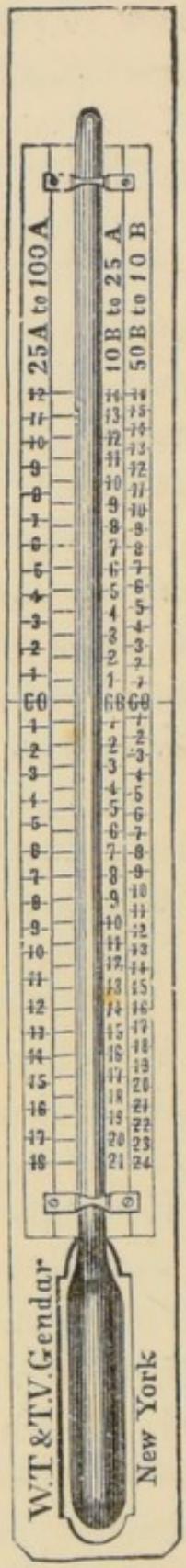


Fig. 2.

It is divided into three columns representing the three

different ranges of liquors, and marked at the top as follows (see Fig. 2):

25 A. (above) to 100 A. (above),	10 B. (below) to 25 A. (above),	50 B. (below) to 10 B. (below),

distinctly indicating which column is to be used in testing the strength. The column on the left, 25 A. to 100 A., is divided at the ratio of 6 for each 20 degrees; the middle column, 10 B. to 25 A., at the ratio of 7, and the column at the right, 50 B to 10 B, at the ratio of 8.

Practical Use.—Note the number of per centages *above* or *below* P., at which the spirit under trial *cuts* the graduated *stem*, then, from the number of per cents thus *cut*, *subtract* as many degrees as the mercury stands *above* 60°, or *add* to the number cut on the stem as many degrees as the mercury stands *below* 60°, and thus will the true strength be ascertained.

Example.—Suppose the hydrometer sinks to 32 on the stem, and the thermometer shows 6 above 60 on the left column, then 6 per cent is to be deducted from 32 (the indication on the hydrometer), leaving 26 above, which is the strength of the liquor; but should the temperature be 6 below the 60, the hydrometer being 32, then 6 per cent should be added, making the proof 38 above. Again, if the hydrometer stands at 32, and the thermometer shows 10 above 60 on the same column, that would indicate that the liquor was less than 25 above, then the middle column should be used, which would give 11 to be deducted, making the strength 21 per cent.

Suppose the spirit under examination cuts the stem at 35 above P., and the mercury stands at 7 *above* 60 on the left column (which is to be used for that strength), ther

7 is to be *deducted* from the apparent strength of 35 per cent, leaving 28 per cent above P., which is the strength of that spirit;—but should the mercury stand at 7 *below* 60, the hydrometer indicating the same strength (35 above P.), then 7 is to be *added*, making that spirit 42 per cent above P.

Or suppose the hydrometer rests in the spirit at 7 below P., and the mercury stands at 8 *below* 60 on the middle column, then 8 is to be *added*, bringing it to 1 per cent above P.

Again, the spirit under trial cuts the stem at 28 above P., and the mercury stands at 8 *above* 60 on the left column, which would indicate that the middle column should be used for that strength, which will give 9 to be *deducted*, making the strength of that spirit 19 per cent above P., instead of 28.

And in like manner for any other strength at any temperature on the scale.

The Saccharometer.

We have seen that Tralles' and Gendar's hydrometers are used to determine the strength of any liquid from water to absolute alcohol. Therefore, when it is requisite to ascertain the strength or density of any liquid heavier than water, it becomes necessary to employ some other instrument. For this purpose *Baumé's hydrometer for liquids heavier than water* is generally used in France and this country. This instrument is principally used by liquor merchants to test the density of syrup when making sweet wines, cherry bounce, and fancy cordials. It is also employed by brewers and distillers to ascertain the quantity of sugar or saccharine matter in wort. This variety of Baumé's hydrometer is usually called a *Saccharometer*.

PART III.

THE ART OF IMITATING AND MANUFACTURING BRANDY WITHOUT DISTILLATION, GIVING NUMEROUS RELIABLE AND VALUABLE RECIPES, AND A DESCRIPTION OF ALL THE ARTICLES USED IN IMITATING FOREIGN BRANDY, SUCH AS FLAVORS, COLORING, ETC.

BRANDY is the name given in this country to ardent spirits distilled from wine, and possessed of a peculiar taste and flavor. The most celebrated of the French brandies are those of Cognac and Saintonge, but comparatively little of that sold under the name of Cognac comes from that district. The brandies of Bordeaux and Rochelle are reckoned next in quality, but a still more inferior kind is obtained from the red wines of Portugal, Spain, etc., as also from the refuse (*marc*) of the grapes left in the wine press, the scrapings of wine-casks, vats, etc. When originally distilled, brandy is clear and colorless, and if wished to remain so, is received and kept in glass vessels; but when placed in wooden casks, the spirit dissolves out the coloring matter of the wood and acquires a light sherry tint: this is called pale brandy, when the color is deepened by burnt sugar (caramel) and other coloring matter it is known as dark brandy.

Pure brandy is composed of the following ingredients, namely: alcohol, sugar, water, volatile oil, acetic acid, acetic ether, œnanthic acid, œnanthic ether, tannic acid and aldehyd. Of these, it is unnecessary to speak particularly of sugar and water.

Alcohol, chemically known as the hydrated oxide of ethyl, is the stimulant base of all distilled and fermented liquors. It is composed of two gaseous fluids, oxyger

and hydrogen, and one solid, carbon. A perfectly pure article is not known in commerce—from its great affinity for water, its strength is rapidly reduced. The officinal strength of alcohol, by the United States Pharmacopœia, is .85, that of the diluted alcohol, .58. The Spiritus Rectificatus of the London Pharmacopœia is .84.

The volatile oil, known in commerce as oil of Cognac, is œnanthic ether (chemically, an œnanthate of oxide of ethyl), a colorless liquid, having a peculiar vinous odor, and a slight taste, which becomes at length acrid to the tongue. Its specific gravity is 0.872. Insoluble in water, it dissolves readily in alcohol or ether.

Œnanthic acid (hydrated oxide of carbon) is considered by most chemists to be identical in composition with pelargonic acid, the difference resulting in the different arrangement of the molecules. Gregory, alone, makes the two different.

The volatile oil above, by which the peculiar flavor of Cognac brandy is imparted, must not be confounded with the heavy oil of wine, which is a double sulphate of ether and ethylen, and is a yellowish, oily neutral liquid, with a penetrating odor, and rather sharp and bitter taste, and having a specific gravity from 1.02 to 1.096.

Acetic acid is the base of vinegar, and requires no description. Acetic ether (chemically, the acetate of the oxide of ethyl) is a peculiar combination of acetic acid and alcohol, through distillation, and undergoes no change by keeping. It is colorless, has a grateful odor, and a peculiar and agreeable taste. Its specific gravity is 0.866.

Tannic acid, when pure, is solid, uncrystalizable, white, inodorous, easily soluble in water, and less so in alcohol or ether. As usually met with, it has a greenish yellow

tinge, and is in the shape of a light, coarse powder. It is the astringent principle of oak and other barks, and its presence in brandy is due to the skins of the grape. All the above are described more fully hereafter, under their proper heads.

Aldehyd, of which there is a slight amount in brandy is alcohol, deprived of a portion of its carbon. It is a colorless, inflammable liquid, with a pungent taste and smell, and a density of 0.79. It absorbs oxygen readily, and is then converted into acetic acid.

There is sometimes, in inferior brandy, some amylic alcohol (hydrated oxide of amyl) commonly known as fusil oil. The nearly entire absence of this is necessary to a healthful brandy.

The constituent parts of brandy having been determined by analysis, it may be reproduced by synthesis; but to do this, so as to produce a perfect imitation, or rather to recreate a true brandy, it is not only necessary to know the proportion of the constituents which analytical chemistry supplies, but also to know how to combine them effectually. This knowledge having been taught us by experience, we proceed to impart to others.

To make Brandy without Foreign Liquor.

RECIPE No. 1.

To 100 gals. pure spirits, 5 to 10 over proof, add
- ½ or ¾ oz. oil of Cognac,
- ½ lb. black tea,
- ½ oz. oil of prune kernals, cut in alcohol 95°,
- ¼ gal. sugar syrup,
- 2 oz. acetic ether,

Color with sugar coloring.

Be very careful not to add any more Cognac oil than is given in the above recipe. (See "*Cognac Oil.*")

To vary your flavor, instead of the oil of prune kernals, add 1 to 2 oz. rum essence, or 40 drops oil of neroly dissolved in 1 pint of alcohol, 95.°

All manufactured brandies are much improved by being filtered. (See "*Brandy Filter.*") Age improves this as well as all manufactured brandies.

The above, or any of the following recipes, may be prepared in smaller quantities by observing the proper proportions of the ingredients used. (*See Appendix.*)

To make Brandy without Foreign Liquor.

RECIPE No. 2.

To 100 gals. pure spirits, 5 o. p., add:

½ to ¾ oz. oil of Cognac, cut in alcohol, 95°,
½ lb. black tea,
¼ gal. sugar syrup,
*⅛ oz. star anise, prepared in the following manner:

Break only the stars of your anise without mashing the kernals, infuse for 6 hours (see "*Infusion*") in 1 pint alcohol, 95°. This is the veritable old Cognac flavor, and has the bed-bug aroma so much prized by the French manufacturers. Add to all the above ingredients, when mixed, 2 oz. acetic ether. Color with sugar coloring.

To make Brandy without Foreign Liquor.

RECIPE No. 3.

To 20 gals. pure spirits, 5 o. p., add:

1 pint quince syrup,
½ drachm tannin powder,
4 drops oil neroly (cut in a gill of spirits),

* To vary this flavor, add ⅛ oz. green anise, mashed up.

½ drachm oil of Cognac.
½ " acetic ether,
½ pint wine vinegar.
Color to the desired tint with sugar coloring.

To make Brandy without Foreign Liquor.

RECIPE No. 4.

To 40 gals. pure spirits, 5 o. p., add:
1 drachm Cognac oil,
1 pint spirit of raisins (see page 65),
1 " spirit of prunes (see page 64),
1 drachm tannin powder,
1 oz. acetic ether,
3 drops oil neroly (cut in alcohol, 95 per cent.)
Color to the desired tint with sugar coloring.

To make Brandy without Foreign Liquor.

RECIPE No. 5.

To 80 gals. pure spirits, 5 o. p., add:
5 lbs. St. John's bread,
5 " raisins,
4 oz. orris root, powdered,
½ lb. white argol (crude wine-stone),
1 oz. acetic ether.
Color with sugar coloring.

Boil the St. John's bread and raisins together in 2 gals. soft water for 5 minutes, and when cold, filter. Pour over the powdered orris root ¼ gal. boiling water, and when cold, filter. Dissolve the white argol in 1 quart soft water, and filter. When the above ingredients are thus prepared they are ready for use.

* Neroly is a splendid beading for brandy.

To make Brandy without Foreign Liquors

RECIPE No. 6.

To 10 gals. pure spirits, 10 o. p., add:

3 drachms orris root powder, infused in spirit (see *"Spirit of Orris Root"*),
½ drachm vanilla, cut up finely and infused in spirit (see *"Vanilla"*),
1 pint sugar syrup,
10 or 12 drops oil Cognac, cut in a little spirits,
⅛ oz. acetic ether.

Color to the desired tint with sugar coloring, and filter. This makes a splendid brandy, and improves vastly with age.

To make Brandy with a little Foreign Liquor.

RECIPE No. 7.

FIRST COMBINATION.

To 40 gals. pure spirits, 5 o. p., add:

¼ or ½ gal. Jamaica rum, 1 drachm oil of cognac,
1 pint sugar syrup,
⅛ oz. tannin powder,
1 " acetic ether.

This recipe is an imitation of the brandy made by Otard, Dupuy & Co.

SECOND COMBINATION, IMITATION OF SEIGNETTE BRANDY.

To vary the flavor of this brandy, and give it a flavor imitating that of Seignette brandy, instead of Jamaica rum, use:

¼ gal. Santa Cruz, or New England rum,
¼ " apple brandy.

THIRD COMBINATION, IMITATION OF ARMAGNAC BRANDY.

Instead of the liquors in combinations 1 and 2, use:

½ gal. Muscat wine.

FOURTH COMBINATION.

Instead of the liquors used in combinations 1, 2, and 3, use:

½ gal. either Sherry or Malaga wine.

Color to the desired tint with sugar coloring.

To make Brandy with a little Foreign Liquor.

RECIPE No. 8.

To 40 gals. pure spirits, 5 o. p., add:

¼ " Santa Cruz rum,

¼ " apple brandy,

8 drops neroly (dissolved or cut in alcohol),

1 lb. white glycerin (to give age and smoothness),

⅛ oz. tannin powder,

½ " acetic ether.

To vary the flavor of this brandy, instead of neroly, add 1 pint raspberry syrup. When this is done you must dispense with the sugar syrup or you will have the brandy too sweet.

Color with sugar coloring.

To make Brandy with Foreign Liquor.

RECIPE No. 9.

To 37 gals. pure spirits, 5 o. p., add:

2½ " Seignette brandy,

½ " Sherry wine,

By using the best Sherry wine, a very excellent brandy may be obtained.

Color with sugar coloring to the desired tint.

To make Brandy with Foreign Liquor.

RECIPE No. 10.

To 10 gals. pure spirits, 5 o. p., add:

1 " Marett Brandy.

¼ gal. Sherry wine,
6 drachms black tea, infused (see "*Black Tea*").
Color with sugar coloring.

To make Brandy with Foreign Liquor.

RECIPE No. 11.

To 40 gals. pure spirits, 5 o. p., add:
5 " Cognac brandy,
½ gallon best Madeira wine.

This will make an excellent-flavored brandy, and, if desired, may be further improved by adding 1 lb. white glycerine, to give age and smoothness. Let it stand 8 or 10 days, and color as desired.

To Imitate Seignette Brandy.

RECIPE No. 12.

To 2½ gals. pure proof spirit, add:
1 " soft or distilled water,
1½ " Seignette brandy,
a little black tea, and a few drops of acetic ether.
Color if necessary.

To Imitate Cognac Brandy. By Dr. Ure.

RECIPE No. 13.

Dilute the pure alcohol to the proof pitch, add to every hundred pounds weight of it from half a pound to a pound of argol (crude wine-stone) dissolved in water, a little acetic ether, and French wine-vinegar, some bruised French plums, and flavor-stuff from Cognac; then distill the mixture with a gentle fire, in an alembic, furnished with an agitator. The spirit which comes over may be colored with sugar coloring to the desired tint, and roughened in taste with a few drops of tincture of cate chu, or oak bark. The above recipe will afford a spirit

free from the deleterious drugs too often used to disguise and increase the intoxicating power of manufactured brandy; one which may be reckoned as wholesome as alcohol in any shape can ever be. Good judges think that brandy of this kind may be manufactured just as well without resorting to the process of distillation.

To Imitate Cognac Brandy.

ANOTHER RECIPE.

To sixty gals. of pure proof spirits add one pound of sweet spirit of nitre, one pound of cassia-buds, ground, one pound of bitter almond meal (the cassia and almond meal to be mixed together before they are put to the spirits), two oz. of orris root, sliced, and about thirty or forty prune-stones; a little butyric ether or spirit of prunes may also be added; stir them all well together two or three times a day, for three days or more; let them settle, then add one gal. of the best white wine vinegar, and if you wish to have it better than domestic brandy is in general, add to every four gals. one gal. of foreign brandy, and you will obtain a mixture nearly equal to the foreign produce.

How to Cut Foreign Brandy with Pure Spirits.

RECIPE No. 14.

To 100 gals. pure proof spirits, add:

65 " Seignette brandy,
2 " sugar syrup,
½ pound black tea,
3 or 4 pounds prune kernals, mashed up and hung in little bags in the cask.

Stir up well one or two times a week. Color, if necessary.

To make a Second Quality

RECIPE No. 15.

To 50 gals. of the brandy made as per recipe No. 14, add:

50 gals. pure proof spirits.

Add 1 pound mashed prune kernals, same way as in recipe No. 14, and stir up as directed in that recipe.

To make a Third Quality.

RECIPE No. 16.

To 50 gals. of the brandy made as per recipe No. 15, add:

50 gals. pure proof spirits.

Add 1 lb. mashed prune kernals, same way as in recipe No. 14.

To Improve Saintonge Brandy with Cognac.

RECIPE No. 17.

To 25 gals. Cognac, add 75 gals. Saintonge brandy; then add, an infusion of ½ lb. liquorice root, boiled in 1 gal. of water, and filtered; when the brandy is thus mixed, add, to your taste, as many gals. of liquorice water (prepared as above) as you think will improve the flavor.

To Improve Armagnac Brandy with Saintonge.

RECIPE No. 18.

To ¼ Saintonge brandy add ¾ Armagnac, then a decoction of liquorice root and water, as directed in Recipe No. 17.

To Improve the Flavor of Inferior Brandy.

RECIPE No. 19.

To 100 gals. inferior brandy, add:

10 lbs. prunes, prepared as follows:—

Put the prunes in an iron pan, over the fire, turn them over and over, for five minutes, until they are a little burned; then bruise them until the stones are broken, and steep the whole in spirits, sufficient in quantity to cover the prunes. If you desire to make a large quantity, it would be better to use a chopping-knife similar to either of those shown in Figs. 1 and 2. Your chopping-board should be of hard wood, with the grain at right angles; we would recommend a board not less than three inches thick, smooth on both sides, so that either may be used, and about two feet square. On this should stand a loose, bottomless tub (see Fig. 3), to confine the materials, and the whole resting on the floor, should be used with a knife, sufficiently long in the handle to be employed by a person standing erect, and it should have a small cross-bar for the hands, as shown in Fig. 4. Prunes prepared in this way are called torrefied prunes, and are also much esteemed as a flavor for Port wine.

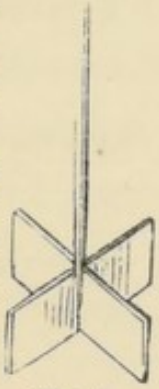


Fig. 1.

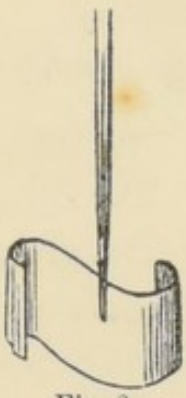


Fig. 2.

Fig. 4.

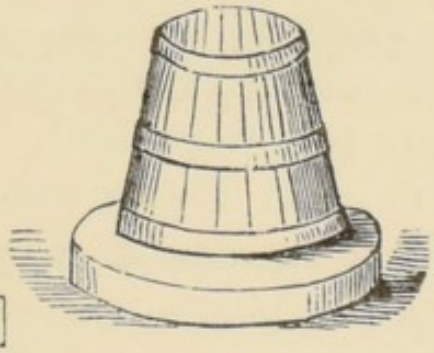


Fig. 3.

Highly Flavored Domestic Brandy.

To 40 gallons French proof spirits, add 2 quarts raisin tincture (see page 259), 2 quarts of prune tincture (see page 258), 2 quarts St. John's bread tincture (see page 258), 1 gallon best sherry wine, 2 drachms oil of cognac and 20 drops oil of bitter almonds, both dissolved in a little 95 per cent. alcohol ; 1 gallon Jamaica rum (or ¼ ounce Jamaica rum essence), and 2 pints wine vinegar. Ten gallons of this mixture, mixed with 30 gallons French spirits, make an excellent domestic brandy. Add 1 pound of glycerine to give the liquor age, body and smoothness.

Imitation Cognac Brandy.

To 36 gallons French proof spirits, add 4 gallons Pellevoisin or Marette cognac, ½ gallon best sherry or Madeira wine, and 20 drops oil of cognac, dissolved in a little 95 per cent. alcohol. Then pour 2 quarts boiling water over 2 ounces black tea ; when cold, filter through flannel, and add a little maraschino ; mix this with the other ingredients, and color the whole to suit with caramel. Add 1 pound of pure glycerine to give age, body and smoothness to the liquor.

Imitation Brandy. Fine.

Take 40 gallons French spirit ; add to it 1 pint tincture of raisins (see page 259), 1 quart prune tincture (see page 258), ½ gallon best sherry or Madeira wine, and 1 pint wine vinegar. Then add 1 drachm oil of cognac, 12 drops oil of bitter almonds, ⅛ to ½ drachm tannin powder, each dissolved separately in 95 per cent. alcohol. Color to suit with caramel, add 1 pound pure white glycerine, to give age and smoothness to the liquor.

Imitation French Brandy.

To 40 gallons French proof spirit, add 1 quart tincture of orris root (see page 66), 1 pint vanilla flavoring (see next receipt), ½ gallon best sherry or Madeira wine, and 1 pint wine vinegar. Dissolve separately, 1 drachm oil of cognac, and 12 drops oil of bitter almonds, each in a little 95 per cent. alcohol, and add them to the mixture, coloring the whole to suit with caramel. 1 pound of glycerine will give age and smoothness to the brandy.

Vanilla Flavoring for Liquors.

Slice 1 drachm vanilla in small pieces ; infuse for 20 days in 1 pint 95 per cent. alcohol ; filter.

Imitation Pale Brandy. Fine.

Infuse 1 drachm star-anise (breaking the star only) for 8 hours in ½ pint 95 per cent. alcohol, and filter ; add this to 40 gallons proof spirits ; then add ½ gallon best Jamaica rum, and 1 pint of the best raspberry syrup. Dissolve 1 drachm oil of cognac, and 12 drops oil of bitter almonds, separately, in a little 95 per cent. alcohol, and mix them with the whole. Add 1 pound of pure glycerine to the brandy, to give it age and smoothness. (For a very fine brandy recipe, see *page* 259.)

Flavoring Compound for Brandy.

Mash 25 pounds raisins, 12 pounds prunes, 3 pounds figs, and 1 pineapple sliced ; infuse for 15 days in 20 gallons proof spirits, stirring every day, and then filter. This splendid Brandy flavor is used in combination with other flavors.

Coffee Flavoring for Liquors.

Infuse 1 pound ground roasted coffee in 1 gallon 95 per cent. alcohol. This is used in combination with other flavors for brandy

To Give Age, Body and Smoothness to Brandy.

One pint of pure glycerine added to 50 gallons of Brandy, will greatly improve the liquor. This substance, when pure, is perfectly harmless, and gives brandy a peculiar smoothness, imparting body and age to that, and other liquors. (See "*Glycerine.*")

To give the Appearance of Age to Brandy Barrels.

issolve in 3 gals. water
3 lbs. sulphuric acid and
1 lb. sulphate of iron.

Wash your barrels with it on the outside.

How to Fix new Barrels when you send Cognac Abroad.

Dissolve 6 oz. sulphuric acid, in
4 gals. water.

Rinse your barrels, inside, first with the above mixture, and afterwards with clear cold water.

To Plaster Brandy Pipes.

First notch over the bottom of the casks, with a hatchet or adze, then for the bottom of a $\frac{1}{8}$ pipe, mix $\frac{1}{4}$ gal. plaster with 1 gal. water, and pour it on ; while the plaster is setting, tap the pipe gently with a mal let, in order that the plaster may penetrate into every crevice. When the plaster is fully set, wash it over with a wet sponge. If you wish to color the plaster, add a little Venice red.

A DESCRIPTION OF ALL THE ARTICLES AND INGREDIENTS USED FOR IMITATING FOREIGN BRANDY.

Sugar Coloring or Caramel.

TAKE 75 lbs. white sugar, and add 3 gals. water; let it boil over a brisk fire, being careful to stir and skim it all the while; every now and then dip in a boiling-stick, and when the sugar that remains on the stick becomes hard and brittle so that it breaks instantaneously, add 1 gall. warm water *slowly* and *gradually*, *stirring* it *constantly*, then let it burn brown. This is called sugar coloring,—the French call it caramel, and it may be used to color any liquor or wine. To make the above quantity, the boiler or pot should be about 35 gals. capacity, as the liquid is apt to run over in a smaller vessel. The boiling-stick mentioned above should be about 18 inches long, 1 inch in diameter at one end, and gradually tapering off to a point at the other. Before using this stick, dip it in cold water and shake it off. A smaller quantity may be made by observing the above proportions.

French Chemical.

A French Brandy Coloring and Flavor.

Take ½ gall. molasses, boil it, and then add 4 lbs. white sugar, and continue to boil until it becomes thick, ropy and dark; then reduce it with some warm water. This is a fine coloring, and also yields a delightful aroma, but must be used for brandy only. To make the chemical as it is sold in bottles, add oil of Cognac, or oil of bitter almonds, cut with alcohol in such proportion as you like (say ½ to ¾ oz. to coloring sufficient for 100 gals. brandy.

FLAVORS USED IN MAKING BRANDY.

UNDER this head will be found a description of all the various aromas so necessary to aid the manufacturer in giving a perfect imitation of genuine French brandy Various flavors are given in our recipes, in order to furnish the several characteristics of the genuine article; for instance: oil of Cognac, butyric ether, argol or crude tartar, œnanthic ether, acetic ether, acetic acid, wine vinegar, and raspberry syrup, are all used to give that distinguishing vinous flavor so apparent in fine brandy. Hickory nut infusion, almond oil, torrefied prunes, orris, neroly, vanilla, raisin spirit, and prune spirit, all give an imitation of the fine nutty flavor, characteristic in brandy. Sugar, syrup, or honey, destroys the fiery taste of the alcohol, while tannin powder, green and black tea, catechu and kino are used to imitate the astringent quality in brandy, and musk and ambergris yield a fine aroma. The best of brandy owes its delicate aroma to a peculiar oily smoothness, produced by the action of tartaric acid upon the pure alcohol used as a basis. Of course we cannot furnish all the various combinations of the aromas hereafter mentioned, to do so would fill ten volumes the size of this book, but we propose to give a description of each, and explain their various properties, and with this and the aid of the excellent recipes already given, must the manufacturer be guided in experimenting upon new combinations. Our system of imitating Brandy is the "*French System*," and is the only method based upon scientific principles. It will be observed that we first take "pure spirit" as a basis, and then unite with it ingredients which represent all those constituents, and those only, which are found by chemical analysis to exist in the foreign liquor we seek to imitate.

Oil of Cognac.

The flavor belonging to genuine French brandy is due to a peculiar oil, known as oil of Cognac. This oil is obtained by distillation from the *marc*, or lees of wine, either dried or made up into cakes, or, in their wet state, mixed with about seven or eight times their weight of water. The brandy from any part of the world may be very closely imitated by distilling the oil from the *marc* of the wines produced in the particular district. Oil of Cognac is also prepared by dissolving the fusil oil of marc brandy in strong rectified spirit, and then adding a sufficient quantity of concentrated sulphuric acid to form a sulphate; alcohol and excess of acid is removed by washing the newly formed compound with water. To 100 lbs. of marc add ½ lb. sulphuric acid; the oil is generally formed towards the end of the distillation, and is found floating in blackish drops on the surface of the distillate. According to a distinguished French chemist, this oil is a compound of potatoe oil and œnanthic ether. Cognac oil when *pure*, has a true vinous odor, and, like all essential oils, requires to be cut with strong alcohol. One ounce of the pure article is sufficient to flavor from 200 to 250 gallons. The manufacturer should be very careful when using this powerful oil: add a very little at a time, and remember more may be added if necessary. Oil of Cognac is very generally adulterated with alcohol; indeed, it is extremely difficult to procure the really genuine article. As a test to ascertain whether it is pure, we offer the following simple method:—Take a half ounce phial, and fill it exactly *half* full with the oil, then fill up the remaining space with water, and shake it well; if the oil is adulterated with alcohol, the *latter* will leave the former and mix with the water, conse-

quently, the volume of the water will be increased, and the volume of the oil will be decreased, and just in proportion to the apparent increase of water is the oil adulterated. By this simple means may be ascertained whether any essential oil is adulterated with *alcohol*, and the test is founded upon the great affinity of alcohol for water. (See "*Oil of Neroly.*") An imitation of Cognac oil is made from the quince and pineapple, and also from cocoanut oil. The manufacturer has an extensive variety of flavors to select from to find a substitute for Cognac oil, and may use instead of that flavor either œnanthic ether, butyric ether, acetic ether, orris, oil of bitter almonds, or a combination of these and the other flavors described in the following pages.

Quince Syrup.

To make this syrup, which is used as a flavor in recipe No. 3, take two pints of quince juice and put it in a warm place until fermentation has commenced. Let it stand three days, then filter the juice through a flannel bag, or blotting paper, and add 4¼ lbs. of white sugar; this had better be powdered. Place the syrup on the fire, and as it heats skim it carefully, but do not let it boil; or you may mix in a glass vessel or earthenware jar, and place in a pan of water on the fire.* This is a very clean way, and prevents the sides crusting and burning. When the syrup is dissolved so that you can dip your forefinger in it and apply it to the ball of the thumb, and then separate the thumb and finger, the fine thread of syrup reaching from each without breaking, take it off; strain through a cloth; bottle when cold; cover with tissue paper dipped in brandy, and tie down with a bladder until wanted for use.

* This is what the French call a *bain-marie*, or water-bath.

Torrefied Prunes.

To prepare this flavor, see "*Recipe No.* 19." This is another and much esteemed kind of prune tincture.

Brandy Essence.

This flavor is prepared by dissolving two fluid ounces oil of Cognac in eighteen fluid ounces of rectified spirits. (See "*Cognac Oil.*")

Spirit of Raisins.

This is recommended in "*Recipe No.* 4," and is a good flavor when used in conjunction with the other ingredients given in that recipe. It is also much used by the French manufacturers. The essence is prepared thus :— Take five pounds of the best Malaga or Bordeaux raisins, stems and all, mash them up in a mortar, add to them double their quantity of spirit, 95°, and digest ten days, agitate frequently (see "*Infusion*"), then filter. By combination with pear oil, or oil of wintergreen, raisin spirit makes a fine flavor for Bourbon whiskey. In France, raisin spirit is obtained by distillation ; but it is so difficult to procure a genuine article here that we recommend the above process.

St. John's Bread. (Siliqua Dulcis.)

The Carob-tree is a native of Syria, Egypt, and all Southern Europe. The fruit of this tree is a bean from four to six inches long, and one inch wide, of a brown leather color, known as *St. John's Bread.* This bean contains a marrow of a light brownish color, and very aromatic, the seeds of the bean are very hard, and of a brilliant brown color. This flavor when combined with raisins is much esteemed by the French and Ger-

mans. Take five pounds St. John's Bread, and five pounds Malaga raisins, boil them together for five minutes; when cold, filter. Use for eighty gallons brandy. (See "*Recipe No.* 5.") St. John's bread is also known by the name of *Siliqua Dulcis*, and can only be procured at the best wholesale drug houses. (*See Appendix.*)

Spirit of Orris Root.

Orris is a native of Italy, and other parts of the south of Europe, where it is also cultivated. The root is dug up in the spring, and prepared for market by the removal of its skin and fibres. Orris has an agreeable odor, resembling that of the violet and raspberry, and a bitterish, acrid taste. It is much esteemed as a flavor for brandy, and is a deservedly popular wine boquet in France and Hungary. The spirit of orris root is thus prepared:—Digest 8 oz. powdered orris root for 20 days in 1 gal. spirit 95°; filter and use in the proportions required (see "*Recipes*" 5 and 6), or pour over the powder sufficient boiling water and, when cool, filter. Orris root is sometimes combined with acetic ether to flavor fine gin.

Solution of Liquorice Root.

The liquorice plant is a native of the south of Europe, Barbary, Syria and Persia, and is cultivated in England, the north of France, and Germany. Much of the root imported into this country comes from Messina and Palermo, in Sicily. It is also largely produced in the north of Spain, where it is an important article of commerce. A solution of liquorice root is sometimes used as a flavor for brandy, and is prepared in the following manner:—Boil ½ lb. of the root in 1 gall. water, and filter when

cool. Use in such proportions as you think will give a proper flavor. (See "*Recipe* 17.") The manufacturer must be his own judge as to the quantity to be used.

Raspberry Syrup.

This syrup is sometimes used to give a vinous body and flavor to brandy. (See "*Recipe* No. 8.") It is made thus :

2 pints of filtered raspberry juice.
4¼ lbs. of sugar.

Select the fruit, either white or red. Having picked them over, mash them in a pan, which put in a warm place until fermentation has commenced. Let it stand for about three days. All mucilaginous fruits require this, or else they would jelly when bottled. Now filter the juice through a close flannel bag, or blotting-paper, and add sugar in the proportion mentioned above ; this had better be powdered. Place the syrup on the fire, and as it heats skim it carefully, but don't let it boil ; or you may mix in a glass vessel or earthenware jar, and place in a pan of water on the fire. Boil, strain, and cork as directed in the recipe for making quince syrup. Use a pint to 40 gals. brandy.

Ambergris.

This substance, which is found floating on the sea, or thrown by the waves upon the shores of various countries, is now generally believed to be produced in the intestines of the spermaceti whale, and perhaps in those of some other fish. From the high price of the genuine ambergris, it is very frequently adulterated. When quite pure and of the best quality it is nearly wholly soluble in hot *alcohol* and *ether*, and yields about 85° of

the odorous principle (*ambreine*). It is also easily punctured with a *heated needle*, and on withdrawing it not only should the *odor* be *immediately evolved*, but the *needle* should *come out clean*, without anything adhering to it. Ambergris is insoluble in water, but readily dissolves in hot alcohol. It is used in very small quantities; one ounce will suffice for 1,000 gallons of brandy. It combines its odor with any other perfume, and forms by each addition a new aroma, greatly exalting the odor of other substances. As a flavor, ambergris should never be used alone. The following makes a good aroma :—Digest for 15 days at a moderate heat 1 oz. of ambergris in 10 oz. spirit of rose, stir several times a day and filter in a covered funnel, pass over the residue 8 oz. spirit 50°. Before digesting the above ingredients, be careful and dilute your ambergris in a heated mortar, with alcohol. Ambergris is highly prized for its odor, which is peculiar, exceedingly diffusive, and perceptible in small quantities. A grain or two, when rubbed down with sugar and added to a hogshead of claret, is very perceptible in the wine, and gives it a bouquet, by some considered a great improvement. A new and expeditious way of dissolving ambergris, musk and civit, is to put over 1 oz. of either of them 4 oz. caustic potassa in powder, and afterwards add a little alcohol to dissolve it completely.

Musk.

Musk is a secretion deposited in the prepuce of an animal inhabiting the mountains of Eastern Asia. It is imported from Bengal, China and Russia. That known as *Tonquin* musk is the most esteemed for its odor. The musk of the shops is generally adulterated. Dried bullock's blood or chocolate is commonly employed for this

purpose, along with a little bone black. The extent of these additions varies from 25 to 75 per cent of the gross weight of the mixture. There are only three certain ways of detecting this fraud, viz., by the inferiority of the odor, by an assay of the iron contained in the blood, or by the microscope. The following mixture is a fine flavor, but must be used in small quantities :—

Digest for 15 days at a strong heat,

1 oz. musk,
4 drachms vanilla,
2 " ambergris, in
12 oz. spirit 95°.

Stir several times each day, filter in a covered funnel, and pass over the residue the same quantity of spirits 50°. This is essence of musk. So diffusive is this aroma that the quantity given in the above recipe would be sufficient to flavor 2,000 gallons brandy.

Civit.

Civit is a perfume obtained from the civit cat, a small quadruped found in China, and the East and West Indies. The perfume is secreted into a cavity which opens between the anus and external genitals, and is collected from animals confined for that purpose. Civit is frequently adulterated with spermaceti, and butter, and a similar substance to civit obtained from the pole-cat. When pure it has an odor intermediate between that of musk and ambergris, but less refined. Civit is insoluble in water, and only slightly soluble in cold alcohol, but heated alcohol dissolves it almost entirely, depositing it again upon cooling. The tincture of civit is prepared precisely the same way as ambergris (see "*Ambergris*") and is a powerfully diffusive flavor.

Spirit of Green Walnut Shells.

Take any quantity of green walnut shells, mash, or cut them up (see "*Recipe No.* 19"), and cover them well with alcohol 95°, digest 10 days, then filter. This is a fine astringent flavor.

Spirit of Hickory Nuts.

An infusion of hickory nuts makes a good flavor for brandy. Break the shell of the nut, and at the same time mash the kernal slightly, then take ½ bushel of nuts thus prepared, and cover them with alcohol 95°, infuse 10 days, and filter. Use a quart of this flavor to 20 gals. brandy; but as a general rule the manufacturer must be his own judge about this and other flavors. We suppose we are addressing intelligent men capable of forming new combinations with the aid of our book. (*See page* 117.)

Spirit of Almond Shells.

This is a good astringent boquet, and should be prepared the same way as Spirit of green Walnut Shells.

White and Red Argol.

During the fermentation of wines, especially those that are tart, a peculiar matter is deposited in the casks, forming a crystalline crust, called *crude tartar*, *wine-stone*, *or argol.* That deposited from red wines is of a reddish color, and is called red argol; while that derived from white wines is of a dirty white color, and denominated white argol. Argol has a sharp acid taste, and gives a fine vinous body and flavor to brandy, it is soluble in warm water but not in alcohol.

To prepare argol for flavoring brandy, dissolve 1 part argol in 8 parts warm water, and use ¼ lb. to 40 gals. brandy. (See "*Recipe No.* 5.")

Wine Vinegar.

Wine vinegar is frequently used as a vinous body flavor for domestic brandy, 1 pint is sufficient for 40 gals. (See "*Recipe No.* 3.")

Oil of Bitter Almonds.

This oil is made from the ground cake of bitter almonds, from which the fixed oil has been expressed. It is very generally adulterated with cheaper oils, and in nearly every case with alcohol. When it is pure—mixed with oil of vitriol—it strikes a clear crimson red color without visible decomposition. Oil of bitter almonds is a splendid flavoring ingredient. Dissolve 1 drachm in alcohol 95°, and use for 50 gals. brandy. Be very careful not to increase the above proportion, as this oil is highly poisonous, and should be used with great caution.

Otto of Roses.

This is the concentrated oil of roses, and is prepared on a large scale in Egypt, Persia, Cashmere, and India, by distilling the petals of the rose with water. Otto of roses is frequently adulterated with the oils of rhodium, sandal-wood, and geranium, and with camphor, and occasionally with spermaceti, to give the spurious compound the usual crystalline appearance.

The following are reliable tests:—Pure otto has a bland, sweet taste; if it is bitter it contains oil of rhodium or sandal-wood; if it is pungent or "bites" the palate, it contains either oil geranium or camphor, and probably both; if it imparts a greasy sensation, it contains spermaceti. The odor of otto of roses is intensely penetrating, and one drop of the pure concentrated article will impart a flavor to 40 gals. of brandy.

Essence of Noyau.

Macerate ½ lb. peach or apricot kernals (having previously mashed them in a stone mortar) in 2 quarts of alcohol for 10 days, being careful to stir or agitate the ingredients daily; filter, and use ¼ oz. to flavor 40 gals. of brandy.

Essence of Vanilla.

The bean of the vanilla plant (*Vanilla planifolia*) yields an aroma of rare excellence. The finest vanilla is grown in Mexico: the pods, or beans, are about 8½ inches long. An inferior quality is produced in Central America, but the beans are not more than 7 inches long, and are drier and not so pulpy as the true Mexican variety. Vanilla is much esteemed as a flavor by the most successful manufacturers of domestic brandy, and there is no question but that it greatly aids in the perfect imitation of the true Cognac. To prepare this aroma, take 1 oz. vanilla pods, slit them from end to end, so as to lay open the interior, then cut them up in lengths of about ¼ inch, and macerate in a pint of alcohol 95°, with occasional agitation for about a month: the tincture thus formed will only require straining through cotton to be ready for use. The above quantity is sufficient to flavor about 150 gals. brandy. (See "*Recipe No.* 6.") A smaller quantity of the infusion may be made in the same way.

Essence of Pineapple.

(See "*Butyric Ether.*")

Acetic Ether.

Acetic ether is colorless, of a grateful odor, and a peculiar, agreeable taste, and undergoes no change by keeping. It is made by distillation from alcohol, sul

phuric and concentrated acetic acid. When pure it will not redden litmus paper. This ingredient is much used in the manufacture of domestic brandy, and as it gives the vinous flavor, and is one of the principal constituents in genuine Cognac, its presence in an imitation of that article is very important.

Acetic ether is not only valuable as a flavor for brandy, but because it neutralizes any *fusil oil* that may remain in the spirit used as a basis for the liquor. The addition of acetic ether, or, indeed, any of the ethers recommended in our recipes, is not at all prejudicial to the health. Use as recommended in the various recipes given by us.

Acetic ether when combined with orris root is used to flavor fine gin; it is also used to flavor rum and whiskey when combined with other ingredients.

Œnanthic Ether.

This is the oil obtained towards the end of distillation of fermented liquors, particularly wines, and is considered to be identical with pelargonic acid. It is colorless, and has a powerful, intoxicating, vinous odor, resembling that of an empty wine cask, or a bottle that has been exposed to the air for some time. Its taste is at first slight, but afterwards very acrid. It is soluble in alcohol. This is, also, a constituent of Cognac, and, therefore, important as an ingredient in its imitation Use ½ oz. for 50 gals.

Butyric Ether.

This ether is readily made by mixing 100 parts of butyric acid with 100 alcohol, and 50 concentrated sulphuric acid, and agitating the mixture for a short time. Butyric ether is sparingly soluble in water, but very so-

luble in alcohol. Dissolved in 8 or 10 parts alcohol it forms the celebrated *pineapple essence*. From 20 to 25 drops of this essence, added to a pound of sugar, containing a little citric acid, imparts to the mixture a strong taste of pineapple. This essence is much employed as a flavoring substance by manufacturers of domestic brandy; it also imparts a delicious flavor to rum, arrack, punch, etc. Butyric ether is used in the same proportion as the others. (See "*Butyric Acid*," "*Fruit Essences*," and "*Rum Essence*.")

Black and Green Tea.

Tea, either green or black, gives a pleasant astringent flavor to an imitation brandy, and is much used by dealers in that article. Use in the following manner: to each oz. of tea, add one pint of boiling water; let it infuse for a few minutes, and when cool strain. Eight oz. prepared in this manner is sufficient for 100 gals. brandy.

Tannin.

Tannin, or tannic acid, is made from powdered galls, oak bark, etc. The term *tannin* was originally applied to a principle, or principles existing in many vegetables, having a very astringent taste; as obtained, however, from different plants, it was found to exhibit some difference of properties, and chemists have recognized but two kinds, one existing in the skin of the grape, oak bark, galls, etc., distinguished by producing a bluish black precipitate with per-salts of iron; and the other existing in Peruvian bark, catechu, etc., and characterized by producing a greenish, gray, or dark olive precipitate with the same salts. The former is the substance known in this work as tannin, and used by us to give the astrin-

gent quality or flavor so necessary to a perfect imitation of Cognac. Mix ¼ ounce tannin powder with sufficient alcohol, and use for flavor to 40 gals. brandy. Tannin powder may be procured of any respectable wholesale druggist (as indeed may all the ingredients recommended by us). Tannin should not be allowed to come in contact with any metallic substance, as it will deteriorate the color.

Catechu.

Catechu is an extract from the inner wood of a species of acacia tree, which is a native of the East Indies. Catechu, as it comes to us, is in masses of different shapes. The color is externally of a rusty brown, internally varying from a pale yellowish brown to a dark liver color. Catechu is inodorous, with an astringent and bitter taste, followed by a sense of sweetness. It is almost entirely soluble in a large quantity of water, to which it imparts a brown color, but when used as a brandy flavor it should be dissolved in alcohol 95°. The dark-colored catechu is the best for a flavor. Use 4 oz. for 100 gals. brandy.

Kino.

Kino is the juice from incisions in the bark of a tree which grows in the East Indies and the western coast of Africa. It is without odor, and has a bitterish, astringent taste, with a somewhat sweetish after taste. Dissolve 1½ oz. in clear cold water; this will be enough to give the astringent quality of tannin to 40 gals. brandy.

All other flavors mentioned in our recipes for brandy such as wines of different varieties, rum, apple-brandy rum essence, etc., will be fully described under their various heads in other parts of this work.

Beading for Proof Brandy.

The "bead" of brandy, or other liquors, is the small globules, or bubbles that remain on top when the liquid is agitated. The bead of a liquor is supposed to show its strength; for instance, if you agitate a quantity of spirit in a glass, and the bead remains on the top a few minutes, it is called proof spirit, but if, when the agitation is discontinued, the bubbles rapidly disappear, the spirit is supposed to be below proof. The bead heretofore generally used by dealers, is that made by mixing sweet oil and sulphuric acid in the following proportions: To every forty drops of sulphuric acid, add sixty drops pure sweet oil. This quantity is generally sufficient to give a bead to ten gallons spirit; but sometimes the alcohol will contain substances, such as acids, alum, or alkalies, that may in a degree neutralize the efficiency of the mixture, and it will in that case require a greater quantity to give the proper "bead." This mixture does not improve by age, and should therefore only be prepared when wanted for use. In mixing, be careful and put the ingredients in a glass vessel. With the exception of that of almonds, olive oil being the most costly of the ordinary fixed oils of commerce, it is consequently the one most subject to adulteration. Nut, poppy, rape, and lard oil are those commonly most used for this purpose. The following test will show whether the oil is pure:— When pure olive oil is shaken in a phial only half filled, the bubbles rapidly disappear; but if the sample has been mixed with poppy or other oil, the bubbles continue longer before they burst. Any pure fixed oil will answer to make the above "bead." To ascertain if an oil is pure, mix with it an equal quantity of nitric acid: if the margin of this combination assumes a yellowish

green color, it is a sure sign that the oil so tested is pure. Another way of preparing this "bead" is as follows:—take one ounce oil of sweet almonds (pure and tested), one ounce sulphuric acid; put them in a stone mortar, and add, by *degrees*, two ounces white lump sugar, rubbing it well with the pestle till it becomes a paste; then add small quantities of spirits of wine, till it comes into a liquid. This quantity is sufficient to give a bead to 100 gallons.

THE BEST "BEAD," and the only one used or recommended by the author of this work, is the *Orange Flower Water Bead.* It has the advantage over either of the above, inasmuch as its virtues are not affected by the presence of either acids or alkalies, in the liquor to be beaded. There are three kinds of orange flower water: the *single*, *double*, and *triple;* the latter has *triple* the strength of the former, and is the kind we recommend. To give a fine bead, use 100 drops to forty gallons brandy—one drop to each gallon. WHITE GLYCERIN improves liquor, it is a good beading and imparts age and smoothness. Use one pound to forty gallons.

To give the Appearance of Age to Brandy.

To give age to brandy, use ammonia, or spirits of Hartshorn, one to three drops per gallon; this will immediately give the appearance of two years' age to brandy; but as ammonia is very volatile, its effects or virtues soon disappear, and should therefore only be used as wanted. Glycerin is also good.

Filter for Brandy.

This filter is employed to give a clear, light appearance to domestic brandy, which object is effected by passing

the liquid through sand and cotton. We particularly recommend this filter to the attention of the manufacturer and liquor merchant, for with proper care and skillful management it will make a domestic brandy sparkle like the diamond. See Fig. 3. The construction and arrangement of this filter is very simple. *A* is a common cask or hogshead. *B* and *C* are false bottoms fitting in perfectly tight, but perforated with ¼ inch holes. *B* should be covered with Canton flannel; *C* should be covered with canvas, and on top of that a layer of cotton batting or wadding. These covers of Canton flannel and canvas have the effect of spreading the liquid all over the surface of both *B* and *C*, thus giving as great extent as possible to the filtering surface. Having prepared *B* and *C* in this manner, you next fit *C* in the cask, and place on top of it a bed of *perfectly clean sand*, four inches deep. Above the sand, and covering it, place a piece of flannel, which is represented by *D*, Fig. 3. On top of the flannel lay a bed of carded cotton, four inches deep, regularly piled up, so that it will be of a uniform thickness all over, but pressed very tightly all around the edge. *E* is a semi-bag, made of Canton flannel, and securely fastened at the top of the cask. This is simply intended as a strainer to catch the coarser substances before they enter the vessel, and to prevent the brandy coming immediately, and with too much force upon the cotton and sand, which would dis-

COGNAC FILTER.

Nec pluribus impar.

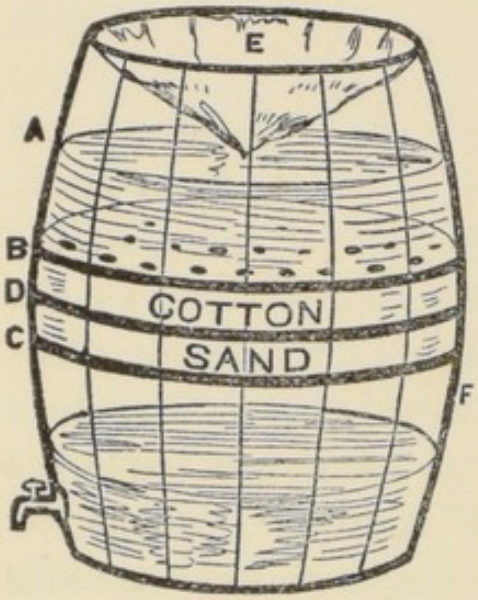


Fig. 3.

arrange, and spoil the filter. It is evident that when brandy is poured into the upper part of a cask so arranged, it will sink through the filters *B*, *D*, and *C*, into the lower chamber *F*, filtered and purified in an almost perfect manner.

As the sand and cotton become charged with impurities from frequent filtration, they will have to be cleansed by being washed with clean water. Sand gives transparency to any colored liquor, and separates the minute atoms or particles that impart a cloudiness to liquids; but, when it is desired to render a liquid limpid and colorless, it will be found necessary to resort to filtration through animal charcoal. (See "*Gin Filter.*")

The Sponge Filter.

A filter which possesses the advantages of being easily and cheaply cleaned when dirty, and which very thoroughly purifies brandy or water, with great rapidity, may be formed by placing a stratum of sponge between *two perforated metallic plates*, united by a central screw, and arranged in such a manner as to permit of the sponge being *compressed* to any required degree. Brandy or water, under gentle pressure, flows with great rapidity through the pores of compressed sponge.

Concluding Remarks on Brandy.

We might increase the number of recipes for the manufacture of brandy, but we have given all those which after trial we can honestly recommend. It is a common practice with a *certain class of dealers* to manufacture brandy from alcohol half reduced by water. As a natural consequence, their liquor suffers so in flavor, and its

deficiency in alcohol becomes so apparent, that they soon see the necessity of either abandoning the practice, or resorting to others of a like kind to disguise it. The latter alternative is commonly adopted, an excess of coloring (*burnt sugar*) is immediately introduced into the spirits, followed by sundry portions of Guinea and Cayenne pepper, grains of Paradise, pellitory, and other acrid substances, to give it a make-believe strength, that "passes muster" with the petty dealer. These pernicious ingredients increase the volume of alcohol without loss of strength, but will not stand the test of the hydrometer. The addition of ethers and ammonia is not at all prejudicial to the health.*

We protest against this adulteration of alcohol, and will give no recipes for manufacturing brandy which contemplate any other basis than that of pure spirit. (See "*Alcohol.*") Any liquor should be rejected that gives the slightest tingling sensation to the throat, for that feeling is an unerring evidence that the spirit is adulterated with the above drugs, and we should all remember that mildness of taste is a peculiarity of good liquor.

In the manufacture of domestic liquors, the aim being

* Auction Brandy.—As a matter of curiosity, we give two recipes of brandy made of reduced spirits, with some of the above ingredients to impart a fictitious strength to the alcohol. And we know that these or similar recipes are extensively used in New York to make a very cheap brandy for auction sale. 1*st.* Take 10 gals. proof spirit, 10 gals. water, 1 pint strong infusion of green tea, ½ pint plain syrup, 2½ pints tincture of grains of Paradise. Color with burnt sugar coloring, and add 1½ oz. of nitric ether. Flavor with 4 drops oil of wintergreen. 2*d.* To 15 gals. proof alcohol, add: 15 gals. water, 1 gall. tincture of Guinea pepper, ½ pint syrup; then add the following mixture: 1 oz. nitric ether, 1½ oz. acetic ether, ½ oz. sulphuric acid. Color with burnt sugar coloring, and flavor with ½ lb. prune kernals, mashed up, and infused in alcohol 95°. Add a "bead." (See "*Beading.*")

to equal the fine imported article, the advantage of using pure, fine quality spirit, and unadulterated oils and essences must be obvious; foreign liquors have generally the advantage of age; the domestic article should have the same advantage, as far as time and circumstances will permit. (*See Appendix.*)

PART IV.

The Art of Imitating and Manufacturing Gin without Distillation, with numerous valuable Recipes, and a Description of all the Articles used in Imitating Holland and London Gin.

This popular liquor is a grain spirit, flavored with either oil of juniper or oil of turpentine. Gin was originally and for some time wholly imported from Holland, and was a soft, rich spirit, flavored chiefly with juniper berries; on which account it had obtained the name of Geneva, from *genièvre*, the French for juniper. After a time the distillation of an *imitation Geneva* sprung up in England, when the *genuine* spirit in this country came to be called Holland gin, to distinguish it from the imitation, or London gin. The monosyllable "*Gin*" is a corruption of Geneva, the accented syllable of which, as in numerous other instances, was seized on by the vulgar and adopted as a short and convenient substitute for the whole word. This far-famed liquor has been long the subject of study among distillers. Many trials have been made to produce a spirit equal in quality to that imported, but with very indifferent success. The subjoined particulars are taken from "*Muspratt's Chemistry*," and were communicated by a gentleman who sojourned in Holland for several years, solely for the purpose of learning the process followed in the manufacture of the Dutch Hollands or Geneva:—"One hundred and twelve pounds of barley malt and two hundred and twenty-eight pounds of rye meal are mashed with four hundred and sixty gallons of water, at 162° Fah.; after infusion has taken

place, cold water is added to bring the strength to forty-five pounds per barrel, or specific gravity 1.047, at which strength, after it has cooled to 80° Fah., it is run into the fermenting tun. To the contents of the fermenting back, which is about five hundred gallons, half a gallon of good yeast is added; fermentation speedily sets in, the temperature rises to about 90°, and the attenuation is complete in forty-eight hours. After attenuation of the wash, from twelve to fifteen pounds per barrel of saccharine matter remain undecomposed in the fermented liquor. The wash and grains are then introduced into the still, and the whole of the low-wines distilled over; these are subjected to a second distillation, and the distillate after rectification is the famous *Geneva*, or Holland gin. A few juniper berries, and sometimes hops, are added in the rectification, to impart to the spirit a peculiar flavor." Some peculiarities are seen in this concise account of the process followed in Holland, namely, the imperfect attenuation of the wort, and the small amount of yeast employed in bringing it about. Double the quantity of spirits are obtained from the worts of the distillers of gin in England that is produced from those in Holland, according to the example just given. It is very probable that the large amount of yeast used by the English distillers, and the last efforts tried to effect an attenuation as low as possible, are the very means which communicate a flavor to the spirit so different from the Dutch. It will also be seen that the superior aroma of Holland gin depends more upon the mode of its manufacture than upon the quantity of juniper berries employed.

In France an exceedingly fine gin is produced by fermenting a portion of juniper berries bruised with four parts of barley meal, or ground malt, proceeding through

out the succeeding part of the operation in the same way as making grain spirit. Another method practiced is the following :—Boil during half an hour two gallons of bruised juniper berries in four gallons of water ; put this into a barrel capable of containing six gallons ; add to it at first four pounds of rye bread that has been dried and reduced to powder, then some aromatic flavor, according to the fancy of the manufacturer, and two pounds of brown sugar. At the end of a month the liquor is converted into an agreeable wine, which, when distilled, affords a spirit much esteemed and commanding a high price. The liquor at present known by the name of gin in this country, as a general thing, is a very different article from that imported from Holland, and consists of plain spirit flavored with oil of juniper and sometimes oil of turpentine, and small quantities of *certain* aromatics. The various recipes, which from time to time have been printed in books, produce a flavored spirit, bearing *no resemblance* to Holland gin, or the more esteemed samples of London gin. The authors seem to have no practical knowledge on the subject, and appear to have imbibed a *juniper-berry mania.* Oil of juniper, in the hands of these gentlemen, appears to be a perfect *aqua mirabilis* that readily converts whiskey into gin, and imparts the rich creamy flavor of *Schiedam schnaps* to crude spirit. But theory and experiment sometimes disagree. In practice it is found that the true flavor of Holland gin cannot be imparted to spirit by juniper alone. Although gin is always *prepared* on the large scale by distillation, it may also be made by the simple solution or digestion of the flavoring ingredients in the spirit ; but it is, of course, better for distillation. Still, however, most of the berries, roots, or seeds used to flavor distilled gin,

have, so far as their oils or essences are concerned, very analogous properties; and since their virtue in distillation with the spirit is to communicate their oily or fragrant principle, why not add a few drops of each of the oils at once to the pure spirit, to procure the desired liquor, and by this means obviate the necessity of distillation? In the preparation of gin, both sweetened and unsweetened, and indeed of liquors generally, the greatest possible care must be taken to avoid an excess of flavoring. The most esteemed samples are those that consist of *very pure French or neutral proof spirit, slightly flavored.* In this respect the same rules that are given for brandy will also apply to this liquor. And while we are on this subject, we would recommend as a basis for gin and brandy the *French* spirit manufactured by Attwood's celebrated patent process, as being a pure article, and as free from fusil as alcohol can be. (See "*Alcohol.*") The whole of the casks and utensils employed for making gin should be perfectly clean and properly prepared, so as not to give color; for, if this spirit acquires the *palest colored* tint, its value is lessened, and if much colored it is rendered unsaleable.

Filter for Gin.

To filter gin, the brandy filter may be used, but a still preferable filter for this liquor can be constructed by using a bed of *granulated* animal charcoal instead of the bed of carded cotton in the brandy filter, in every other respect the filter for gin may be made like that recommended for brandy. Animal charcoal is substituted for cotton because the former substance renders any liquid limpid by filtration through it, and it is desirable to make gin as colorless as possible. (See *Filter for Bitters*, page 211.)

To make Holland Gin.

RECIPE No. 1.

To 100 gals. pure spirit, proof, add :

1 ounce oil of juniper berries,
1 gal. white sugar syrup,
¼ oz. oil of sweet fennel.
1 lb. orange peel (infused).

Infuse the orange peel in sufficient pure spirit 95°, to cover it for 3 or 4 days, then filter through filtering paper before using. The oils of juniper and fennel should be cut with pure spirit, say 1 quart for each. This and all other manufactured gin is much improved by being filtered. The above or any of the following recipes may be prepared in smaller quantities, by reducing the proportions of the ingredients.

To make Holland Gin.

RECIPE No. 2.

To 25 gals. pure proof spirit, add :

1 " gin essence,
¼ " white sugar syrup,

Mix thoroughly and filter if necessary.

To make Schiedam Gin.

RECIPE No. 3.

Take 40 gallons French spirit, 10 above proof,

3½ drachms oil of juniper berry,
30 drops oil of sweet fennel,
8 ounces orange peel tincture,
1 quart of syrup.

Cut the oils in 95 per cent. alcohol. Oil of juniper is not easily cut, therefore add the alcohol until the liquid is clarified.

The tincture of orange peel is made as follows: Steep 1 pound of orange peel in 1 gallon 95 per cent. alcohol for 15 days; filter.

This is a fine gin, and only requires age to make it a perfect imitation of the genuine article.

To make Holland Gin.

RECIPE No. 4.

To 80 gallons pure proof spirit, add:

¾ oz. pure oil juniper,
¼ " oil of caraway,
⅛ " oil of sweet fennel,
3 " ground cardamoms (infused same as spirit orris, see "*Brandy Flavor*"),
1 drachm essential oil of almonds,
4 " essence of lemon peel.

Be careful and cut all the oils in alcohol 95° before using them. (See "*Recipe No.* 1.") Filter with brandy filter.

To make Holland Gin.

RECIPE No. 5.

40 gallons French spirit,
4 oz. essence of juniper oil,
¾ " " " sweet fennel oil,
¾ lb. orange peel, infused in 1 gall. French spirit, 10 o. p., for ten days, stir the infusion twice every day,
1 quart of sugar syrup.

The above recipe will make a fine gin, being entirely free from all the deleterious drugs sometimes employed by ignorant dealers. (*See next Recipe.*)

How to make the Essences recommended in the Foregoing Recipe.

Dissolve 1½ oz. of juniper oil in 16 oz. spirit, 95 per cent. Use 4 oz.

Dissolve 1 oz. sweet fennel oil in 12 oz. spirit, 95 per cent., and use ¾ oz.

Use as directed.

To reduce Holland Gin.

RECIPE No. 6.

To 25 gals. pure Holland gin, add:

25 " pure French spirit, proof,

½ " white sugar syrup.

Mix thoroughly.

This is after all the best imitation of genuine Holland gin, and as such we recommend it.

Imitation Old Tom London Gin

RECIPE No. 7.

Dissolve in 1 quart 95 per cent. alcohol, 1 drachm oil of coriander, 1 drachm oil of cedar, ½ drachm oil of bitter almonds, ½ drachm oil of angelica, and ½ drachm oil of sweet fennel; add it to 40 gallons French spirit, 10 above proof, with 1 pint orange-flower water, 1 quart syrup, and 1 drachm oil of juniper dissolved in sufficient 95 per cent. alcohol to be clear.

To make London Cordial Gin.

RECIPE No. 8.

This is gin sweetened with sugar, and *slightly* flavored or aromatized.

To 90 gals. of good gin, add:

1 drachm oil of sweet almonds,

2 " " cassia,

2 drachms oil of nutmeg,
2 " " lemon,
3 " " juniper,
3 " " caraway,
3 " " coriander,
3 fluid oz. essence of orris root,
3 " " " cardamom,
3 pints orange flower water,
56 to 60 lbs. lump sugar dissolved in 4 gals. pure water.

The essences and oils should be cut or dissolved in two quarts pure alcohol 95 per cent, and added *gradually* to the gin until the *requisite flavor* is produced. Then mix in the dissolved sugar, and add a sufficient quantity of soft or distilled water (having previously dissolved 4 oz. of alum in it) to make up in all 100 gals. When the whole is perfectly mixed, add 2 oz. salt of tartar, dissolved in 2 or 3 quarts of *hot water*, then stir up and mix the liquor well once more, and allow it to repose. In a week, or less, it will have become *brilliant*, and may be either racked, or drawn from the same cask.

To Sweeten Gin of any kind.

RECIPE No. 9.

To 95 gals. unsweetened gin, add:

40 or 45 lbs. lump sugar dissolved in 3 gals. clear water. Fine it down with roche alum and salt of tartar as above directed, and let it stand for one week.

To give Common Gin the Flavor of Aromatic Schiedam Schnapps.

RECIPE No. 10.

To 25 gals. common gin. 5 o. p., add:

15 pints strained honey,
2 gals. clear water,
5 pints white sugar syrup,
5 " spirit of nutmegs mixed with the nitric ether (see "*Nutmeg and Mace*"),
5 pints orange flower water,
7 quarts pure water,
1 oz. acetic ether,
8 drops oil of wintergreen dissolved with the acetic ether.

Mix all the ingredients well; if necessary, fine with alum and salt of tartar. The manufacturer must bear in mind that the common gin used in this recipe must be entirely free from any disagreeable taste or flavor.

Finings for Gin.

RECIPE No. 11.

To 100 gals. gin, take 4 oz. roche alum, and put it into a pint of pure water; boil it until it is dissolved, then gradually add 4 oz. salt of tartar; when nearly cold put it into the gin, and stir it well with a staff for ten minutes. The liquor must not be covered until it is *fine;* when this is accomplished, cover it up tight to prevent its losing its strength.

To Clean Gin that may be Tainted.

RECIPE No. 12.

In cases when gin has any disagreeable taste, such as a musty or faint flavor, to remove it, use, for 100 gals., 4 oz. potash and 4 oz. roche alum; mix them with 2 quarts of water, and boil until they are dissolved; then add 4 oz. salt of tartar. Mix this in the tainted gin,

being careful to stir it up well, and in one week it will be found to be perfectly purified.

This method must not be tried when the gin to be purified is much below proof, as in that case the potash and alum will combine with the water in the spirit, and impart to it a still more disagreeable flavor.

There is also another objection to be urged against this fining,—and that is,—the potash sometimes becomes attracted by the oil of juniper (for which it has an affinity) and necessarily saponifies the latter. In nine cases out of ten, however, the above recipe will answer the desired purpose, and thus we recommend it.

To remove the Blackness from Gin.

RECIPE No. 13.

Some gin has a particular blackness; to remove which, take 1 oz. of pulverized chalk, and 2 or 3 oz. of isinglass, dissolved; put this into your gin and it will become transparent. The above is enough for 50 gallons. The blackness which gin sometimes contracts by coming in contact with iron, may also be carried down by putting a solution of 2 oz. of isinglass and 1 quart of skimmed milk into the spirit. When the color is very black, which will happen by merely an iron nail having fallen into the liquor, there is no remedy, but to have the commodity distilled over again.

To Clarify Stained Gin.

RECIPE No. 14.

When gin has once become much stained, the only remedy is to redistill it; when it is only slightly stained, the addition of a few pounds of acetic acid to a pipe or butt, a spoonful or two to a gallon, or a few drops to a decanterful, will usually decolor it.

To Reduce Pure Holland Gin.

RECIPE No. 15.

When it is desirable to lower genuine Holland gin, particular care should be taken to choose a good, clean, and bright spirit for the purpose. Boiled water in a cold state should be used and must be particularly clean. Add a sufficient quantity of lime water; and stir the whole well together for five or six minutes, that the ingredients may become incorporated. Should the liquor run ropy, or if the color is not satisfactory, run it through the filtering bag; and repeat the operation till it passes through bright; and this object may be greatly promoted by throwing some alabaster powder at the bottom of the filtering bag. Or the color may be improved by boiling alum and salt of tartar in a couple quarts of water, till it becomes milk-white, and when the mixture is nearly cold, stir the gin, and pour the mixture into it at the same time. The proportion of this kind of fining is, ½ lb. of alum and 1 oz. of tartar to a barrel of gin containing 30 gallons.

FLAVORS USED IN MAKING GIN.

HAVING given all our recipes for making or preparing gin, we will now introduce a particular notice of each substance mentioned in the formulas with a description of the oil derived from it, and its properties, to enable the manufacturer to become better acquainted with the nature of the roots, seeds, and essences, that give to his liquors their peculiar fragrancy, astringency, *et cetera;* moreover the information thus laid before him, may induce him to make use of those only that are servicable in imparting the desired aroma. If spirits are at all wholesome, they must be more so in a pure than in a degraded

state, consequently it should be the aim of the fabricator to elevate rather than deprave the taste of the consumer.

Juniper Berries.

The common juniper is a native of Europe; but has been introduced into this country, in some parts of which it has been naturalized. The berries, as the fruit is commonly 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. What the liquor manufacturer prizes in this berry is its volatile essence, which is an oily liquid having the same elements as turpentine and oil of lemon, but with different properties. Their smell is also very similar, hence the origin of the supposition that London gin is sometimes mixed with the latter. Oil of juniper is the most powerful of all diuretics, and gives to the urine the smell of violets. It promotes perspiration and relieves flatulency, consequently, gin is recommended in many diseases of the urinary organs. Oil of juniper is frequently adulterated with oil of turpentine, a fraud readily discovered, as the genuine oil is soluble in alcohol, while that adulterated is not. The oil of juniper consumed in this country is brought from Europe, and is believed to be procured chiefly from the tops of the plant, being sold for a price which is altogether incompatible with the idea that it is prepared from the fruit alone. As a general thing 1 or 1½ oz. of this oil will flavour 100 gals. of gin.

Fennel Seed, or Sweet Fennel.

The plant producing fennel seed is a native of Europe, as well as the United States. Our shops are partly supplied from our own gardens, but a much larger portion

of fennel is imported, chiefly from Germany. Fennel seed cultivated here is sweeter, and more aromatic than that from abroad, probably in consequence of its greater freshness. Fennel seed yield from 2 to 4 per cent of essential oil. That used in this country is imported. It is colorless or yellowish, with the odor and taste of the seeds. Used as directed in "*Recipes*" 1 and 3.

Orange Peel.

The peel of the orange yields the oil proper which has the strong odor of the rind. The essential oil distilled or expressed from the thin outside rind of the fruit of the sweet orange, is called essence of Portugal, and is a splendid flavor for gin when used in the proper proportions. One hundred oranges yield 4 to 5 oz. of the oil. The essence may be made by observing *all* the directions given for making *essence of lemon*. (See "*Lemon Peel.*")

Gin Essence.

Is a compound flavor, prepared from the oils of juniper, cedar, and other aromatics, and when pure and fresh is a fine flavor. It is sold by all respectable wholesale druggists and essence dealers.

Orange Flower Water.

The water used for distillation to procure the oil of neroly is imported into this country under the name of *eau de fleur d'orange*. It is remarkable for its fine fragrance, and is a good flavor for gin. There are three sorts of orange flower water found in commerce: the first is distilled from the flowers; the second is made with distilled water and neroly; and the third is distilled

from the leaves, the stems, and the young unripe fruit of the orange-tree. The first may be easily distinguished by the addition of a few drops of sulphuric acid to some of the water in a tube; a fine rose color is almost immediately produced. The second also gives the same color when it is freshly prepared; but after a certain time—two or three months at the farthest—this color is no longer produced, and the aroma disappears completely. The third is not discolored by the addition of the sulphuric acid; it has scarcely any odor, and that rather an odor of the lemon plant than of orange-flowers. It is needless to say that the first is by far the best of the three qualities. It is prepared from the fresh and the salted leaves of the orange flower. From ¾ lb. of the former, or 1 lb. of the latter, a quart of *triple* orange flower water is obtained. This is the variety to be used in our recipes. (See "*Neroly*" and "*Brandy Beading*," page 76.)

Coriander Seed.

The coriander plant is a native of Italy, but at present grows wild in most parts of Europe, having become naturalized in consequence of its extended cultivation. The seed of this plant has a smell and taste gratefully aromatic, and altogether owing to the presence of a volatile oil. This oil may be obtained separate by distillation. One pound of the seeds yields forty-two grains of the oil; their virtues are also imparted to alcohol by maceration. Use in proportions as directed in the various recipes.

Angelica Root.

This plant is a native of the north of Europe, it is cultivated in various parts of Europe, and may occasion-

ally be met with in the gardens of this country. This species of angelica is known as *garden angelica*, and is the kind recommended. The common purple angelica, and the species known as *masterwort*, are natives of the United States, but must not be used for flavoring purposes. Angelica root is apt to be attacked by worms, and keeps better in a powdered state in full and well-closed vessels. The smell is strong and fragrant, its taste is at first sweet, then hot, aromatic, and bitter. These properties are extracted by alcohol. Five hundred parts of the dried root produce four parts essential oil.

Calamus Root.

The sweet-flag or calamus is an indigenous plant, growing throughout the United States in wet swampy places. It is also a native of Europe and Asia. The odor of calamus is strong and fragrant, its taste pungent and aromatic. Sixteen ounces of the dried root afford about two scruples volatile oil, the yield of the fresh root is about one hundredth per cent of oil. Its virtues may be extracted by alcohol, or boiling water. Digest four ounces of the root (cut in small pieces) in half a gallon alcohol 95 per cent for ten days, then filter, or pour over the root sufficient boiling water to cover it well, and when cool strain ; use as directed in the recipes.

Cassia Buds.

The Cassia is a species of cinnamon tree, and a native of China. This plant produces buds which bear some resemblance to the clove, but are smaller. When fresh, cassia buds have a rich cinnamon flavor, and yield nearly one per cent of an essential oil. This is a very diffusive

flavor when pure, and care should be taken not to use too much. Nitric acid converts the pure oil into a crystalline mass, and the pure article may thus be proven. Oil of cassia is generally adulterated with alcohol; this fraud may be detected by placing a lump of perfectly dry chloride of calcium in a test-tube containing the suspected oil, and shaking it well. If the oil is pure, the chloride of calcium will remain unaltered; but if it contains alcohol, the lump will dissolve and form a dense sub-stratum. This test will detect alcohol in any essential oil. (See also "*Oil Neroly*" and "*Oil Cognac.*")

Lemon Peel. (Oil and Essence.)

The oil of lemon is obtained both by expression and distillation. It is chiefly imported from Portugal, Italy, and the South of France. Pure lemon oil is very fluid, colorless, and of an agreeable odor. Like turpentine, the oil of lemon has the same elements as the oil of juniper. (See "*Oil of Juniper.*") One hundred lemons yield by expression 1¾ to 2 ounces of oil, and by distillation 1¼ to 1½ ounces. Essence of lemon peel is made as follows: Digest 1 lb. of the thin outside *yellow peel* of fresh lemons in 1 quart alcohol 95 per cent, let it stand one week, then press and filter. This is a fine gin flavor. Care should be taken that none of the rind should be detached but that portion in which the cells are placed, containing the essential oil.

Cardamom.

This valuable plant is a native of the mountains of Malabar, where it springs up spontaneously in the forests after the removal of the undergrowth. The odor of cardamom is fragrant, the taste warm and highly aromatic.

These properties are extracted by alcohol, they depend on a volatile oil which rises with water in distillation. The oil obtained from the seed is colorless and of an agreeable odor. The seeds contain about 5 per cent of oil, which may also be extracted by maceration in alcohol 95 per cent. Use as directed in the recipes.

Oil of Cedar.

The species of juniper commonly called *red cedar* grows in all latitudes of the United States from Burlington in Vermont to the Gulf of Mexico, and is therefore too familiar to render any description of it necessary. Upon distillation, cedar wood yields an essential oil that is exceedingly fragrant. This oil in former times was very scarce, but recently it has been made from the refuse shavings of the pencil makers, and is now sent extensively into the market. One hundred pounds of shavings yields from 20 to 25 ounces of the oil. The tincture or essence of cedar smells agreeably of the wood, from which it can be made by steeping the cedar wood in alcohol 95 per cent. This oil is also used in combination with creosote for flavoring Irish and Scotch whiskey.

Sweet Almonds.

The almond tree is a native of Persia, Syria, and Bombay, but we are supplied with almonds chiefly from Spain and the South of France. They are distinguished into the soft-shelled, and hard-shelled, the former of which comes from Marseilles, and Bordeaux, and the latter from Malaga. The kernals of the almond when deprived of their skin are called *blanched* almonds; this is easily done after immersion in boiling water. Sweet almonds yield about 50 per cent of essential oil, which is obtained by compression from blanched almonds.

Nutmegs and Mace.

The nutmeg tree is a native of the Molluccas, but the principal nutmeg gardens of the world are the Banda or Spice Islands. The nutmeg tree, like the orange and many others, yields two distinct odorous substances, that is, oil of mace, and oil of nutmeg. The oil of nutmeg is a beautiful white and transparent fluid, having an intense fragrance of the nut, from which it is easily procured by distillation. By expression, the nutmeg will also yield an unctuous fat oil of an agreeable color. Two pounds of nutmegs will yield about 3 or 4 ounces of oil. Mace is procured from the nutmeg-tree; thus, the nutmegs are enclosed in four different covers, the first is a thick husk, something like that of our walnuts, but larger; under this lies a thin reddish coat, which is the mace of commerce; the mace wraps up the shell and opens like a net work. The odor of mace only resembles that of nutmeg in being spicy; it cannot, however, be mistaken for the smell of nutmeg. The oil of mace, like that of nutmeg, is readily procured by distillation. Two pounds of mace yields about 3 oz. of oil. The oil of nutmeg is used in combination with a number of other odors to give a flavor to London cordial gin. It is also used for other purposes that will be made known in different parts of this work. The spirit of nutmeg is made by macerating 6 oz. of bruised nutmegs for six days and is used in "*Recipe No.* 10."

Caraway Seed.

The caraway plant is a native of Europe, and has been introduced into this country. The properties of caraway depend upon an essential oil. This odoriferous principle is drawn by distillation from the seeds of the plant. It

has a very pleasant smell, quite familiar enough without description. Twenty-five lbs. of caraway seed yield about 16 ounces of the essential oil. This aroma is used in "*Recipes*" Nos. 4 and 8 for gin, and enters largely into the composition of cordials.

Wintergreen or Partridge Berry.

This plant is a small shrubby evergreen, and grows indigenous from Canada to Georgia. To the very peculiar aromatic odor and taste which belong to the whole plant, the leaves add a marked astringency. The aromatic properties reside in a volatile oil, which may be separated by distillation. This oil is soluble in ether or alcohol, and is the heaviest of all the essential oils; this peculiarity affords an unerring test of its purity. When combined with acetic ether this oil gives a fine flavor for gin. (See "*Recipe No.* 10.") It is also much used to flavor "Monongahela," "Old Rye," and "Bourbon" whiskeys. For the latter, use 50 drops to 100 gallons; cut in alcohol 95 per cent or acetic ether.

Honey.

Pure honey consists of a syrup of uncrystallizable sugar, and crystalline saccharine grains resembling grape sugar. *Virgin honey* is that which flows spontaneously from the comb. *Ordinary honey* is that obtained by heat and pressure. The former is pale and fragrant; the latter darker, and possessing a less agreeable taste and smell.

Honey is frequently adulterated with molasses, potato sugar, syrup, starch, wheat flour, and water. The *first* may be detected by the color and odor; the *second* by boiling a sample of the honey for a short time in water

containing 2 or 3 per cent of caustic potassa ; if the liquid remains colorless it is pure ; but if it turns brown, more or less, it is adulterated according to the quantity of syrup present. The *third*, by the honey not forming *a nearly clear* solution with cold water, and striking a blue color with iodine. When it contains wheat flour and is heated, it at first liquifies, but on cooling it becomes solid and tough. Water is added to honey to increase its bulk. Its presence may be suspected from the greater thinness of the liquid. In warm weather honey, if not very pure, sometimes ferments, acquiring a pungent taste and deeper color. To prevent its liability to fermentation, and render it fit for use, *ordinary* honey requires to be purified of certain impurities with which it is always mixed. To accomplish this it is generally only necessary to melt the honey by the heat of a water bath, and strain it whilst hot through flannel ; or beat up 10 lbs. with the white of two eggs until it froths, then add water enough to give it a syrupy consistence. It is then mixed and boiled until the albumen can be removed with the froth. Having done this, it should be poured into an upright vessel which carries a cock two or three inches from its bottom. Being covered and set aside for a week or so, the impurities subside, and the clear honey can then be racked off through the cock. Honey gives to neutral spirit the qualities of smoothness and age, and should be dissolved with about its own bulk of *cold water*, as it does not dissolve readily in alcohol. It is used in fine gin.

Spirit of Nitric Ether. (Sweet Spirits of Nitre.)

Nitric ether is formed by the mutual action of nitric acid and alcohol ; it is colorless, and has an agreeable odor and taste. This ether when dissolved in alcohol or

distilled with it, is largely used as a flavoring ingredient. *Spirit of nitric ether*, or *sweet spirits of nitre*, as the solution or distillate is termed, is a colorless, limpid liquor, having a fragrant etherial odor, somewhat analogous to that of ripe apples, and a pungent aromatic taste. When combined with other flavors the spirit of nitric ether is used to impart aroma to various liquors, but chiefly for gin. It is a powerful diuretic, and should not be used.

Alum.

Alum is a white salt possessing a sweetish astringent taste. It dissolves between fourteen and fifteen times its weight of cold and three-fourths of its weight in boiling water, but it is insoluble in alcohol or brandy.

Alum, when combined with salt of tartar, is extensively used for clarifying liquors, particularly gin. (See "*Recipes*" 11 and 12.) Roche alum is so called because it originally came from Rocca, in Syria. It usually comes in fragments about the size of a hickory nut, and has a pale rose color. This species of alum is preferred for fining purposes.

Salt of Tartar.

Salt of tartar is the pure carbonate of potassa, obtained from the bi-carbonate or cream of tartar, and differs from the same salt procured from pearl-ash in containing no impurities. This is somewhat difficult to procure, as most shops do not keep it, and at present this name is usually applied to any pure carbonate of potassa, without reference to its mode of preparation. Salt of tartar when combined with alum is used for fining gin and other liquors.

For ORRIS ROOT, LIQUORICE ROOT, OIL OF BITTER ALMONDS, and ACETIC ETHER, see "*Brandy Flavors.*"

Concluding Remarks on Gin.

In imitating gin, the manufacturer should be very careful and avoid the use of too much of any one particular flavor. The combinations given in our recipes may be altered both in the number of the ingredients and the quantities used. These variations are matters of fancy, as the object sought is merely to get a pleasant aroma. This, however, if carried to excess, will attract observation, and the manufacturer will fail in obtaining a perfect imitation. The flavor imparted by cardamoms, when used judiciously, is peculiarly agreeable and appropriate. That from juniper berries, or oil of juniper, gives the gin flavor. That from caraways or their oil is also in general esteem. *Cassia*, in *extremely* small proportions, also tells well. The only danger in the employment of *all* these articles is *using too much of them*. When this misfortune happens, the remedy is to add sufficient *plain spirit* to reduce the flavor to the proper standard. The creaminess and smoothness so much admired in Holland gin results chiefly from *age*, as it usually lies in bond some time before being consumed. This may be imitated by the addition of a little sugar syrup or clarified honey. A rich *mellowness* that combines well with gin, turning on the Holland flavor, is given by a very small quantity of garlic, say 4 or 5 cloves to 100 gallons, or about 15 grains of assafœtida, with 1 grain of ambergris rubbed to a powder with a little white sand or loaf sugar. The Dutch distillers, most noted for making this liquid, add a little pure Strasburgh turpentine, and a handful or two of hops to the spirit, along with the juniper berries. The former substance has a pale yellowish brown color and a very fragrant and agreeable smell, and tends materially to impart the fine aroma for which the best Holland gin

is distinguished. There are a class of dealers who employ *weak* spirit in making their gin, who are compelled to resort to the use of pellitory, grains of Paradise, Cayenne pepper, and other ingredients, to impart an artificial strength to their liquors. Gin made up to sell at auction is thus prepared, but no fair imitation can be accomplished by this means.

PART V.

The Art of Imitating and Manufacturing Jamaica, Arrack, and Santa Cruz Rum, with a Description of the Articles used for that Purpose.

Rum is distilled from a fermented mixture or wash, of molasses, scummings of boiled cane juice, and *dunder*, which last named material is the lees left after previous distillations. The whole are mixed up and allowed to ferment for seven or eight days, and when the mixture throws up clear globules, or bubbles, it is fit for distillation. The first distillation produces a spirit called "*low wines.*" To make this into rum of Jamaica proof it is distilled a second time. Twelve hundred gallons of wash produce 530 gallons of low wines, and from these are distilled 220 gallons of proof rum. A third distillation obtains from these 220 gallons about 113 gallons of marketable rum. The best rum is that which is made solely from molasses; but that in the fermentation of which is left the *debris* of the sugar-cane, froth, *et cetera*, always retains a sharp, disagreeable acid, and frequently acquires a burnt taste, on which account it is given to the negroes who work in the sugar-houses, and is consequently called *negro-rum*.

If crystallized sugar were fermented by itself, the produce, when distilled, would be mere spirit of wine, without any of the flavor peculiar to rum. This flavor, therefore, is generated by the acid and other ingredients in the molasses and dunder. The ingredients or constituents are chlorophyll or green coloring matter, butyric

acid, and a peculiar oil which gives the cane juice when fresh a balmy odor. During fermentation, these form ethers and combinations similar to those occurring during the fermentation of grape juice; to these ethers and combinations the peculiar flavor of rum is owing. The Chinese, who prepare the famous arrack of Batavia, which, without contradiction, is the best of all rums, take much care in rectifying it, mixing with it during distillation a composition called *ragie*, in which is cinnamon and anise seed, in such proportion as not to be perceived either by smell or taste, being only sufficient to do away with the otherwise nauseous odor of the liquor. The distillers in the West Indies, in addition to the very essential ingredient of dunder, sometimes use other articles in the fermenting process, such as tartar, nitre, sea-water, or common salt. From the presence of butyric acid and ether in rum, it is a favorite flavor for imitating Cognac brandy. Next to arrack (which is only used for flavoring punch), Jamaica rum is the most expensive of the rums imported into this country, and is therefore the variety most imitated. New England, which is the cheapest kind of rum, is frequently used as a basis for imitating Jamaica and Santa Cruz rums; indeed, the better quality of New England rum is often fully equal in flavor to the latter article. When Jamaica is to be imitated it should be colored up to the dark tint of the genuine article with burnt sugar coloring. The majority of dealers use pure spirit as a basis for manufacturing rum, and flavor with combinations of apple oil, butyric ether, birch oil, spirits of nitre, and "rum essence," which latter article is a butyric compound especially prepared by chemists for flavoring rum. Time adds much to the mildness and value of rum; but the planters, by the ad-

dition of pineapple juice, impart to it the virtue conferred by age. When it is necessary to filter rum, the brandy filter may be used for that purpose.

To make Jamaica Rum.

RECIPE No. 1.

To 45 gals. New England rum, add :

5 " Jamaica rum,

2 oz. butyric ether,

¼ " oil of caraway, cut with alcohol, 95 per cent.

Color to the desired tint with sugar coloring.

The above, or any of the following recipes, may be prepared in smaller quantities by observing the proportions of the ingredients used.

To make Jamaica Rum.

RECIPE No. 2.

To 36 gals. pure spirit, 10 o. p., add :

1 " Jamaica rum,

3 oz. butyric ether,

3 " acetic ether,

½ gal. sugar syrup.

Mix the ethers and acid with the Jamaica rum, and stir it well in the spirit. Color to the desired tint with burnt sugar coloring.

To make Jamaica Rum.

RECIPE No. 3.

To 60 gals. pure proof spirit, add :

1 lb. rum essence.

Color to the proper tint with sugar coloring.

To make Jamaica Rum.

RECIPE NO. 4.

40 gals. spirit, 10 o. p.,
1 lb. Jamaica rum essence,
4 " Tincture St. John's Bread,
15 drops oil of cloves. Color.

How to Make the Tincture of St. John's Bread.

Mash four pounds of St. John's Bread, and infuse ten days, one gallon of spirit, 95 per cent., stir the infusion twice each day. This will extract the oil from the beans. Rack off the spirit, and pour over the beans one gallon of soft water, to extract the sugar. Let it infuse four days, and stir twice every day. Rack off and filter through flannel. Mix both tinctures together and add it to the rum.—(*See Appendix.*)

To make Jamaica Rum. (Good.)

RECIPE No. 5.

20 gals. spirit, 10 o. p.,
20 " New England rum,
½ lb. Jamaica rum essence,
2 " Tincture of St. John's Bread, prepared as above,
15 drops of oil of cloves,
1 lb. white glycerin, to give smoothness and age. Color.

To make Jamaica Rum.

RECIPE No. 6.

To 50 gals. pure proof spirit, add:

1 lb. rum essence,
4 " St. John's bread,
2 lbs. sugar candy.

Cut the beans of the St. John's bread in small pieces, and boil in a gallon of soft water for five minutes, and when cold, filter. (This is done to extract the sugar from the bean.) Afterwards take the St. John's bread and macerate it for ten days in one gallon alcohol, 95

per cent., filter, and mix the ingredients separately, and stir them well together. Color with sugar coloring.

The above recipe is given by a celebrated German chemist.

To make Santa Cruz Rum.

RECIPE No. 7.

To 45 gals. New England Rum, add:
5 " Santa Cruz rum,
4 drachms vanilla essence.

To make Santa Cruz Rum.

RECIPE No. 8.

To 50 gals. pure proof spirit, add:
5 " Santa Cruz rum,
5 lbs. refined sugar dissolved in half gallon water,
3 oz. butyric acid,
2 " acetic ether.
Color if necessary.

To make Pine-apple Rum.

RECIPE No. 9.

In Jamaica it is usual to put *sliced* pine-apples in the puncheons containing the finer qualities of rum, which is then termed *pine-apple rum*. To make pine-apple rum, use the following recipe:

To 50 gals. rum, made according to recipe No. 1, add:
25 pine-apples (sliced),
8 lbs. white sugar.
Let it stand two weeks before it is drawn off.

To make Batavia Arrack.

RECIPE No. 10.

Arrack is a variety of rum, imported from the East

Indies, and in this country is chiefly used to make punch. Arrack is distilled from the fermented juice of the cocoa nut and the fermented infusion of rice in husk or rice-beer. Some varieties are pleasant flavored and as wholesome as the other spirits of commerce, but the inferior qualities are regarded as more heating and apt to disagree with the stomach than either brandy, whiskey, rum, or gin. When sliced pine-apples are put into *good* arrack, and the spirit kept for some time, it mellows down and acquires a most delicious flavor, and is thought by many to be then unrivaled for making nectarial punch.

To 12 gals. pale rum, add:

2 oz. flowers of benzoin,
1½ " balsam of Tolu,
1 " sliced pine-apple.

Digest with occasional agitation for a month; then add: ½ pint raw milk. Agitate well for 15 minutes, and rack in a week. A fine imitation.

To make Batavia Arrack.

RECIPE No. 11.

To 8 gals. rice spirit, 10 o. p., add:

3 " fine Batavia arrack,
4 drachms tincture of flowers of benzoin.

This is a splendid imitation of the genuine article.

Auction Rum.

Is prepared from plain or neutral spirit. The spirit is educed to any proof with *soft* water, and a fictitious strength is given with Guinea pepper, grains of Paradise, and pellitory, about one fourth genuine Jamaica rum is added, together with beading and coloring. (See "*Auction Brandy.*") Like all auction liquors, this is cheap.

but at best it is a miserable compound, and we cannot recommend it.

To remove Blackness from Rum.

To remove the blackness of rum, which it sometimes contracts by coming in contact with nails or iron of any kind, mix three or four pints of skimmed milk in a can, with a gallon or two of the rum, and, pouring the mixture into the puncheon, stir it well about; having bunged up the cask, the rum will become bright in ten or twelve days, and may be racked off.

FLAVORS USED IN MAKING RUM.

We have already described so many of the ingredients used for flavoring rum in other parts of this work, under the heads of brandy and gin flavors, that it will not be necessary to occupy much space for that purpose here. We will, however, notice those not mentioned elsewhere, and trust that by so doing, it will be the means of making the manufacturer more familiar with the various substances recommended for imparting the necessary aroma to liquors. We feel that this is a very important subject, and assure our readers that the most frequent cause of failure in the imitation of almost every kind of liquor is the addition of *too much* flavoring. Persons not accustomed to the use of strong aromatics and essential oils, seldom estimate their power, and are thus liable to add too much of them. Our motto is, *Use too little rather than too much flavoring.* It is also necessary for the manfacturer to be a judge of the flavors and learn the various tests given for the detection of adulterated articles. Our recipes all contemplate the use of genuine ingredients, and if a manufacturer employs a substance adul-

terated with one half of something else, it is quite evident that he will not be following our instructions, and as a consequence will be unsuccessful in the object sought for

Birch Oil.

The birch is a native of both America and Europe, when the bark is distilled, it yields an oil having the peculiar odor of Russia leather, in the preparation of which it is employed. The American species of birch called sweet birch, is remarkable for the aromatic flavor of the bark and leaves, and an oil obtained from the bark has been proven to be identical with oil of Wintergreen. Use as directed in the recipes.

Rum Essence.

Rum owes its flavor to a volatile oil or ether and butyric acid ; a fact which the chemist has availed himself of in the manufacture of a butyric compound for the purpose of enabling the dealer to manufacture an imitation rum from plain spirit, this is called rum essence. Rum essence is sometimes used to flavor brandy, it is very frequently adulterated, and the manufacturer should therefore be careful and procure it from a respectable wholesale druggist. Use as directed elsewhere.

Preparation of Rum Ether.

Take of black oxide of manganese, of sulphuric acid, each twelve pounds ; of alcohol, twenty-six pounds ; of strong acetic acid, ten pounds. Mix and distill twelve pints. The ether, as above prepared, is an article of commerce in Austria, being the body to which rum owes its peculiar flavor. The above composition may be employed with success ; it is a valuable recipe, and was given by a German chemist of great ability.

Butyric Acid.

The sour taste of milk is owing to the formation of *lactic acid.* This acid is also generated during the fermentation of the beet, turnip, and other bulbous roots. The casein* in the milk gradually conveys milk-sugar and other kinds into this acid; if a small portion of casein be introduced into a solution of cane or milk-sugar, lactic acid soon forms, but the transforming action of the casein does not here cease: in time, a fermentation commences, and butyric acid is produced. Butyric acid thus produced emits a mingled odor of acetic acid and rancid butter. This acid is the principal constituent of rum, and is therefore much used in making an imitation of that article. (See "*Butyric Ether*," "*Rum Essence*," "*Fruit Essences*," etc.)

Soot.

This well known substance has a peculiar smell and a bitterish, disagreeable taste. Its composition is very complex; it contains cloride of potassium, ammonia, sulphate of lime, acetic acid, nitric acid, and creosote. The insoluble parts of soot form nearly 50 per cent of the substance. Soot has been highly recommended as a flavor for rum, by a celebrated chemist, but we have never used it ourselves.

Apple Oil. (Valerianate of Amylic Ether.)

This is one of the newly discovered "*fruit oils.*" It is formed during the preparation of *valerianic acid* from *potatoe oil*, and is recognized by the offensive odor of rotten apples evolved during the process. By treating

* The curd or coagulable portion of milk. Cheese made from skimmed milk, and well pressed, is nearly pure casein.

the crude product of the distillation with a *solution of pure potassa*, the valerianic acid is removed, and the volatile oil obtained nearly pure. Dissolved in four parts of rectified spirit it forms the "*Apple Essence*" now so much employed as a flavoring ingredient for liquors. Apple oil when combined with Jamaica Rum is sometimes used to give neutral spirit the true flavor of rum. In conjunction with oil of Cognac, it is one of the best flavors to convert pure spirit into an imitation peach brandy, and when united with butyric ether it is a splendid "Old Madeira" flavor. With plain spirit it gives an excellent imitation apple brandy.

Oak Bark.

Black oak bark has a more bitter taste than that of any other species, it contains a coloring principle, capable of being extracted by boiling water, to which it imparts a yellowish brown color. Besides this principle, oak bark has an astringent flavor, and contains much tannin. (See "*Tannin.*") Oak bark is used to color rum, brandy, and whiskey, and to impart the slightly astringent taste so natural to those liquors. The tincture of oak bark in recipe No. 6, is made by infusing 2 ounces of black oak bark in 1½ pint of boiling water for five hours and straining the tincture before using.

Flowers of Benzoin or Benjamin.

The benzoin tree is a native of Siam, Borneo, and Java. The best kind comes from the former place. Benzoin exudes through incisions made in the tree, and when dried it becomes a hard gum. When the gum is heated, white specks rise as a smoke, which is easily condensed upon paper. The material thus separated from the ben-

zoin is called flowers of benzoin or Benjamin in commerce, and by chemists, benzoic acid. Flowers of benzoin give a delightful aroma, and are used to make imitation arrack rum.

Balsam of Tolu.

Balsam of Tolu is procured from the *Toluifera balsamum*, a tree which grows in South America; it exudes from the tree when wounded. It resembles common resin; with the least warmth, however, it runs to a liquid, like molasses, and is entirely dissolved in alcohol. The smell of Balsam Tolu is particularly agreeable and is used to give a flavor to imitate arrack.

The other ingredients used in making rum, such as butyric ether, oil of caraway, acetic ether, and sulphuric acid, are all described in other places in this work, and may be found by consulting the index.

PART VI.

THE ART OF IMITATING AND MANUFACTURING WHISKEY WITHOUT DISTILLATION, WITH A DESCRIPTION OF ALL THE ARTICLES USED FOR THAT PURPOSE.

WHISKEY is an alcoholic liquor distilled from the fermented wort of malt or grain. In Great Britain, whiskey is made from malt or barley; the best quality is obtained from the former. In the United States, whiskey is generally distilled from wheat, rye, or corn. The best whiskey made in this country is conceded to come from Bourbon county, Kentucky, and is distilled from corn. Rye whiskey is much esteemed in the South and Southwest, and when old and pure has a delightful aroma resembling the odor of new mown hay. Pittsburg has long been celebrated for the "Monongahela" whiskey distilled there. "Potteen," or illicit Irish and Scotch whiskey is far-famed as an ingredient for making punch and "whiskey skin."

The singular flavor of the Irish produce is supposed to be caused by using turf for the exsiccation of the malt. In making potteen, that distilled from pure malt is considered superior to that made from a mixture of malt and raw grain. To assign a reason for this would require an analysis of the process of malting; but it may be sufficient to observe, that the effects of the malting process are similar to those the grain undergoes in the course of vegetation, when sown in the ground. Illicit distillers, as if aware of this metamorphosis, almost invariably use malted grain. The constituents or elements of this whiskey are, alcohol, pelargonic ether, acetic ether, fusil oil,

and pyroligneous acid (crude creosote). Whiskey owes its flavor to pelargonic ether, which is nearly identical with œnanthic ether. The smoky taste apparent in the Scotch whiskey is imparted by pyroligneous acid, and is usually imitated by adding a small quantity of creosote dissolved in acetic ether, but a much better method is given in recipe No. 14. Like other liqours, whiskey is easily imitated by *judiciously* flavoring *pure* or *neutral spirit* with various ingredients, which we will describe hereafter. Should it be deemed necessary to filter whiskey, the brandy filter may be used for that purpose.

To make Bourbon Whiskey.

RECIPE No. 1.

Mix together 40 gallons proof spirits, ½ gallon peach flavoring (see *Recipe No.* 2), ¼ gallon hickory nut flavoring (see *Recipe No.* 3), 1 gallon highly flavored brandy (see "*Highly Flavored Domestic Brandy*," page 58), 1 pint wine vinegar, and 1 pint white glycerine. Add to these 12 drops oil of cognac dissolved in 95 per cent. alcohol, and color with caramel.

Peach Flavoring for Whiskey.

RECIPE No. 2.

Steep for 1 month, 10 gallons dried peaches, 10 gallons oak saw-dust, and 5 pounds black tea in 40 gallons proof spirits ; strain and filter. Use 2 gallons of the above flavoring to 1 barrel of proof spirits. It makes an excellent rye whiskey.

Hickory Nut Flavoring for Whiskey.

RECIPE No. 3.

Crush one bushel hickory nuts, and infuse for 1 month in 12 gallons 95 per cent. alcohol ; strain and filter.

To make Bourbon Whiskey.

RECIPE No. 4.

Take 36 gallons proof spirits, 4 gallons highly flavored proof rye whiskey, 1 gallon highly flavored domestic brandy (see page 58), together with the same proportions of vinegar, glycerine, and oil of cognac, as before. (See *Recipe No.* 1.)

To make Bourbon Whiskey.

RECIPE No. 5.

To 36 gallons proof spirits, add 4 gallons highly flavored proof Bourbon, 1 gallon New England rum, ½ gallon sweet Catawba wine (or 1 quart sherry wine), and 1 pound white glycerine. Color to suit with caramel.

To make Bourbon Whiskey.

RECIPE NO. 6.

Take 36 gallons proof spirit, 4 gallons highly flavored proof Bourbon, 1 gallon malt whiskey, 1 pint wine vinegar, 1 pint syrup, and 12 drops oil of cognac dissolved in 95 per cent. alcohol. Mix. Color with caramel.

To Improve Cheap Bourbon.

RECIPE No. 7.

Inferior Bourbon whiskey may be much improved in quality by the addition of the peach flavoring described in *Recipe No.* 2, *page* 117. One or one and a half a gallon of the flavoring should be added to each 40 gallons of whiskey. This will give a fruity taste.

Imitation Copper-Distilled Bourbon Whiskey.

RECIPE No. 8.

Dissolve 1 drachm sulphate of copper in ½ pint water, filter, and add it to 40 gallons proof spirit, with

1 gallon peach flavor (see *Recipe No.* 2), 1 gallon flavoring compound for brandy, (see page 59), 1 pint wine vinegar, 1 pound white glycerine, and 12 drops oil of cognac dissolved in 95 per cent. alcohol. Color with caramel.

To make Rye Whiskey.

RECIPE No. 9.

To 40 gallons proof spirit, add 2 gallons peach flavoring (see *Recipe No.* 2), 1 pint white vinegar, and 12 drops oil of cognac in 95 per cent. alcohol. Color with caramel, and add 1 pound best white glycerine.

To make Sweet Rye Whiskey.

RECIPE No. 10

Mix 30 gallons proof spirit, 10 gallons proof rye whiskey, and 1 gallon raisin flavor (see page 259). Colored with sufficient caramel, add 1 pound white glycerine.

Imitation Irish Whiskey.

RECIPE No. 11.

Mix 36 gallons French spirits, 20 above proof, 4 gallons Scotch (Ramsay) whiskey, 3 pints best sherry wine, 2 pints syrup, and 10 drops sassafras flavor. (See *next Recipe.*)

Sassafras Flavoring for Bourbon.

RECIPE No. 12.

Granulate ½ pound sassafras bark, and infuse it in ½ gallon 95 per cent. alcohol for 20 days ; filter.

Imitation Scotch Whiskey.

RECIPE No. 13.

Mix 30 gallons French spirits, 20 above proof, prepared as directed in next Recipe, 4 gallons Scotch whiskey, and 1 quart syrup.

To Impart a Smoky Flavor to Whiskey

RECIPE No. 14.

The simplest way to impart this peculiar flavor to whiskey, is by preparing the barrel. Insert securely a large sheet-iron funnel into the bung-hole of a dry 40-gallon barrel ; provide a small open furnace, containing a charcoal fire ; put 1 pound of birch bark on the fire, and support the barrel, with its funnel downwards, over the furnace, so that the funnel, which should be considerably wider than the furnace, will receive the smoke from the bark. When the bark ceases smoking, remove the funnel and bung the barrel up tight. After it has stood 24 hours, put the spirit in the barrel, and keep it there for 36 hours, frequently rolling the barrel, in order that the spirits may be thoroughly impregnated with the smoke and smoky deposit on the inside of the barrel. The spirits will then be found to have acquired the desired flavor. Creosote, diluted with alcohol, is sometimes used to impart the smoky flavor to spirits, but it is not so good as the above method.

Electricity as an Agent for improving Whiskey and Wines.

From experiments made on a large scale, it has been found that electricity in any form, either as a regular current or a succession of discharges, renders wine or whiskey mellow and mature. It is supposed that the bitartrate of potassa is decomposed, setting free potash and tartaric acid : the former tending to neutralize the acids of the wine ; and the tartaric acid, reacting upon the fatty matters present, favors the formation of the ethers which constitute the bouquet

of the wine. It is probable, also, that a small quantity of the water is decomposed, setting free oxygen, which forms, with some of the constituents of the wine, new compounds peculiar to old wines. It has been stated that whiskey soon becomes turbid after the application of electricity, and that this is not always remedied by subsequent filtration.

Peach Flavoring for Whiskey, by a New Method.

Take a 55 or 60 gallon cask ; at 4 inches from the bottom place a false bottom, perforated with ¼-inch holes. Cover this false bottom with a thin layer of straw, laid uniformly ; this again cover by a thin, even layer, laid at right angles across the lower layer. Then pack ten gallons dried peaches (40 lb.) regularly, without pressing them ; add 5 pounds black tea, well separated, over the peaches, and cover the whole with a cloth. Next pack 10 gallons oak sawdust evenly, and cover it also with a cloth. Place some piece of lath over the cloth, with some middle-sized stones (12 lbs. in all), to keep the sawdust down. Insert a faucet in the side of the pipe, between the bottom and the false bottom. Now add 20 gallons proof spirit, and draw off, three times every day, 15 gallons of the tincture, and pour it back immediately. As the sawdust acts as a filter, the tincture will be ready for use and bright in 10 or 15 days. This is an on the method on page 117.

To Improve the Flavor of Whiskey.

Whiskey will be much improved in flavor by putting three ounces of pulverized charcoal and four ounces of ground rice into a gallon of spirits, and letting it stand for a week, and stirring it up every day.

Bourbon Whiskey.

Take 40 gallons of proof spirit,
1 quart hickory-nut tincture (see page 117),
1 gallon peach tincture,
½ gallon highly-flavored domestic brandy (see page 58),
1 pound white glycerine.
Color with caramel.

Bourbon Whiskey.

Take 40 gallons of proof spirit,
1 quart hickory-nut tincture (see page 117),
½ gallon prune tincture (see page 258),
½ gallon peach tincture (see page 117),
12 drops oil of cognac dissolved in 95 per cent. alcohol.

Bourbon Whiskey.

Take 40 gallons proof spirit,
4 galls. highly flavored proof Bourbon whiskey,
½ gallon prune tincture (see page 258),
1 pint wine vinegar, and 12 drops oil of cognac dissolved in 95 per cent alcohol.

Bourbon Whiskey.

Take 36 gallons spirit,
4 gallons highly flavored rye whiskey,
1 gallon highly flavored domestic brandy (see page 58),
½ gallon prune tincture (see page 258),
1 pint wine vinegar,
1 pound white glycerine,
Color with caramel.

Bourbon Whiskey.

Take 38 gallons proof spirit,
1 gallon peach tincture (see page 117),
1 gallon domestic brandy,
½ gallon prune tincture (see page 258),
1 pint wine vinegar.
Color with caramel.

A few drops of oil of wintergreen imparts a fine flavor if desired.

Bourbon Whiskey.

Take 40 gallons proof spirit ;
Add 20 drops oil of cognac,
10 drops oil of bitter almonds,
Each dissolved in 95 per cent. alcohol ;
2 drachms Jamaica rum essence,
½ ounce sherry wine essence,
1 lb. white glycerine.
1 pint wine vinegar.
Color with caramel.

Glycerine.

Glycerine was discovered in 1789, by Scheele, by whom it was called the sweet principle of oils. It is produced, not only during the saponification of the fats and oils, by oxide of lead in forming lead plaster, but also during the same process when affected by potassa and soda, in the manufacture of soap ; the alkalies uniting with the oily acids, and setting the glycerine free. Hence soapmakers' waste is an abundant source of glycerine. But, thus originating, it is apt to have more or less odor, which even percolation through animal charcoal does not always remove.

Mr. Richard A. Tilghman, of this city, has discovered a process, which consists in subjecting fatty bodies to the action of water at a high temperature under pressure, whereby their constituents combine with water, so as to form free fatty acids, and solution of glycerine. Thus obtained, it is called white or distilled glycerine, and is produced at once in the purest form. Impure glycerine may be told by the following tests: One volume of glycerine should dissolve completely in one volume of alcohol, acidulated with one per cent. of sulphurice acid, without affording any precipitate of sulphat of lime, even after standing for twelve hours. If a drop be rubbed on the hand, no odor should be perceived. Glycerine is employed to give body and age to liquor; it is also a good beading. Use one pound to a barrel of liquor. (*See page* 58.)

To Purify Glycerine.

Commercial glycerine is purified by diluting it with water, it is then decolored with a little animal charcoal, filtered, and evaporated to the consistence of a thin syrup. It is further evaporated in a vacuum, or over sulphuric acid until it acquires a specific gravity of 1,265.

Some samples of glycerine called pure contain lead; others, chlorine, and are seldom free from water; and the best that can be procured is generally more or less acid. This last impurity is the most important to get rid of, which may be effected by digesting for some days with powdered chalk, and afterwards decanting.

Tests for Pure Glycerine.

Pure glycerine has a neutral re-action; and, on

evaporation in a porcelain dish, leaves only a slight carbonaceous crust, while the impure has a much greater percentage of coaly matter. The pure article does not become brown when treated, drop by drop, with concentrated sulphuric acid, even after several hours ; the impure is discolored even when but slightly adulterated. Nitrate of silver and pure nitric acid turn impure glycerine milky, but do not affect the pure article. Sometimes impure glycerine is blackened by sulphide of ammonium ; oxalate of ammonium has a similar effect ; lime-water produces a milky cloudiness. Pure glycerine is unaltered by these tests, and when rubbed between the fingers has no fatty smell.

PART VII.

GIVING A DESCRIPTION OF PURE WINE AND ITS CONSTITUENTS, WITH A TABLE OF THE ALCOHOLIC STRENGTH OF DIFFERENT KINDS OF WINE ACCORDING TO DR. BENCE JONES; ALSO, THE METHOD OF MANUFACTURING WINE IN EUROPE AND THIS COUNTRY.

What Wine is.

WINE is the fermented juice of the grape, and consists mainly of water and alcohol, its other constituents or components being volatile oil, œnanthic ether, grape sugar, gum, extractive and coloring matters, tannic, carbonic, and malic acids, tartar and tartrate of lime. The volatile oil has never been isolated, but is supposed to be the cause of the delicate flavor and odor of wine, called the *bouquet;* it is generated during fermentation, and is supposed to be a combination of acetic, butyric and other ethers. The vinous odor of wine is due to œnanthic ether, which has a sharp, disagreeable taste, and has so powerful an odor of wine as to be almost intoxicating. It does not exist in the juice of the grape, but is produced during the fermentation, and increases in quantity by keeping, as the odor of old wines is stronger than that of new wines. So powerful is the odor of this substance, however, that few wines contain more than one forty-thousandth part of their bulk of it. Yet it is always present, can always be recognized by its smell, and is one of the general characteristics of all grape wine. Œnanthic ether must not be confounded with the substance which gives rise to the bouquet of wine. The other

ingredients of wine, above enumerated, are sometimes present, and sometimes absent. Thus, sugar is present in sweet wines, tannic acid in rough wines, and carbonic acid in those that effervesce. Coloring matter exists in the husk or skin of the grape, and is produced by the newly-formed alcohol; its natural color is a purple blue, and the red tint is due to the action of acids. Tartaric acid exists in the juice of the grape in combination with potents, forming bitartrate of potash or cream of tartar. When the fermented juice is left at rest, this gradually separates from the liquor, and deposits itself as a *crust* or tartar on the sides of the casks and bottles. Hence, by long keeping, good wines become less acid, and every year added to their age increases their marketable value. The different kinds of wine derive their various qualities from the mode of fermentation, the nature of the grape and the soil and climate in which it may have grown. Grape juice possesses all the necessary essentials for the production of vinous fermentation, and, therefore, to effect this it is unnecessary to add yeast, as is done when alcohol is made from malt or grain. The alcohol in pure wine is that which results from the vinous fermentation, and is intimately united with the other ingredients of the liquid; but with almost all the wines of commerce a portion of brandy is mixed, the state of union of which is probably different from that of the natural alcohol of the wine. The intoxicating ingredient in all wines is the alcohol which they contain; and hence their relative strength depends upon the quantity of this substance entering into their composition. The alcohol, however, naturally in wine, is so blended with its other constituents, as to be in a modified state, which renders it less intoxicating and injurious than the same quantity of

alcohol which has been separated by distillation and dilu ted with water.

Dr. Bence Jones, of England, has determined the quantity of alcohol in different wines, thus:

Alcoholic Strength of Various Wines.

		Per cent.		Per cent.	
Rhine Wine, varied from		9.5	to	13.0	by measure.
Sherry,	"	15.4	"	24.7	"
Madeira,	"	19.0	"	19.7	"
Marsala,	"	19.0	"	21.1	"
Claret,	"	9.1	"	11.1	"
Catawba,	"	9.0	"	9.5	"
Burgundy,	"	10.1	"	13.2	"
Port,	"	20.7	"	23.2	"
Tokay,	"	9.5	"	9.9	"
Moselle,	"	8.7	"	9.4	"
Champagne,	"	14.1	"	14.8	"
Brandy,	"	50.4	"	53.8	"
Rum,	"	72.0	"	77.1	"
Gin,	"	49.4	"	50.0	"
Whiskey,	"	59.3	"	61.2	"
Cider,	"	5.4	"	7.5	"
Bitter Ale,	"	6.6	"	12.3	"
Porter,	"	6.5	"	7.0	"
Stout,	"	6.5	"	7.9	"

The Burgundy and Claret have less alcohol than was found by Mr. Brande forty years ago, in the wines he examined. The Sherry is now stronger; the Port is not so strong; the Marsala is weaker; the Rhine wine is the same strength; the brandy is as strong as formerly; the rum is nearly half as strong again; the porter is stronger, and the stout stronger than formerly.

Young wine is red and bright at first, owing to the presence of phosphoric and other acids. As these acids become subdued, the color is subdued as well, until all that raw brightness, indicative of immaturity, is mellowed and ripened into the rich, tawny hue—that mixture of glowing red and mellow brown, with the golden light striking through, which every one takes as his surest guide in his choice of Port and red wines. Alas for his innocence! Even this may be counterfeited, and the tell-tale color of immature wines be artificially concealed and metamorphosed into the tawniest hue that ever graced the table of an epicure.

The error of preferring wines of great age has, at length, been discovered, and the excellence of the vintage has proved to be of more consequence than the number of years. Provided the vintage has been a good one, no Port wine drinker wishes his to have exceeded its eighth year; so that the lately esteemed epithet, "old," has lost its charm. Old Hock has also given way to young Hock, that is, of a fine season. The same may be said of Claret; and well, indeed, for unless clarets be the growth of some peculiarly good season, they will not keep till old.

As the first-rate growths of wines are confined to a small number of vineyards, and these often of very limited extent, the supply of such wines can never equal the demand. Every one who can afford the luxury, is naturally desirous to stock his cellar with those of the choicest quality; he orders no others; and the manufacturer and wine-dealer are thus induced to send into the market a quantity of second-rate and ordinary kinds, under the names of the fine wines which they are unable to furnish. In this way, great confusion and misunderstanding have arisen in those countries where they are but little known,

with respect to the true characters of many wines of the greatest name.

How Pure Grape Wine is made.

In most of the wine-growing countries three separate gatherings or vintages are made: the *first* of which includes all the finest and ripest bunches, from which the rotten or imperfect berries are carefully removed; a *second* gathering is composed of the next best bunches; whilst the *third* is made up of the refuse of the first two. The gathered bunches are deposited as lightly as possible to avoid bruising, and the damaged portions set aside. In order to effect the gathering without injury, the laborers use a kind of osier basket, which is conveyed on the head, or on the back of a horse.

In some cases the grapes are removed from the bunches and in others these last are pressed whole, as the astringent principle contained in the stems is considered beneficial, and there is no doubt that it aids in keeping the wine. Grapes for white wines are rarely removed from the stalks. The next operation consists in the *pressing*, which is managed variously in different countries. Some of them being still addicted to the use of the most rude methods, as, for instance, the mere weight of the human body, which is the prevailing method in some parts of France. In other parts a wine-press is employed; but for making red wine the treading is essential, in order to disengage the coloring matter from the skins, though there can be no objection to the subsequent use of the press. The only species of wine made from the grape without mechanical pressure other than its own weight is that called *lagrima*, which flows from the grapes as they are suspended in bunches; but this can only be made

from the Muscatel grape. The juice thus obtained, either by treading or pressing, or in the way used for *lagrima*, is called *must*, and is turbid, with a sweet and agreeable taste, and a laxative effect on the human system. When *must* is put into a suitable vessel, at a temperature of 55 to 60 degrees, Fah., a gradual fermentation ensues as a natural consequence of the presence of vegetable albumen in the grape; bubbles of carbonic acid gas are evolved, and rise to the surface, bringing with them much of the refuse or dregs, which accumulate into a thick, spongy, and firm crust, covering the whole liquor. After a certain time the crust breaks into fragments and falls to the bottom, which is a sign that the fermentation has proceeded far enough, and it is, therefore, checked by racking into casks, and bunging them carefully, after removing them into a cool cellar.

By fermentation, much of the saccharine matter is converted into alcohol, and the remainder is pleasant to the palate, with just enough sweetness to be agreeable. It is mainly upon the degree to which fermentation is carried, that the flavor of the wine depends, though the kind of grape and the nature of the soil and climate have also their proportionate effects.

From the development of alcohol, the effect upon the brain—in occasioning excitement, and, in large quantities, drunkenness—is produced, by which all spirituous liquors are distinguished; while there can be no doubt that any quantity of must, or unfermented wine, may be swallowed with perfect impunity, as far as intoxication is concerned. But even after the wine is stored in the casks, a slow fermentation still goes on by which the mucilaginous particles, and the tannin and woody matter, as well as the tartar, are thrown down in the shape of what is called *lees*. In

this slow change the taste of the wine becomes more refined, and the harshness disappears, which was due to the presence in solution or suspension of the above ingredients. But, if the first fermentation has not been fully performed the second is also interfered with, and the wine continues turbid, emits bubbles, and sometimes breaks the containing vessel, as in the case of sparkling wines, in which this is purposely effected, but with great care, to avoid overdoing it.

If, on the other hand, the first fermentation has been carried too far, the wine is liable to run on to the acetous fermentation, which is very slow and insensible, but surely begins as soon as the alcoholic stage is concluded, if not checked by artificial means. Acetic acid, once formed, can not be altered into any other useful product, and the wine-grower is compelled to conceal its presence by converting it into a neutral salt, adding, for that purpose, an alkali or alkaline earth, or, in some cases, lead, which unites with acetic acid to form the acetate of that metal; a salt which has a *sweet* taste, not disagreeable to the palate, and without much effect upon the coloring matter of the wine, while, at the same time, it retards fermentation and putrefaction. Hence, its use has always been adopted by those who either are ignorant of its baneful effects upon the human system or are reckless of the consequences. The alkalies, on the other hand, destroy the red color of wine, changing it to a dark olive, and producing a disagreeable effect upon the flavor, so that they are never adopted, except with the white wines.

Wine-making is one of the simplest operations of nature. You can crush the juice from a bunch of grapes with your hands, put it into a bottle tie a piece of cloth over the top, and it converts itself into wine without

further human assistance. Let us see, now, what has caused this change. Pure grape-juice contains sugar; fermentation simply converts the whole, or a portion, of this sugar into alcohol. When this conversion is completed, the fluid in the bottle is no longer grape-juice, but wine! It is surprising, indeed, to think how many ignorant and credulous people there are who set their faces against, and will not believe, this simple and beautiful miracle! Let us add, also, that, when you apply a gentle heat to the wine so made, the spirituous part evaporates, and, when collected in a proper vessel, is brandy.

Upon the quantity of sugar in the grape-juice depends the *strength* of the wine. Some grapes have but a small quantity of sugar, and, therefore, it is a common custom to add cane sugar, either white or brown, to the must, to make the wine *strong enough to keep;* or, sometimes, which is still worse, brandy or whiskey is added, either before or after fermentation. The great difficulty which the native wine maker perceives is this: "*If I do not add sugar or spirits to my wine, it will not keep!*"

This is true, and now let us see the reason for it. So soon as the must has undergone the vinous fermentation, it passes rapidly to the acetous fermentation—*if exposed to the air*. In other words, if, after you have squeezed your bunch of grapes, and made your bottle of wine, you do not cork it up, you will soon have a bottle of vinegar. But, if you do cork it up, the wine will keep for many years. The same rule holds good with wines in larger quantities. If your casks are not full, your wine will soon turn sour. Therefore, when your wine is racked off, see that every cask is full, and kept full. When a very large quantity is made this is an easy matter, for the main casks can be filled, from time to time, from smaller

ones; but, when the quantity is small, the best way to accomplish it is to supply the wastage by adding clean washed pebbles, or clean gravel, so as to raise the wine to the bung. Be sure and turn the bung on one side, so that the wine will cover it. The only way to keep pure wine sound is to exclude the atmosphere.

Rules for Making Good Grape Wine.

The following rules for the manufacture of wine were communicated by M. D. Babo, the president of an agricultural society, and an extensive proprietor and wine-grower at Weinheim, in the Grand Duchy of Baden :—

1. The grapes should not be gathered until they have arrived at complete maturity, that is to say, when they do not grow sweeter, in a sensible degree. If the weather is good, they may be allowed to hang some time after this for the purpose of giving the watery parts of the fruit time to evaporate. This increases considerably the strength and sweetness of the wine. Black grapes intended for red wine should not be allowed to become too ripe, as, if they do, they injure the color of the wine.

2. The vessels should be clean, and, above all, should not have contained sour wine. Care should also be taken that nothing should be allowed to fall into the must, which might cause acidity during the fermentation.

3. The white grapes should be put in a tub and pressed as quickly as possible, with the stems on. If obliged to wait before pressing the must, it is best to take out, at least, a portion of the stems which it contains, so that it shall not taste of them. The must of weak and mucilaginous wines ought to be allowed to ferment some days with the stems, so that the tannin which they contain will assist in the precipitation of the mucilaginous matter

For good wines, the mash or residuum of the grapes should never be pressed, as the last juice which comes from the press usually contains a great deal of acid, and but little sugar.

4. For the sharp wines of inferior quality, and for sweet and mucilaginous wines, it is indispensable to put the must into open tubs, and to leave it there for several days. There forms during this time a layer or stratum of a dirty brown color, which contains a great part of the mucilage, yeast, and acid rejected by the must, and which should be taken off with care every time it forms, so as to remove all those substances which alter the taste of the wine, cause fermentations, and do a great deal of mischief.

5. Care should be taken not to put the must into casks which are dirty, or which have been fumed with sulphur. There are some wine-growers who think that the fumes of sulphur applied to casks preserve the sweetness of wine, and there are ignorant purchasers who permit themselves to be cheated as to the quality of the wine, by the sugar which the unfinished fermentation has left in it without decomposing it. But the following summer these wines are found to be muddy and ferment often with great force, become sour, and are often completely spoiled. The wine, then, should be placed in casks which have not been fumed, and no obstacle to fermentation should be opposed, nor should it be arrested by the fumes of sulphur. There is no exception to this rule, save for those autumns which are unusually warm, and which cause fears that the fermentation will be too strong. In such case, the vessels may be fumed with sulphur.

6. The fermentation of red wine should be treated differently from that of white. The must of black grapes

may remain twenty-four hours, with the stems mixed with it, so that the tannin contained in them may communicate itself with the must. At the end of that time, the stems and the seeds should be separated by means of a sieve, and the must should be poured into open vessels, which should be lightly covered during the fermentation. The temperature of the must during the fermentation should not be allowed to exceed 15° of Reaumur (65¾° Fahrenheit), in order to prevent the spirit from escaping. Every three or four hours the fermenting mass should be stirred to prevent it from souring.

7. At the end of fifteen or twenty days, when all action has ceased and the skins have yielded their coloring matter to the must, it should be put under the press and strongly squeezed, so that all the coloring matter shall be extracted. The wine is then placed in casks not fumed; and if it is desired to increase the capacity for tanning, some of the seeds, which should be separated by a sieve from the mesh, should be added to it.

8. If the weather is cold, the openings to the cellars should be closed, so that the fermentation may meet with no interruption. Persons should never enter the cellars until they have been tested for carbonic acid by a light. The carbonic acid may be driven from the cellars by opening all the issues, by lighting a fire on the stairway, by throwing hot water into them, and by scattering freshly-slacked lime in them. During the fermentation, the bung-hole should only be closed with vine-leaves, or by a little bag filled with sand—the object being to prevent the air from entering at the same time that the carbonic acid is permitted to escape.

9. Towards Christmas the clarification of the wine is about completed, and the yeast, which has become inso-

.uble during the fermentation, is precipitated. Four weeks after the commencement of the fermentation, the casks, which should not be quite filled up at first, become completely full.

10. The racking or drawing off from the lees, at Christmas, is very important and necessary. There always remains in the wine, after the first fermentation, a certain quantity of soluble leaven, and if this is not scattered, and the wine still contains undecomposed sugar, the liquid will become turbid, it will ferment again, and possibly be spoiled. In the first racking, towards the commencement of the year, care should be taken to expose the wine as much as possible to contact with the air, in which case the oxygen of the atmosphere precipitates the insoluble leaven, and the liquid clarifies completely, so that the second racking may be retarded until the end of April, there being no further fear of fermentation.

11. The following autumn another racking should take place, after which the wine may be considered as completely made. In drawing off, great care should be taken not to mix the portion of the wine at the bottom of the cask, which is still turbid, with the clear part which is above. The turbid part should be placed in a separate vessel, and submitted to a new racking before it is added to the other.

The author of these rules closes by saying: "If our wine-growers will strictly observe these prescriptions, without permitting themselves to be turned aside by local usages, they will obtain beautiful and good wines."

How to make Native Wine.

The following directions for manufacturing wine from our native grapes, with rules for conducting the process

are by John O. Moltier, an experienced wine-maker of Cincinnati, and may therefore oe considered reliable.

In order to make good wine it is necessary to have a good cellar, clean casks, press, etc. First of all, have your grapes well ripened; gather them in dry weather, and pick out carefully all the unripe berries, and all the dried and damaged ones; then mash or grind them with a mill, if you have a proper mill for the purpose. Be careful not to set your mill so close as to mash the seed, for they will give a bad taste to the wine. If you wish to have wine of a rose color, let the grapes remain in a large tub a few hours before pressing. The longer time you leave the grapes before pressing after they are mashed, the more color the wine will have.

For pressing the grapes, any press will answer, provided it is kept clean and sweet.

After you have collected the must in a clean tub from the press, have it transferred into the cask in the cellar. Fill the cask within ten inches of the bung; then place one end of a siphon, made for that purpose, in the bung, and fix it air-tight; the other end must be placed in a bucket containing cold water. The gas then passes off from the cask without the air coming in contact with the wine, which would destroy that fine grape flavor which makes our Catawba so celebrated. When properly made, the must will undergo fermentation. Keep the end of the siphon that is in the water fully four inches deep, so as to exclude the air from the wine. When it has fermented, which will be in fifteen days, fill the cask with the same kind of wine and bung it loosely for one week; then make it tight. Nothing more is needed till it is clear, which, if all is right, will be January or February next. Then, if perfectly clear, rack it off into another

clean cask, and bung it up tightly until wanted. If the wine remains in the cask till fall, about November, it will improve by racking it again. Be sure to have sweet, clean casks. Do not burn too much brimstone in the cask; I have seen much wine injured by excessive use of brimstone, generally by new beginners. For my part, I make little use of it.

You can make different qualities of wine with the same grape by separating the different runs of the same pressing. The first run is the finest, if you want to make use of it the first season; but it will not keep long without losing its fine qualities.

To make good sound wine that will improve by age, the plan is to mix all up together. The very last run will make it rough, but it will have better body and better flavor when two or three years old, and will improve for a number of years. The first run will not be good after two or three years.

I have fully tested the different ways of making and keeping wine these last twenty-five years.

PART VIII.

A New Process by which to make Cheap Wines by Fermentation, as Practiced in France and Germany, and also Adopted by the large Wine Manufacturers in New York, with Diagrams showing how to make the Necessary Apparatus.

In presenting the following pages to the trade, the author has but one object to achieve, and that is the benefit of those who labor in the field in which he has spent the best part of his life. He has only to say that what he knows with regard to the making of approved stimulating beverages, he has set down in plain shape and form, so that all may read and understand. The process by which to make cheap wines, described in the pages which follow, is *his* discovery, and *his* alone. It was discovered during years of occupation as a manufacturer of wines in continental Europe and this country also, and is now given for the benefit and guidance of those who have been paying others large per centages for doing what they may do themselves.

By the process we describe, wines equal to the best of the inferior grades of imported grape vines can be manufactured at very little comparative cost and not much trouble, and they will be found, when tested, to compare more than favorably with what are called *cheap imported* wines. Whether the wines procured from abroad are genuine or not (and we assert that most of them are not), those made by this new process, the author claims, *are* genuine, inasmuch as they comprise and embrace a repre-

sentative of every constituent or component of the purest and best wines made from the grape, and cannot be improved.

The inferior wines that pass through our custom houses, as the trade well know, are not, in nine cases out of ten, what they are represented to be, but are adulterated and "doctored" before they are shipped here. Wines of an inferior are mixed with those of a superior grade, and in many instances the inferior kinds of foreign wine are flavored and substituted for the more expensive ones. Those who ship such beverages know how to drug and "fix" them for the American market and have them pass off as genuine; and those who buy them to sell again pay great percentages to foreigners for pernicious mixtures, when, by a little application of industry, they could produce pure, healthy, and agreeable imitations of the juice of the grape at less cost, and to the benefit of themselves and their customers.

The wines most subject to foreign drugging and adulteration are the various kinds of Rhenish and Clarets. Much of these which are imported are made by processes similar to that disclosed in these pages.

It is very seldom that one bottle of what could be honestly called "*the real article*" ever reaches these shores. The question arises whether it is better to do our own work at first cost, or let others do it for us and pay them a profit of at least two hundred per centum for their unnecessary labor.

By the process of wine-making herein described, nothing but a pure and genuine wine is produced,—nothing, in fact (cheap as it will be), that will not embrace every excellence said to concentrate in the *real* foreign grape wine.

Port, Sherry, Madeira, and other wines, may be made by using the above wine for a basis, and adding flavoring and coloring ingredients as will hereafter be described.

Apparatus for Making Cheap Wines.

No very expensive apparatus is required for making wine by this process. We will give a description of what is necessary. Fig. 1 is a fermenting cask (*a gin pipe*), containing from 135 to 140 gallons; A is a tin pipe or siphon, which is inserted in the bung of the cask, air tight, the other end of which dips in the vessel B, which latter should contain water fully four inches deep so as to exclude the air from the wine; CC are holes ¼ inch in diameter to draw off the wine; they should be stopped with wooden spikes four inches long;* D is a door made for the convenience of washing the pipe and letting out the marc. Fig. 2 is the mixing cask, which should be capable of containing 1,000 gallons; E is a tap to draw off the wine; F is a filter, made of felt, placed around the tap; G is another tap to draw off the lees or residue of the wine; H is a hole stopped with a bung. Fig. 3 is a clarifying cask, with a capacity of about 7 or 800 gallons. Fig. 4 (L) represents a tin gutter or trough resting in an upright wooden stand made to receive and support it. This gutter should be slightly inclined to render it more solid, and sufficiently long to serve for five or six fermenting casks if necessary; it would also be much stronger, and therefore less liable to be broken, if it had a light wooden border around it.

* The wine may also be decanted with a siphon which is a good plan.

FIG. 1.

FERMENTING CASKS.

(135 *to* 140 *Gallons.*)

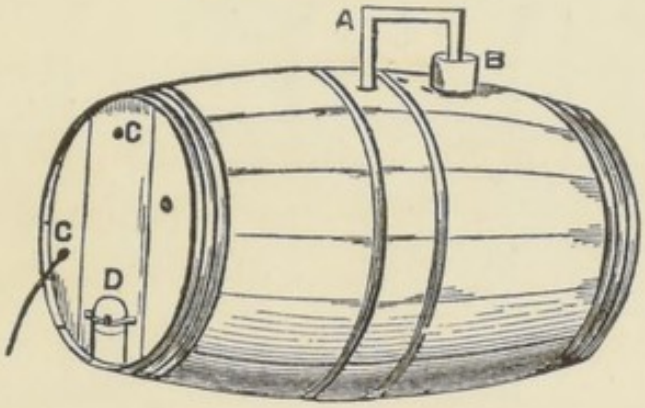


FIG. 2.

MIXING CASKS.

(1,000 *Gallons.*)

FIG. 3.

CLARIFYING CASKS.

(700 *to* 800 *Gallons.*)

FIG. 4.

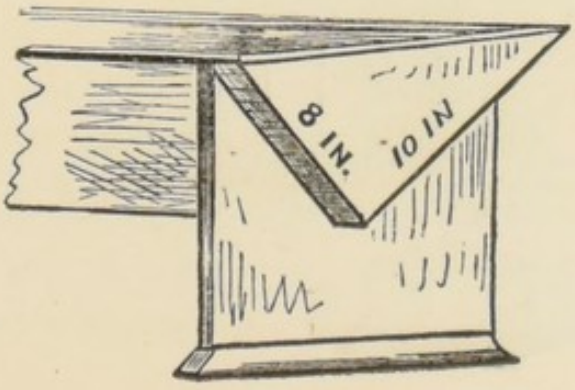


Fig. 5.

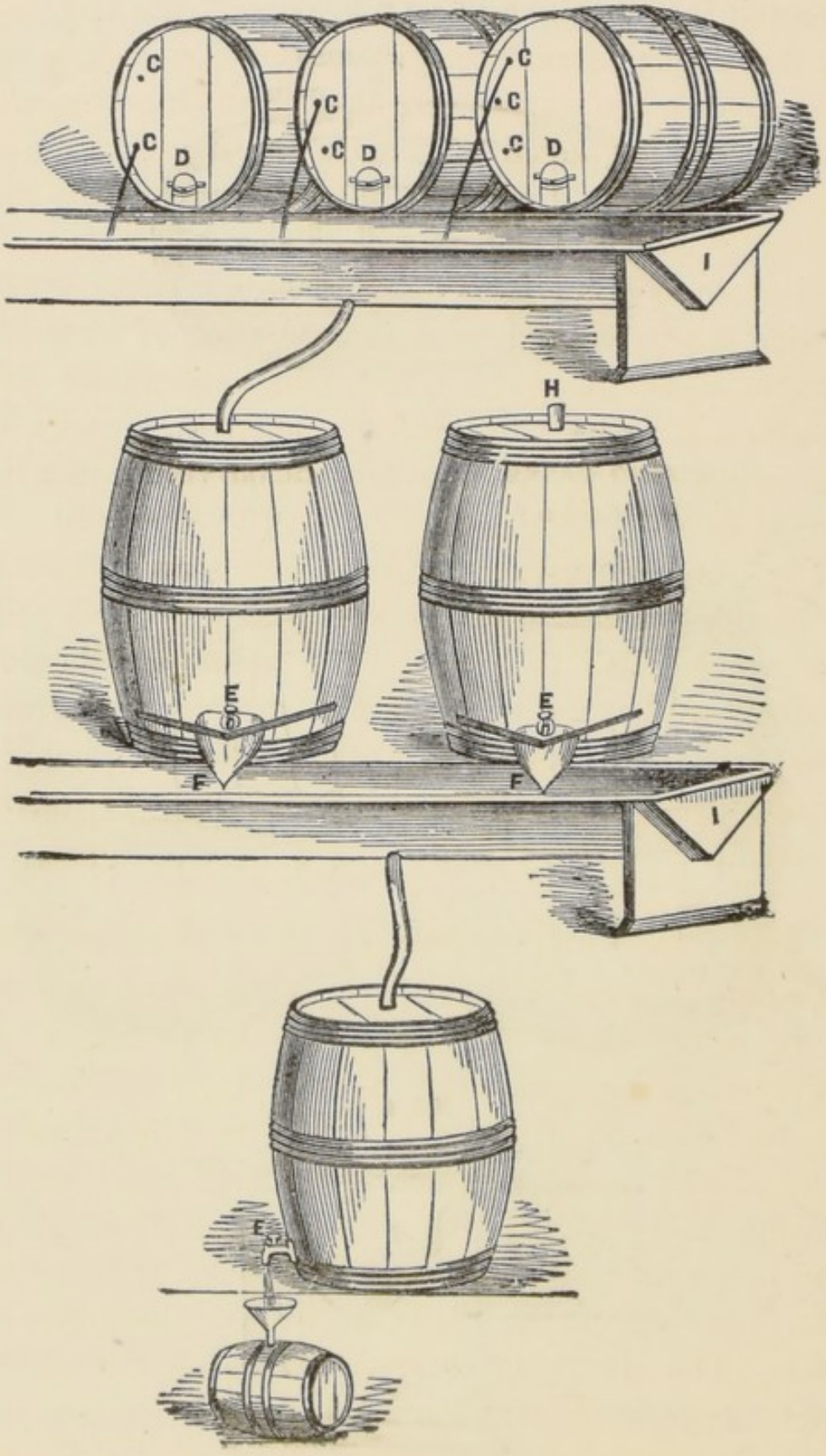


Fig. 5 represents the general disposition of the apparatus when arranged for making wine. It will be observed that the *fermenting casks* are all on the third or top floor. The fermenting room should contain a stove, so as to keep the temperature at the proper degree, and it is also necessary that this room should be so situated as to admit a current of air through it, when required; this is absolutely indispensable, as will be seen hereafter. It is prudent to have three or four fermenting casks or pipes, as wine is very capricious in the operation of fermenting, and, out of ten barrels, no two will act exactly alike; therefore, it is wise to employ a number of casks—for, acccording to the old proverb, "*eggs should not be all carried in one basket.*"

The *mixing casks* should be on the second floor, and the *clarifying cask* on the first or ground floor, as will be seen by referring to Fig. 5. The apparatus should be arranged so that the wine can flow through India-rubber tubes from one floor to the other; this will enable the manufacturer to economize time and labor, which is very important.

How to prepare Shavings for the Clarifying Cask.

Take *beech-wood* without bark. The wood should be cut in pieces 12 or 14 inches long by 1½ inches wide. Shavings cut by hand with a draw knife are best, but they may also be cut with a plane; in which case the plane should be worked nearly level, so as to curl the shavings thoroughly. Before using the shavings boil them in a kettle until they bubble up once or twice, then take them out of the kettle and throw them into cold water. The clarifying cask should be filled with shavings thus prepared, but care should be taken not to press

them down. When the shavings become dirty by use, wash them with boiling water. If the merchant desires to discontinue the manufacture of wine, he should boil the shavings again, and dry them, to prevent them from souring; if this is done carefully the shavings may be used anew when required. In manufacturing wine care should be taken to have the shavings always covered with wine; to accomplish this, have two or three mixing casks for each fining or clarifying cask.

How to make White and Red Wine by the New Process.

Take 60 gals. water,
* 20 lbs. raisins,
1 " linden or tilia flowers, with the leaves,
20 " sugar,
5 " tartaric acid,
1 gill yeast,
4 gals. spirit, 95 per cent.

Crush up and thoroughly disintegrate your raisins in a mortar or between two cylinders, remembering that sweet fruit only ferments when well mashed up, as the ferment it contains is quite separate from the liquor, and must, therefore, be thoroughly bruised to combine the two.

Put the raisins with 10 gals. water into the fermenting cask. Take the tilia flowers and pour over them 1½ gals. boiling water; let it cool and strain it from the tilia flowers, which latter may be thrown away. Melt the tartaric acid in the tilia flower water, and pour the mixture into the fermenting cask. The tilia flowers should be as fresh as possible, and the tartaric acid in small pieces. Complete the 60 gals. of water by mixing the

* To make a superior quality of wine, 40 pounds of raisins may be used,—the more raisins the better the wine.

sugar, which should previously be melted in a large pail. You thus have:

10	gals.	water added with the raisins,
1½	"	tilia flower water and tartaric acid,
50	"	water in which the sugar was dissolved,
2	"	water for waste in manufacture,
63½	"	wine.

For manufacturing wine, distilled or soft water is preferable; but, where it is difficult to obtain this, boiled water may be substituted. The pipes or casks should not be entirely filled, but space for 2 or 3 gals. should be left in each, lest fermentation should make them overflow. When the fire is made in the fermenting room, mix the yeast with a little of the liquor from one of the pipes, and add it to the rest with constant stirring for 10 minutes, then let it stand still. For the first 8 hours bung up the pipes to hasten fermentation; when fermentation is fully established, place the tin siphons in the bungs of the fermenting casks. (See *Description of Apparatus*, and *Fig.* 1, *letter A.*) Be careful that the other ends of the siphons dip in a vessel containing water; by this means you neutralize the electricity of a variable temperature, and, besides this, a good fermenta tion never takes place without air. During the fermen tation maintain the temperature at from 75 to 85 Fah., for 3 or 4 days and nights; at this temperature the contents of the pipes will soon be in violent motion. On the third day, the wine will begin to show its body, and piquancy, the sugar will also become less perceptible, and the vinous quality will easily be noticed by tasting the wine, or applying the nose to the bung-hole. When the fermentation has arrived at this point, extinguish the fire

but allow the fermentation to continue 3 or 4 days without fire; this is preferable, and more natural, because the process is slower. Finally, when the liquid begins to taste of the wine, stop the fermentation as follows: open the doors and windows to establish a draft, but if it is winter, care should be taken not to expose the wine to too sudden a change of temperature. Fermentation should always be stopped in time, for if carried beyond the vinous fermenting stage, acetous fermentation ensues, and you have vinegar instead of wine. When the effervescence has ceased, and the raisins have partly settled to the bottom, rack off the wine into the mixing casks. Be careful, and allow no dirty or foul matter to come off whilst racking the wine. During the process of racking add the alcohol, not all at once, but in two or three portions. The spirit will give the wine a disgusting flavor, but this will nearly all be dispelled by the ferment still remaining in the wine at the time of racking; which will also tend to thoroughly combine the spirit with the wine. Two or three days after racking, draw off 75 gallons from each mixing cask and pour it back again immediately, so as to mix it up thoroughly; this should be done every two or three days. After six or eight days more, when the wine has arrived at a greater degree of perfection, draw it off into your fining or clarifying cask containing the shavings. Be careful and let the wine run clear, for any impurity would retard their clarification. The shavings are used to hasten the fining, and to thoroughly counteract any of the unpleasant taste remaining, caused by mixing in the alcohol. Filtration, fining, or clarification by sudden means, very frequently affects the quality of wine by dissipating the volatile principle or bouquet; by fining with shavings, however, the wine is improved.

We may here remark that any *fermented* liquor will clarify itself in process of time. As soon as the wine has arrived at the desired degree of clearness, put it into casks in order to make of it whatever kind you wish, such as red, white, Port, etc. If the wine is still not so clear as you wish, it will be of no special importance, as it will have to be fined before bottling; besides, wine for storage will deteriorate when fined too much. By referring to Figs. 1 and 5, it will be observed that the fermenting casks rest horizontally on a small platform; this is necessary, as the ebullition of the liquid produced during the process of fermentation should take a rotary or whirling motion, and this is greatly facilitated by placing the casks in the described position. It is always desirable to manufacture large quantities of wine, as the wine will be superior in quality, and considerably less in cost. Wines made by this method are so excellent that they may be readily sold without adding one drop of imported wine: indeed, as we have already stated, much of the Claret and Rhine wines imported from France and Germany *are* made by a similar process, and have no merit beyond being imported.

PART IX.

How to Imitate Madeira, Sherry, Malaga, Muscat, Port and Claret Wines, and Manufacture Cherry-Bounce, etc., with wholesome and perfectly harmless Ingredients, giving numerous Recipes, and a Description of all the articles to be used.

To make Madeira Wine. (By Boiling.)

RECIPE No. 1.

To 30 gals. white wine, or wine made by our process, add:

20 lbs. sugar,
20 " figs, mashed up,
20 oz. linden or tilia flowers, with the leaves,
3 drachms Turkish rhubarb,
10 grains socotrine aloes.

Boil one minute and filter after three or four days.

To make Madeira Wine. (By Infusion.)

RECIPE No. 2.

To 20 lbs. figs, mashed up, add:

50 lb. raisins "
20 oz. linden or tilia flowers, with the leaves,
3 drachms Turkish rhubarb,
10 grains aloes,
3 gals. sugar syrup.

Infuse the above ingredients for 10 days in 30 gallons spirit, 20 o. p., then reduce it to the proper strength, and filter.

To make Muscat Wine. (By Mixing.)

RECIPE No. 3.

To 35 gals. Muscat wine, add:
18 " honey,
20 " spirit, 40 o. p.
100 " distilled water.
Filter.

To make Sweet Wine.

RECIPE No. 4.

To 16 barrels whiskey, add:
34 " water,
2,000 lbs. sugar,
4 " coriander seed, infused in half gallon spirit 95 per cent,
½ gal. sulphuric acid.
The latter ingredient is added to clarify the wine.

To make Sherry Wine. (By Mixing.)

RECIPE No. 5.

To 70 gals. Sherry wine, add:
100 lbs. sugar,
40 gals. spirit, 40 o. p.,
200 " water.
Agitate or stir up the above compound for several days.

Neroly is a good flavor for Sherry wine; one drachm dissolved in one pint spirit, 95 per cent, is sufficient for 300 gallons. An infusion of dried peaches is also a good flavor. Infuse one gallon peaches in two gallons alcohol, 95 per cent, as long as you can get any flavor from the fruit. The essence of Sherry wine is also a very desirable flavor, and may be purchased from any respectable essence dealer.

To make Port Wine.

RECIPE No. 6.

To 13 gals. spirit, 40 o. p., add :
55 " water,
1 " wine vinegar,
30 lbs. sugar,
½ oz. ground cinnamon infused in one quart water
½ " ground cloves " " "
50 Cayenne pepper-seeds,
1 oz. tannin dissolved in half pint alcohol, 95 per cent.

Color with mallow flowers. (See "*Wine Colorings.*") An infusion of torrefied prunes is a very good Port aroma. (See "*Recipe No.* 19," *Brandy.*) Common prunes cut and infused in spirit without being burned or torrefied, is also a good flavor for Port wine.

To make Port Wine.

RECIPE No. 7.

To 60 gals. wine made by our method of fermentation add :
30 lbs. sugar,
3 gals. spirit, 40 o. p.,
½ lb. powdered orris root infused in one gallon boiling water, and strained when cool,
1 quart cinnamon water (see above recipe),
1 " clove " " "
1 oz. tannin powder dissolved as above.

To make Port Wine.

RECIPE No. 8.

To 5 gals. fermented elderberry juice, add :
10 " spirit, 40 o. p.,

40 gals. water,
¼ oz. ground cloves infused in one quart of water,
¼ " ground cinnamon " " "
½ lb. powdered orris root infused as directed iu the the last recipe,
50 Cayenne pepper seeds,
20 lbs. sugar.

Fermented Elderberry Juice used in the above recipe.

RECIPE No. 9.

Press out the juice of the berries and put it in a fermenting cask. To each 40 gallons juice, add 20 lbs. of sugar, then let the juice ferment two or three days at a temperature of from 75 to 85 Fah., and stop the fermentation when the juice attains the degree of sweetness you desire. After fermentation, add : one gallon alcohol, 95 per cent, to each 10 gallons of juice, and let it stand ten days, then rack it off through a flannel filter. As a general thing, you should not let the juice ferment longer than 48 hours, or you may destroy too much of the sugar.

Boiled Elderberry Juice for making Port Wine.

RECIPE No. 10.

Put the elderberries in a copper kettle (tinned over inside) and cover them with water ; let them boil five minutes and afterwards put them in a clean cask. Add 1 gal. alcohol, 95 per cent, to each 10 gals. of the juice ; this is done to preserve it. Elderberries thus prepared will make a first quality Port wine.

To make Cherry Port.

RECIPE No. 11.

To 15 gals. prepared cherry juice, add:

30 " alcohol, 90 per cent,
30 " Catalonia or Marseilles wine,
3 oz. essence of noyau,
½ lb. ground cinnamon infused in ½ gal. water,
¼ " " cloves " 1 quart "
3 " mace infused in alcohol, 95 per cent.

Filter, and add water to make the wine any degree of strength you desire.

To Prepare Cherry Juice by Infusion for making Cherry Port, Bounce, and Brandy.

RECIPE No. 12.

Put the cherries into barrels and cover them with spirit, 95 per cent; let them steep for a month, and stir them well every eight days. Use the juice that runs off first, and repeat this operation two or three times. The last time, you may bruise your cherries and stones, and steep them altogether to make cherry brandy.

To Prepare Cherry Juice by Boiling.

RECIPE No. 13.

Put the cherries in a kettle tinned inside, cover them with water, and boil them at a *gentle* heat for one hour. When cold, put them into barrels and add 1 gal. spirit 95 per cent, to each 10 gals. of the juice.

To make Ginger Wine.

RECIPE No. 14.

To 10 gals. spirit, 95 per cent, add:

5 lbs. ginger root,

5 oz. cloves, 1 lb. allspice, ½ lb. cinnamon, ½ lb. mace.

Grind up all the above ingredients and infuse them in the spirit for 10 days, stir every day and filter. Then put the spirit thus perfumed in a barrel, and add 85 gals. water and 5 gals. elderberry juice (see "*Recipe No. 9*"), and 50 lbs. sugar, which must be dissolved in the water. Stir fifteen minutes, and when clear, filter. Cherry juice may be substituted for the elderberry juice and is perhaps better. (See "*Recipe No. 12.*")

To make Cherry Bounce. (Superfine.)

RECIPE No. 15.

To 15 gals. cherry juice, add:

15 " spirit 80 per cent,
30 " Catalonia or Marseilles wine,
1½ oz. essence of noyau,
3 " mace, infused in 1 quart alcohol 95,
½ lb. cinnamon, ground and infused in ½ gal. water,
¼ " cloves " " " 1 quart "

Put all the above ingredients in a clean barrel and add 60 gallons sugar syrup, 25 degrees strong by Baumé's Saccharometer. (See page 35, "*Hydrometer.*") Stir up the ingredients well, and filter after four or five days. If the color is not deep enough add a little sugar coloring. The above recipe contemplates the manufacture of 120 gallons, but a much smaller quantity may be made by reducing the quantity of each ingredient and observing the same proportion in all.

To make Cherry Bounce. (2d Quality.)

RECIPE No. 16.

To 12 gals. cherry juice, add:

30 " spirit, 80 per cent,

30 gals. Catalonia or Marseilles wine,
3 oz. essence of noyau,
½ lb. cinnamon, ground and infused in ½ gal. water
½ " cloves, ground and infused in ½ gal. water,
1½ oz. mace, infused in 1 pint alcohol, 95 per cent.

Mix all the above ingredients in a clean barrel, and add 60 gallons sugar syrup 13 degrees strong by Baumé's Saccharometer. (See p. 46.) Stir up all the ingredients well together, and filter after four or five days. Make the color a little darker with sugar coloring, and to give a good shade add a little orchil, prepared as described in wine colorings.

To make Guignolet, or French Cherry Bounce.

(1st Quality.)

RECIPE No. 17.

To 20 gals. cherry juice, add :
7½ " spirit 95 per cent,
7½ " Catalonia or Marseilles wine,
¾ oz. powdered orris root, infused in 1½ gals. alcohol, 95 per cent,
½ gal. cinnamon water, made as in recipe 16.
¼ " clove " " " " 15.
1½ oz. mace, infused in alcohol 95 per cent.

Mix all the above ingredients in a clean barrel, and add 68 gallons sugar syrup, 25 degrees strong by Baumé's Saccharometer. Stir up the mixture and let it rest eight days ; then strain.

To make Guignolet, or French Cherry Bounce.

(2d Quality.)

To 12 gals. cherry juice, add 24 gals. spirit, 95 per cent., 24 gals. Catalonia or Marseilles wine, ¾ lb. powdered orris root, infused 48 hours in 1½ gals. 95 per cent.

alcohol, 3 oz. essence noyau, ½ gal. cinnamon water (see "*Recipe No.* 16"), ¼ gal. clove water (see "*Recipe No.* 15"), 1 oz. mace, infused in 1 pint 95 per cent. alcohol. Mix all the above in a clean barrel, and add 60 gals. sugar syrup, 25° Baumé. Stir up 15 minutes, let it rest eight days, and then strain.

Pasteur's Method of Preserving Wines.

M. Pasteur announced some time ago that wines became spoiled in consequence of the presence of microscopic organisms, which could be destroyed by exposing the wine, for a few moments only, to a temperature of 131° Fahr. A committee of experts was appointed to make a comparative examination of wines which had and which had not been subjected to heat; M. Lapparent being President, and M. Dumas and M. Pasteur assisting. They concluded that the preservation of wine in bottles is greatly improved by heating; that the destruction of the germs is perfect, without impairing the taste, color, or limpidity of the wines.

To Determine the Nature of Acidity in Wine.

If wine has undergone the acetous fermentation, then convert it at once into vinegar by one of the usual modes. But if its acidity proceeds from an excess of tartaric acid, this defect may be remedied by shaking the wine with a concentrated solution of neutral tartrate of potassa, which, with the surplus of tartaric acid, will form bitartrate of potassa, and precipitate as such. To discover the nature of the acidity, neutralize an ounce or so of the wine with some carbonate of soda, then add a small quantity of sulphuric acid, and boil up; if acetic acid or vinegar be present, it will be perceptible by its odor.

Parent's Method of Preserving Wine.

This consists in the addition of a small quantity of tannin or tannic acid to the wine, which perhaps acts in a similar way, by destroying the vitality of the spores of the fungus, since a microscopic examination of wine known to contain these germs, within a few weeks after being treated with the tannin, has failed to detect the slightest trace. Indeed, wine which has already begun to change, and become turbid, can be restored to its primitive clearness, and with a great improvement in its taste. Care must be taken, however, to use only tannin which has been prepared from the constituents of the grape, since the slightest proportion of the extract of nut-gall, although accomplishing the general object of destroying the fungus, will impart a peculiar taste, which never disappears.

The Use of Glycerine in Wine.

Glycerine differs from sugar in not fermenting or taking any active part in the process of fermentation. It can, therefore, be made use of after fermentation, to impart any required degree of sweetness to wine, without the risk of further fermentation, as is the case with sugar when used for this purpose ; it is said that it can be added with perfect safety to even a young or new wine, as soon as it has become clear. It is absolutely necessary that the glycerine should be chemically pure. The proportion of glycerine should be from 1 to 3 gallons for 100 gallons of wine, according to the quality of the latter. If the wine is perfectly clear it will be ready for bottling at once. Mix the glycerine first with an equal quantity of the wine, and then add the mixture to the rest.

FLAVORS OR BOUQUETS USED IN MAKING DIFFERENT KINDS OF WINES.

In making good imitations of different kinds of wines, it is very important to have a thorough knowledge of the various flavors or bouquets to be employed ; indeed, without an insight into the secret of imparting flavor to common wines, it is useless to attempt an imitation of the more expensive genuine articles. We shall here attempt a description of each of the various ingredients used in our recipes, and also briefly mention those popularly employed by the "*trade*" all over the world.

Wines are Always Doctored

More or less for every market, or they would, otherwise, be reduced to a few leading varieties, so as to interfere in a great measure with the existing profitable trade. Much of this part of the art of wine-making is effected by mixing various wines together, at the time when they make a second attempt at fermentation, which is called "bearing the fret," and the operation, "fretting in." When wines are mixed, they always have a tendency to ferment again, and the compound is never complete till this is settled and over. Some kinds of grapes are only cultivated for the purpose of making a wine suited to flavor others of insufficient character, and which is kept solely for that purpose. Brandy is very generally used, especially for the American market ; and, besides these aids, several other ingredients are employed for imparting flavor, as bitter almonds, linden or tilia flowers, oil of apples, orris root, orange flowers, aloes, rhubarb, elderberry flowers, sage, acetic ether, beech leaves, ambergris, rose water, etc. In Spain, a very nutty wine, called

Amontillado, is frequently added to Sherries deficient in flavor. A poor Sherry is also much improved by the addition of honey and a little bitter-almond oil. In Portugal, the juice of elderberries is very commonly added to Port wine to increase its color, and extract of rhatany for the double purpose of improving its color and imparting an astringent taste. But the most common adulterant of Port wine, both in Portugal and this country, is "*jerupiga*" or "*geropiga*"—a compound of elder juice, brown sugar, grape juice, and crude Portuguese brandy. Sage is used to flavor Rhenish wine. An infusion of elderberry flowers will impart a Muscat flavor. Beech leaves improve white wine. A grain or two of ambergris, when rubbed down with sugar, and added to a hogshead of Claret, is very perceptible in the wine, and gives it a bouquet, by some considered a great improvement. Apple oil, when combined with butyric ether, imparts a fine "Old Madeira" flavor. Nerol, dried peaches infused in alcohol, and essence of Sherry are all good flavors for Sherry wine. (See "*Recipe No.* 5.") Hop-water, mixed with honey, imparts a genuine Madeira aroma: one pound of hops to one gallon of boiling water mixed in half a gallon of honey. Torrefied prunes are an esteemed Port wine flavor. (See "*Recipe No.* 6.") When caution is used, these flavors may all be employed to advantage. We suppose it scarcely necessary to renew the warnings, given in other parts of this work, to avoid the too common error of using an excess of flavoring ingredients. But a long experience in manufacturing wines and liquors, and a practical knowledge of powerful flavoring materials, has taught us that we can not be too careful in this particular. We, therefore, again admonish our readers to refrain from the excessive

employment of aromatics in attempting to imitate genuine wines. We will now proceed to describe the particular flavors recommended in our formulas.

Linden or Tilia Flowers and Leaves.

The flowers and leaves of the linden or lime tree produce a fine flavor for wine; indeed, if we except orris root, it is about the best. This flavor is very aromatic, and is the principal bouquet employed in making wine by our new process. It should be remembered, however, that the flowers must not be used alone, but always combined with the leaves. This aromatic is equally good for either white or red wine, and should be used in the proportions recommended in our recipes—about 1 pound to each 60 gallons of wine.

Orris Root.

We have already described this aromatic. (See "*Spirit of Orris.*") It has a very pleasant odor, which, for the want of a better comparison, is said to resemble the smell of violets. It is, however, exceedingly derogatory to that modest flower, when such invidious comparisons are made. Nevertheless, the perfume of orris root is good. and well worthy of the place it has obtained as a wine bouquet. The powder of orris root, when infused in pure alcohol, or decocted in boiling water, is extensively employed in the manufacture of *red* wines, and is much esteemed by the Bordeaux manufacturers. The Hungarians use orris very extensively, under the name of *bojtokan* root, as the nature of the soil in Hungary gives no special bouquet to their wines. Use this flavor as directed in the formulas.

Turkish Rhubarb.

Notwithstanding the length of time that rhubarb has been in use, it has not yet been determined from what precise plant the Asiatic drug is derived. All that we certainly know on the subject is, that it is the root of one or more species of rheum. The variety known as Turkish rhubarb is sometimes used as a flavor for Madeira wine, and may be employed as directed in the recipes.

Socotrine Aloes.

The genuine Socotrine aloes is produced in the island of Socotra, but the greater part of what is sold under that name is prepared in the kingdom of Melinda, upon the eastern coast of Africa. Socotrine aloes is in pieces of a yellowish or reddish-brown color. It has a peculiar, not unpleasant odor, and a taste, which, though intensely bitter and disagreeable, is accompanied with an aromatic flavor. This variety of aloes is frequently employed to flavor Madeira wine, and the quantity to be used will be found by referring to the formulas.

The other articles recommended in our recipes for flavoring wines are all described in other portions of this work, and may be found by referring to the index.

COLORING FOR WINES.

THE substances we use and recommend for coloring wine are all perfectly wholesome and innocuous, therefore they may be safely relied upon as entirely harmless; indeed in every department of this work we have scrupulously avoided employing any ingredient which used in the proportion directed could possibly produce any un-

healthy effect. In coloring wine, care should be taken to imitate as closely as possible the natural tint of the genuine article; over-coloring should be avoided. A little alum or tartaric acid increases the brightness of any color. As a general thing we prefer the berry juices for coloring wine, particularly that of the huckleberry. The mallow flower is, however, most generally used, as it is prepared without much trouble, and yields a fine color.

Mallow or Malva Flowers.

The mallow or malva flower is a native of Europe, growing abundantly on waste grounds and by the way-sides. It is also sometimes cultivated in our gardens. This flower, which gives a beautiful color to water, is used for coloring Port and Claret wines, and we consider it one of the best articles that can be employed for that purpose. Weigh two pounds, and steep the red petals in cold water for five or six hours. Tartaric acid mixed with the mallow gives a bright red color, and salt tartar a deep purple red.

Another method of preparing mallow flowers is as follows: infuse one pound of the flowers in one gallon boiling water for half an hour, then draw off the liquid, and repeat the operation a second time until the coloring matter is all extracted. The first plan, with cold water, gives the finest color, but the second way produces the largest quantity of coloring matter. A little huckleberry juice may be added which will also give a fine bouquet to the wine, and when coloring Port wine add a little elderberry juice. Mallow flowers are more easily prepared than any other coloring, and as they give an excellent red tint, are largely employed by manufacturers.

Huckleberry Juice.

This is a fine Port wine coloring, as well as bouquet, and may be prepared from either fresh or dried berries, but the former are the best. The *fresh berries* are fermented and prepared the same as elderberries. (See "*Recipe No.* 9.") When the berries are dry they should be put in a copper kettle, tinned inside, and covered with water; let them soften by a slow and gentle heat, then put them into barrels, and to each ten gallons add one gallon alcohol, 95 per cent, in order to preserve them.

Elderberry Juice.

At the time elderberries are gathered, make arrangements with the country people to supply the berries free from stems. Put them in casks, and cover them with spirit, 95 per cent, in the proportion of 1 gal. spirit to each 10 gals. of the berries. This will preserve the fruit, and you can use them as wanted.

Another method is to take the berries and crush and press all the juice from them, the same as you would grapes; then add spirit in the same proportion as directed above. For two other methods see "*Recipes*" Nos. 9 and 10. Elderberry juice is a splendid ingredient for coloring Port wine.

Mulberry Juice.

Mulberry juice is frequently used to color Port wine Prepare and treat the same as elderberries.

Pokeberries and Dwarf Elderberries

Are sometimes used to color and flavor Port wine, and are prepared the same way as elderberries.

Cherry Juice.

To prepare cherry juice for coloring and flavoring Port wine see "*Recipes*" Nos. 12 and 13.

Orchil, or Archil, and Cudbear.

This peculiar coloring matter is derived from lichenous plants which grow on maritime rocks. Orchil, as as prepared in England, is in the form of a thickish liquid of a deep reddish purple color.

Cudbear is obtained from the same plant, and generally comes in the form of a purplish-red powder. It is procured in the same manner as orchil; but the mixture, after the development of the color, is dried and pulverized. This color is very fine, cheap, and easy to prepare; but it is not very *fast*. It is prepared as follows: put 10 lbs. Orchil or cudbear in a barrel, add 10 gals. of the wine you desire to color, let it steep 4 or 5 days, and then add to each 60 gals. wine, 1 gal. prepared as above. When drawing off the coloring, let it run through a piece of flannel. The above coloring is better for Port than Claret wine, because the former contains a greater per cent of alcohol, and, therefore, preserves it from precipitating, and depositing on the sides of the cask.

Turmeric

Is the root of a plant which is a native of the East Indies and China. The best is said to come from the latter place. Turmeric yields a yellow color, and is used to give the natural tint to white, Sherry, and Madeira wines. The powdered root should be digested in alcohol, 95 per cent, in greater or less proportions according to the depth of color required.

Saffron.

Spanish saffron is generally considered the best variety, but the high price of this coloring matter gives rise to frequent adulterations, and it is necessary to observe great caution in purchasing in order to procure a genuine article. The most certain test of pure saffron is concentrated sulphuric acid. It instantly changes the color of pure saffron to indigo blue. Saffron is prepared the same way as turmeric, and is used for coloring Sherry and Madeira.

Rhatany

Is the root of a plant which grows in Peru. It is without smell, but has a bitter and very astringent taste. The powder is of a reddish color, which is extracted by infusion in alcohol, 95 per cent. Rhatany is used to color and impart an astringent taste to Port wine, and must be used with judgment and caution by parties employing it for that purpose, as too much of it will make the wine too astringent.

Alkanet.

This is the root of a plant which grows in the South of Europe. Its coloring principle may be extracted by infusing it 48 hours in alcohol, 95 per cent, and also by decocting it in boiling water. It yields a fine deep red color by either of these methods. Alkanet is used to color Port wine, and is much prized for that purpose.

Red Saunders.

This tree is a native of India. The wood has little taste or smell. It imparts a red color to alcohol, but not to water. Red Saunders is used for coloring Port wine Infuse 6 lbs. 48 hours in 12 gals. alcohol, 95 per cent.

Brazil, Pernambuco, and Logwood

Are not considered very good for coloring wine, as the color of each is liable to be precipitated by any acidity that may be in the wine. To prepare either of the above woods, take 2 lbs. of the wood and boil it in 1 gal. water; when cool add ½ gal. spirit, 95 per cent. To brighten up the color add a little alum, or tartaric acid.

Caramel or Sugar Coloring.

This coloring is described under the head of brandy coloring, and may be found by referring to the index.

Red Beet Roots.

Do not cut them on any account, and let them soak 10 minutes in cold water, then scour with a soft brush, and rinse in two waters. Tie them in a cloth, and set on the fire in a pan of cold water, and boil them gently until tender, then pour off the water, and set them to get cold in the cloth; you must then peel and, when wanted, slice them. If the least incision were made by knife or fork to try if tender, the color would escape into the water. Purple beet-roots are alone fit for this purpose, the light colored ones are useless.

PART X.

How to Fine and Preserve Wine.

The following recipes for the treatment and fining of wine we feel confident will prove generally useful to the merchant and manufacturer.

If there is one species of knowledge more essential to a wine merchant than another, it is a perfect acquaintance with the most wholesome, safe, and efficient treatment of his wines.

These recipes are not the product of mere theory, or founded on other books on the subject, but are the result of above twenty years' extensive and uninterrupted experience in the management of wines, aided by the instruction of which the author had the advantage in early life from celebrated wine growers in Europe.

To fine Wine difficult to clarify, or thick in consequence of an Imperfect Fermentation.

To clarify 60 gallons. Take 1 oz. of the species of Dock or Rumex plant, called *patience root*, which boil in ¼ gal. water. When cold, filter, and add 1 oz. common salt, then 1 glass of sheep's blood. Beat all the ingredients well together with a broom until the mixture foams up well, then add it gradually to the wine, stirring continually while pouring it in, and for 15 minutes afterwards. In a few days the wine will be clear.

To fine Madeira or any kind of Wine with Isinglass.

To fine 40 gallons wine, steep 1 ounce isinglass in 1 pint of pure cold water over night, and then melt it over a gentle charcoal fire, until a uniform gelatinous mass is formed. When cool mix with it 3 pints of wine, and let it repose 12 hours in a moderately warm room. Then add 1 gallon of wine and mix the whole in a wooden vessel; whisk it with a clean broom until it foams up. Pour this mixture gradually in the wine you desire to fine, being careful to stir the whole continually during the process. Bung up the cask, and in the course of 48 hours the wine will appear perfectly clear and bright. Isinglass prepared in this way will precipitate perfectly, and leave no particles suspended in the wine.

To fine White or Red Wine with Eggs.

White Wine.—To fine 60 gallons white wine, take the *whites* of 5 or 6 *fresh* eggs, 1 egg-shell nearly reduced to powder, and a small handful of common salt. Beat the whole together in a little of the wine, with a small clean broom, until it foams, then pour it into the wine gradually, constantly stirring it all the while.

Red Wine is clarified in the same way. When you have Roussillon, or the dark wines called *vin du midi*, which are usually of a deep color, and wish to make it of a lighter color, add 5 or 6 eggs, yellows, whites, and shells together, with a small handful of salt.

To fine a Pipe of Port Wine.

Take the whites and shells of ten good eggs, and beat them up to a froth in a wooden bucket; add one gallon of Port and whisk it well up to a froth with a clean broom; draw off 4 gallons, and put the finings in it, stir

it up well, leaving out the bung one day; then bung it up, and in ten days it will be fit to bottle. If the weather be warm, mix up one pint of silver sand and add to the finings.

To fine Wine, Cider, Ale, or Porter.

Take of finely shredded isinglass, 1 pound, and macerate it in wine, sour beer, cider, or vinegar, add more of the liquid as the isinglass swells until about a gallon has been used, agitation with a whisk being occasionally had recourse to, for the purpose of promoting the solution. As soon as the whole of the isinglass is dissolved, the mixture is reduced to the consistence of thin syrup, with wine or any liquid that the finings are intended for. The whole is next strained through a cloth or hair sieve, and at once reduced to a proper state of dilution, by the addition of more liquor. A pound of good isinglass will make 10 to 12 gallons of finings. 1 to 1½ pints is the usual dose for a barrel of ale or porter; and a quart for a hogshead of wine or cider.

To remedy Sour Wine.

The souring of wine is produced by various circumstances, sometimes from its having been kept in a warm cellar where it has been exposed to draughts of air, often by the vibration occasioned by the rolling of heavy bodies over the cellar; but most frequently it originates from the wine having been imperfectly fermented. The only safe remedy for the solving of wine is the *cautious* addition of a *little neutral tartrate of potash;* it may also be mixed with a *larger* quantity of rich wine of its kind, at the same time adding a little good brandy. Wine doctored in this way should be fined after having stood 2 or

3 weeks, and then immediately bottled, and consumed as soon as possible, for it will never prove a good keeping wine.

To restore Pricked or Decaying Wine.

If the wine is *only thick*, add 2 pints of milk to every 30 gals. of wine and stir 10 minutes. But if the wine has an inferior taste, or is partly or entirely spoiled, treat it as follows:

Put the 30 gals. wine into a clean cask, then take

2 pints spirit of wine, 95 per cent,
3 oz. common salt,
1 lb. white sugar.

Dissolve the salt and sugar in ½ gal. of the wine, and add the spirit. Then pour the whole *gradually* into the wine, being careful to stir it continually with a stick during the operation. After the mixture is all poured in the wine, stir the whole for 10 minutes longer. Then add 2 pints of milk and continue stirring 10 minutes more. After some days the wine will be completely clarified and restored. "Pricked" wine signifies wine which has been slightly soured.

To remedy Excessive Acidity in German Wine.

You simply add a little chalk. This mode of correcting the sourness of wine is perfectly harmless, whereas the pernicious practice of using white and vitrified lead for this purpose cannot be too much condemned. Lead in any form is a poison.

To restore Sour Wine with Potash.

To 25 gals. wine, add 4 oz. of potash dissolved in a little water, and stir well with a stick for 10 minutes.

How to treat Wines beginning to Decompose

Many persons are unaware of the difference between a wine that is beginning to decompose (called in French the Poux), and that in which the acetous fermentation has commenced.

The Poux appears at the bottom of the barrel while acetification begins at the top.

For the first stage of the Poux the wine becomes thick and has a peculiar taste termed flat.

For the second stage the wine becomes still more troubled, and has the taste of stagnant water.

Finally in the last stage, when the decomposition has reached its maximum, the wine becomes greyish and appears like muddy water.

If some of the wine is put into a champagne glass and a pinch of tartaric acid is added, a red color will be produced which will not be the case if the wine is in the state of acetous fermentation.

THE BEST REMEDY FOR THE POUX IS AS FOLLOWS: As soon as discovered add tartaric acid in the proportion of $1\frac{3}{4}$ ounces to every 20 gals. of the wine and let it rest for a few days, when if the wine has not regained its natural color a little more tartaric acid must be added.

"Sweating In" and "Fretting In" Wine.

The technical terms "sweating in" and "fretting in," are applied to the partial production of a second fermentation, for the purpose of mellowing down the flavor of foreign ingredients (chiefly brandy) added to wine. For this purpose 4 or 5 lbs. of sugar or honey, with a little crude tartar (dissolved), are commonly added per hogshead; and when the wine is wanted in haste, a spoonful

or two of yeast, or a few bruised vine leaves are also mixed in, the cask being placed in a moderately warm situation until the new fermentation is established, when it is removed to the wine-cellar, and, after a few days, *fined down.*

To Remove Mustiness from Wine.

The disagreeable taste in wine, generally known as *mustiness*, is occasioned by the presence of an essential oil. This may be removed by adding a little sweet or almond oil, and then violently stirring the wine for some time. The *fixed* oil attracts and seizes on the essential oil and rises with it to the surface, when it is easily skimmed off, or the liquid under it drawn off. A few slices of burnt or toasted bread, or a little bruised mustard seed, or coarsely powdered charcoal, will often have the same effect.

To Remove the Taste of the Cask from Wine or Beer.

The remedies for this malady are the same as those for mustiness. In the case of a large and valuable vat of beer thus affected, on which we were consulted, we recommended agitation with three 4 lb. loaves of bread, cut into *thin slices*, highly toasted (scorched), and then crumbled in the hands. The effect was most satisfactory, and almost immediate; the beer was sold within a fortnight, and highly approved of.

To Improve Claret Wine.

To 54 gallons Bordeaux wine, add six gallons Catalonia wine. You will then have a first quality wine.

To Mix Water with Catalonia Wine.

Twelve or fifteen gallons of water may be added to 60 gallons of good Catalonia wine, providing you also add one gallon alcohol, 95 per cent. For white wine rain water is the best; for all others use distilled water, and if that is not obtainable, boil the water you use.

To Strengthen Light Wine.

When you have a light wine not strong enough, mix in a little sugar of potatoes. This will soon change into alcohol, and of course make the wine stronger.

To Stop a Fermentation.

Transfer your wine into other casks which have been sulphured, or, in other words impregnated with sulphurous gas, by burning *sulphur tapes* or matches inside them. These consist of a roll of linen or cotton an inch broad and seven inches long, dipped in melted sulphur, to which aromatic seeds are sometimes added. The match is suspended from the bung-hole by a wire, and being lighted, the bung is loosely closed. The air within dilates and escapes through the smallest openings. The action of the sulphurous gas deoxydizes the ferment and therefore arrests fermentation. For a sixty gallon cask one tape is sufficient. The tape should remain in the cask one hour, then remove it and put in the wine. Red wine should never be sulphured as it loses its color by the process. If the tape be extinguished on plunging it into the cask, it is a proof of the cask being unsound, and unfit for receiving the wine; in which case it should be well cleansed, first with lime-water, then with very dilute sulphuric acid, and lastly with boiling water. Fermentation may also be readily checked by the addition

of mustard seed or sulphate of lime. One ounce of brimstone or one pound bruised mustard-seed, and about four to eight ounces of sulphate of lime are sufficient for a hogshead. This substance seldom fails of arresting the fermentation.

How to Decolor Wine.

The color of wine is subject to change: naturally it is precipitated by age and exposure to the light; artificially it is removed by the action of lime-water, skimmed milk, milk of lime, and sometimes fresh-burnt charcoal. Wines that have acquired a brown color from the cask, or red wines that have become "*pricked*," or dark wines of any kind, may easily be turned into white wine by employing either of the above substances. In this way brown Sherry is commonly changed to pale Sherry; for this purpose two or three pints of skimmed milk are generally sufficient to decolor a cask of wine; but when it is found necessary to change the color of red wine two or three quarts or more will be required. Charcoal is not often used as it affect the flavor as well as color of wine. A little milk of lime may sometimes be substituted for milk, especially when the wine to be decolored is very acid, and red wines may be rendered quite colorless by it.

To Remedy Ropiness in Wine.

The peculiar cloudy, stringy, oily appearance in wine, called by the French "*graisse*," and the Americans "*ropiness*," is occasioned by the presence of a glutinous substance, and is generally observed in those *white* wines which do not contain much tannin. M. Francois, a chemist, first discovered the cause of this malady, and pointed out the proper remedy, in the addition of tan-

nin. He recommended the use of one pound of the bruised berries of the mountain ash in a somewhat unripe state, well stirred in *each* barrel of the wine to be improved. After agitation, the wine is to be left to repose a day or two, and then racked off. The tannin in the berries by this time will have separated and precipitated the glutinous matter from the liquid, and removed the ropiness. Wines effected with this malady cannot be fined in the regular way as they do not contain sufficient of the astringent principle to cause the coagulation or precipitation of the finings; this principle must therefore be supplied, and for *pale white wines*, which are the ones chiefly attacked with ropiness, nothing equals a little pure tannin or tannic acid dissolved in proof spirit. Red wines contain so much tannic acid that they are never troubled by ropiness. Wine after having been cured of ropiness should immediately be *fined* and *bottled*.

How to Ripen Wine.

Dealers adopt various ways to hasten the ripening of wine. One of the *safest* and *best* plans for this purpose, especially for strong wines, is to let them remain on the lees fifteen or eighteen months before racking off, or, whether "crude" or "racked," keeping them at a temperature ranging between 50 and 60° Fah., in a cellar free from draughts, and not *too dry*. Dealers sometimes remove the bungs or corks, and substitute bladders fastened air tight. Bottled wine *doctored* in this way and kept at about 70° Fah., ripens very rapidly. Four or five drops of acetic acid added to a bottle of some kinds of new wine, immediately gives it the appearance of being two or three years old.

If newly bottled wine be exposed to the sun, it will

begin shortly to deposit, and improve in flavor ; and even the rawest wine of this kind, by placing the bottle in water, and boiling it, may be made in the course of a day to assume the quality which it would have had after many years' keeping. In the island of Madeira wine is commonly boiled, and the same treatment is applied to Port. In Spain, brown Sherry undergoes the same process.

To Give a Body to Wine.

Gum Arabic is the best substance for giving a body to wine. One pound of this gum dissolved in hot water will improve 60 gals. of wine.

To Clean a Foul, Sour Cask, and Restore the Taste of the Wood.

In order to accomplish this, dissolve about 1½ lbs. of lime in 5 gals. of boiling water. Rinse the cask to be restored with this liquid, and afterwards with boiling water. If the cask is very foul, it should also be rinsed with very dilute sulphuric acid after the lime water, and afterwards with boiling water. As a general thing, however, the lime water and boiling water are sufficient. To restore the natural taste of the wood : mash up in a mortar a handful of juniper berries and put them in the tainted cask, then pour over them several gallons boiling water, roll the cask violently, and set it first on one end, and then upon the other.

To Remove Acidity in Wine by the Use of Lime.

The improvement of wine by the *moderate* use of lime is highly recommended by M. Battilliat, a celebrated French wine-maker. Use from ½ to 1 drachm pulverized lime to each gallon of wine ; this quantity will be sufficient

to abstract the tartaric and acetic acid. A precipitate is formed in the first instance, which carries down a larger or smaller portion of the coloring matter of the wine (if red). The lime, therefore, in the first instance, produces discoloration, but it also combines with the tannic acid, forming tannate of lime, a salt which, though insoluble in excess of lime, remains in solution, if sufficient lime be added to saturate the liquid. Lime, therefore, is always capable of imparting to wine the same property which is given by albumen or isinglass—the wine is rendered less astringent by the precipitation of tannic acid and becomes at once less acid to the taste. From these two causes the use of lime in the preparation of wine has become much more general, since it gives a sweeter, and less astringent taste to the wine, and an appearance of age. Lime, like other alkalies, if employed in excess, turns wine brown.

Tests to Detect Adulterated Wine.

To ascertain whether wine is artificially colored.

Use a solution of potash in alcohol, a solution of liquid ammonia and potash.

If the wine is colored by the coloring matter of the grape.

Potash changes the red color to a bottle green, or brownish green: ammonia changes the color to brownish green or greenish brown. A solution of alum to which some potash has been added gives a dirty grey precipitate.

If the wine is artificially colored.

Potash gives the following precipitates:

Dwarf Elder . . . . . violet,
Mulberry . . . . . "

Beet root	violet,
Pokeweed berries	yellow,
Indian wood	violet red,
Pernambuco	red,
Litmus	violet blue,
Orchil or Cudbear	dirty lees color.

Or pour into the wine to be tested a solution of alum and precipitate the alumina it contains, by adding potash, and the precipitates will have the same characteristic colors as above.

If the wine contains alum or sulphuric acid.

If the wine contains alum which has been added to make the red color deeper, less easily discolored, and give them an astringent taste, they must be tested by the palate. The taste is slightly sweet and astringent, the acidity is more evident.

These wines, discolored, precipitate:

White, with volatile alkali,
" " caustic potash.

These precipitates, which are flocculent, are soluble in excess of potash.

The presence of sulphuric acid can be shown by the addition of any Barytus salt.

If the wine contains lead.

Sulphate of soda gives a white heavy precipitate, when the wine contains lead in solution:

Chromate of potash or iodide of potassium give a yellow precipitate:

Alkaline sulphides and sulphuretted hydrogen give a black precipitate.

If any wine gives these creatives the presence of lead is conclusively proved.

How to Rack Wine.

In racking wine intended to be bottled, the first object is to procure a fresh cask, emptied of as good wine as possible; then we ought to be particular in the cleanliness of the cans or vessels made use of in the operation; the shive should be loosened in order to allow the wine full and efficient vent while it is running off; and before we commence racking, we ought to bore a vent-hole in the bung stave of the empty cask, either before or behind the funnel, so that the confined air in the empty cask may escape as we pour in the wine. By this means we prevent the wine becoming impregnated with the air previously contained in the empty cask, which air we may plainly hear escape from the vent-hole as the cask fills, and we hereby also prevent any bubbling over from the funnel, thus precluding the possibility of the wine imbibing by contact any new element, which is a very essential precaution to be observed in racking operations, especially with delicate wines. Moreover, the wine, after being thus racked, immediately regains its quietude, and as soon as the bottoms are bagged, if you think proper to do so, the bright wine from the bag may be mixed with the finings, and the wine then fined and shived up. It must be borne in mind, that after racking wines from the deposited lee, a moderate fining only is required. In the adoption of this mode we can depend on wines retaining their perfect condition and brilliancy, so as to fit them for immediate bottling if desired, or if left to rest, their amelioration will be promoted by the operation.

Some imagine that wines lose both character and body

from the operation of racking; that is altogether a mistaken notion. Whenever there is a necessity for racking wines, their pleasantness of flavor, delicacy, etc., are invariably much enhanced, provided the operation be properly performed.

Port Wine Filter.

Like the *Cognac* Filter, this is very simple in construction and arrangement. (See "*Fig.* 1.") A is a common

PORT WINE FILTERS.

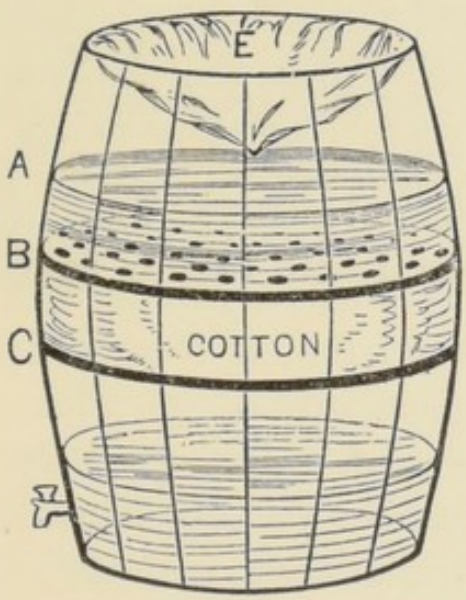


Fig. 1.

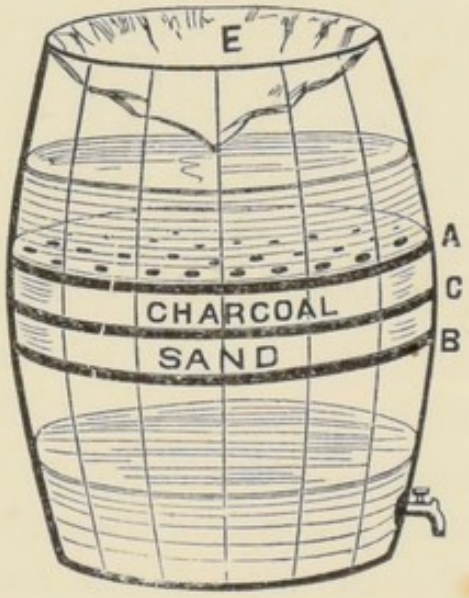


Fig. 2.

cask, or hogshead. B and C are false bottoms, fitting in perfectly tight, but perforated with $\frac{1}{4}$-inch holes; B should be covered with Canton flannel, and C with canvas, and above the canvas with flannel. A space of fourteen inches should be left between the false bottoms B and C, and this space filled in with carded cotton, regularly piled up, so that it will be uniform in thickness all over, but pressed in very tightly all around C. (See "*Cognac Filter.*") E is a bag, made of Can-

ton flannel, to prevent the liquid being filtered from coming with too much force upon the cotton. When 15 or 20 barrels of wine have passed through the cotton, take the depth of two inches from the *top* of it. This should be done, to remove the impure matter lodged in it.

Fig. 2 represents another Port wine filter, and is similar in construction to Fig. 1. It, however, differs a little in arrangement. A and B are double bottoms, fitting in tightly, and perforated with $\frac{1}{4}$-inch holes, with a space of eight inches between each bottom. B should be fitted in and covered with canvas, and, above the canvas, with a layer of cotton batting one inch thick, and then with a bed of cleanly-washed sand, three inches deep. Above the sand, and covering it, place a piece of flannel, C, and, above all, powdered charcoal four inches deep. Then fit in A, and cover it with Canton flannel.

PART XI.

On the Quick Method of Manufacturing Champagne.

French Champagne.

In France, Champagne is made of a light, dry, white wine. In the fermentation, the carbonic gas not being allowed to form sufficiently, or fully develop itself in the cask, it is quickly reproduced in the bottle: the saccharine principle renews its progress toward alcohol; and, if the latter be sufficient to prevent the decay of the wine, the quality is good. This wine does not effervesce in uniform times. Some kinds will do so in a week or two; others will be months before the signs appear. If a wine shows no sign the first year, it is mingled, the next year, with new wine, *known* to possess the effervescing principle. After some time, the manufacturer adds about five per cent of a liquor composed of equal parts of sugar candy and white wine. This insures the formation of the gas. The wine is disgorged (decanted), and, after the disgorgement, or cleansing out of the sediment, the bottle is filled up with fresh wine, or the above mentioned liquor. A little brandy is usually added to wine for exportation. French Champagne does not contain over 60 degrees of gas, and does not average more than 45 degrees.

American Champagne.

The process of making American and imitation French champagne is one requiring great care, especially in producing a not only clear, but bright wine.

Full directions are given below for making the necessary syrup, mixing the ingredients, fining, filtering and gassing ; including a number of receipts for different kinds of champagne. A careful attention to the instructions laid down will produce wines which will compare favorably with the best genuine importations.

To make a Filter for Champagne Wines.

A filter for wines is usually made of felt, shaped like a cone or sugar loaf ; those without any seam are the best. A lining of paper pulp is prepared in the following manner : Tear from 2 to 4 sheets filtering paper into small pieces and put it into a pail ; pour over it a little boiling water, sufficient, by thorough beating, to form a fine smooth paste ; then add sufficient water to fill the filter. Pour this quickly into the filter, and, 5 minutes after the water has drained through, fill up with the wine to be filtered, taking care to keep the filter always full.

To make Syrup for Champagne Wine.

To 25 pounds white sugar, add 2 gallons water and the whites of 4 eggs ; stir until the sugar is dissolved. Let the whole simmer to the candy degree ; then strain it through a bag made of fine flannel.

To prepare Isinglass for Fining Wines.

Cut up some isinglass (it must be of the very best quality), and put it in a jar, with just enough wine or water to cover it ; add daily as much of the wine or water as has been absorbed by the isinglass. In 6 or 8 days it should be completely dissolved, forming a thick fluid mass. Squeeze it through a linen cloth and put it into a bottle, adding 4 or 5 per cent. of 95 per cent. alcohol to make it keep. For 40 gallons

wine to be fined, take 1 wine-glassful of dissolved isinglass, add a little wine and a pinch of salt, and beat to a froth with a whisk, adding by degrees sufficient wine to make the mixture up to ½ gallon. When foaming, pour it slowly into the wine, stirring till all the fining is incorporated with the wine. Isinglass thus prepared and used will precipitate completely ; and, after a few days, the wine will be bright. Too much care cannot be taken in the preparation of fining, as even the finest isinglass contains fibrous matter which dissolves with difficulty ; this is very apt to remain suspended in the wine, and is not visible until developed, after bottling, by the gas with which the wine is afterwards charged.

To Prepare Champagne Wine for Charging.

Put the wine used to make the champagne into a cask, add the brandy spirit, the aroma or flavoring, and the syrup, and stir for 10 minutes. Every day for 4 days draw off 15 or 20 gallons of the mixture and pour it in again ; let it rest 4 days more, then add the fining, stir for 10 minutes, and bung up the cask. In 3 or 4 days, if bright, draw off slowly, so as not to disturb the lees. Filter (see champagne filter, already described), and it is ready for the fountain of the gassing apparatus.

To Charge Champagne with Gas.

Matthews' apparatus is the one usually adopted in the United States for generating the gas and charging champagne wine. The fountains, tubes, and valves are silver-lined, and the machines are adapted for pint and quart bottles. The following is a proper charge for a No. 2 apparatus with 2 fountains : Charge the generator with 9 gallons water, 6 gallons ground mar-

ble, and 3 gallons sulphuric acid ; put 2 gallons water in the gas washer, and 20 gallons wine in each of the fountains. For a warm climate, a pressure of 70 pounds to the square inch is sufficient. When the wine is made in winter for immediate sale, the pressure may be increased to 80 pounds. Genuine champagne has an average pressure of 50 pounds.

Catawba Champagne.

Take 40 gallons Catawba wine ; ½ gallon old cognac brandy ; and 4 gallons syrup made of 30 pounds sugar and 2 gallons water (as directed on page 184). Or, 38 gallons Catawba wine ; 2 gallons Angelica wine, and 4 gallons syrup as above. A very little tincture vanilla added to either of these makes a fine bouquet.

Delaware Champagne.

The wine made from the Delaware grape, is the best that can be employed for making champagne. It may be used as directed in the foregoing recipe for making Catawba champagne.

California Champagne.

40 gallons California wine ; one quart raspberry syrup ; 4 gallons syrup made of 25 pounds sugar and 2 gallons water (as directed on page 184); and 4 gallons water. Or, 20 gallons California wine ; 20 gallons Sauterne or white Bordeaux wine ; ½ gallon old cognac brandy ; with 4 gallons syrup as before. Add to these 10 per cent. of water.

Scuppernong Champagne.

40 gallons Scuppernong wine ; ½ gallon old cognac brandy ; and 3 gallons syrup made of 20 pounds sugar (as directed on page 184) and 2 gallons water.

Imitation French Champagne.

40 gallons white Bordeaux wine ; 1 gallon muscat wine ; ½ gallon old cognac brandy ; and 4 gallons syrup made of 25 pounds sugar and 2 gallons water. (as directed on page 184). In this receipt a little tincture of vanilla, or a small bottle of œnanthic bouquet, may be used instead of the muscat wine. They may be omitted altogether if aroma is not desired.

Cheap Champagne.

13 gallons California wine ; 13 gallons white Bordeaux wine ; 13 gallons water ; 1 gallon 95 per cent. French spirit ; 1 quart raspberry syrup, and 4 gallons syrup made of 25 pounds sugar and 2 gallons water (as directed on page 184). Or, 20 gallons Catawba wine ; 20 gallons water ; 2 gallons Angelica wine ; 2 gallons 95 per cent. French spirit, and 4 gallons syrup as before.

The Bottling Machine and Safety Guard.

MATTHEWS' BOTTLING MACHINES, for filling bottles with champagne and other liquids under pressure, are now made with the patent safety screen, which prevents accidents so frequently caused by the explosion of the bottle, and are unequaled for durability and rapidity of operation.

To Strengthen Champagne for Bottling.

To strengthen the wine, rinse each bottle with a little cognac brandy when bottling. If desired, a bouquet may be added at the same time.

To Clean Champagne Baskets.

When the baskets are dirty, wash them with muriatic acid, and water, by means of a brush.

The Cause of Thick Muddy Champagne.

The Germans, to give strength to their common wine, add a little potato sugar, which is speedily converted into alcohol. When this second fermentation has been carelessly conducted, and the wine afterwards used for making champagne, it is evident that when more sugar is added, a slow fermentation will ensue in the bottled wine, which will become thick or muddy.

PART XII

How to make the Best Cordials.

THE materials employed in the preparation of liquors or cordials, are rain or distilled water, white sugar, and clean, perfectly flavorless spirit. To these may be added the substances from which the flavor and aroma are extracted which distinguish and give character to the particular cordial to be made, and also the articles employed as "*finings*" when artificial clarification is had recourse to. In the preparation or compounding of cordials, one of the first objects which engages the operator's attention is the production of an alcoholic solution of the aromatic principles which are to give them their peculiar aroma and flavor. This is done, either by simple infusion or maceration (see "*Infusion*," etc., page 28), or by maceration and subsequent distillation (see "*Distillation*," page 18), or by flavoring the spirit with essential oils. When essential oils are employed to convey the flavor, they are first dissolved in a little of the strongest rectified spirit of wine, and when added to the spirit, they are mixed up with the whole mass as rapidly and as perfectly as possible by laborious and long continued agitation. The stronger spirit may be reduced to the desired strength by means of *clear* soft water, or the clarified syrup used for sweetening. The sugar employed should be of the finest quality, and is preferably made into syrup before adding it to the aromatized spirit; and this should not be added until the latter has been ren-

dered perfectly fine by filtering or fining. Some spirits, as anise seed, etc., frequently require this treatment, which is best performed by running them through a fine and clean filter, having previously mixed them with a spoonful or two of magnesia. By good management, cordials thus made will be perfectly "clear" and transparent; but should not this be the case, they may be fined with the white of about 12 or 20 eggs to the hogshead, or by adding a little alum, either alone, or followed by a little carbonate of soda or potassa, both dissolved in water. In a week or fortnight the liquor will be clear. For many excellent hints on the manufacture of cordials we refer our readers to the article headed "*Infusion, Maceration and Digestion.*" (See also *Appendix.*)

To Clarify Loaf-Sugar and make Syrup for Cordials.

Take a copper boiler or pan, and put into it your sugar, broken in small pieces. The pan should be sufficiently large to allow the scum to rise a little without boiling over. One pint of water to every two pounds of sugar may be added, this proportion will make a fine syrup, about 32 degrees, Baumé, but the manufacturer often requires weaker syrups when preparing inferior cordials, and the easiest method of ascertaining the proper point of concentration is by the use of that variety of Baumé's hydrometer, called a saccharometer. (This instrument is mentioned under the head of "*The Hydrometer.*") Beat up the whites of two eggs (if you are clarifying about ten pounds of sugar, or mix in this proportion), until it is very frothy, and then mix in with the rest. Now place the boiler on the fire, and have ready some cold water. When the mixture begins to

boil and rise to the top of the pan, throw in a little of the water to prevent the sugar running over.

You must let the sugar rise *three times* before commencing to skim it, each time cooling the mixture by the cold water just spoken of. The *fourth time* the sugar rises, skim it completely, and drop the cold water gently in as occasion may require, continuing to take the scum* off (which is rather white), until no more comes upon the surface. The sugar must now be strained through a fine sieve—one made of cloth, or a flannel bag will do.

In order to make clarified sugar extra white, you must be careful to get the very best loaf-sugar. Break it up, as in the previous case, and add water in about the same proportion, viz., a pint to every two pounds, or two pounds and a half. Beat up well a couple of eggs (supposing ten pounds of sugar are being clarified) and add some *ivory-black*, about a pound; see that the ivory black is thoroughly mixed into the water. The mixture should now be made as hot as possible, but without being allowed to boil. If symptoms of boiling and rising appear, instantly add a drop of cold water. Having thoroughly melted the mixture, strain as before through a fine cloth, or flannel strainer. The syrup need not be heated any more, but it will have to be strained three or four times, until it is extra fine and clear. (See "*How to make Syrups.*")

On Clarifying Brown or Moist Sugar.

Here, again, take care the pan is large enough to allow the syrup to rise without immediately boiling over. Brown sugar does not require so much water as loaf. A quart will be sufficient for five or six pounds of moist

* The scum need not be thrown away; after a quantity is collected, it can be clarified.

sugar. Thoroughly beat up one egg (the yolk had better be omitted, as it will only rise with the scum, and be skimmed off), and, as must be observed in the case of loaf-sugar, mix the egg in with the water before pouring it on the sugar. Now, get about one pound of charcoal (that made out of hedge wood, or small branches, is the best); beat it very fine, and stir it into the sugar. As it boils, skim it, as in the previous case, and add cold water to prevent it running over. Now commence straining it through a pocket-shaped strainer of cloth. First of all it is quite black, but the straining must be proceeded with until the mixture is quite clear. If you pour some of the syrup into a glass, you will soon see if it is perfectly clear and fine, if it is not, you must keep on straining.

RECIPES FOR MANUFACTURING CORDIALS WITHOUT DISTILLATION.

Maraschino. (135 gallons, superfine.)

4 oz. essence of noyau,
1 " " " rose,
½ " " " neroly,
4 drachms of mace, infused in alcohol, 95 per cent,
¼ lb. cinnamon, " " 1 quart of water,
2 oz. cloves, " " 1 pint "
2 lbs. orris root (powdered), infused in 2 gals. alcohol 95°, for 15 days.
Dissolve the essences in 2 gals. alcohol 95°. Mix.
Put into a barrel, 41 gals. alcohol 85°,
Add the aromas, 4 " 95°,
Sugar syrup, 90 " 32°, Baumé's saccharometer

135 gals.

Stir all the ingredients well together for at least half an hour, and let the mixture stand two weeks; then filter and put in the filter two or three sheets of filtering paper. (See "*Filter Bags for Cordials.*")

Maraschino. (40 gallons.)

1¼ oz. essence of maraschino,
1½ drachms essence of rose,
½ " " " noyau,
8 drops " " cinnamon,
5 " " " cloves,
½ lb. orris root (powdered), infused in ½ gal. alcohol 95°, for 15 days.

Dissolve the essences in 1 gal. alcohol, 95 per cent. Mix.
Put in a barrel 12 gals. alcohol, 95 per cent, and add:
Perfumed alcohol, 2 gals, 95 per cent (as described above),
Sugar syrup, 26 gals. 30 degrees, Baumé's saccharometer.
Mix and filter as directed in the last recipe.

Maraschino. (135 gallons.)

3½ oz. essence of noyau,
6 drachms essence of rose.
Dissolve the above in ½ gal. alcohol, 95 per cent, and add:
4 spoonfuls of magnesia,
1 gal. orange flower water,
½ lb. cinnamon (bruised), infused in ½ gal. water,
¼ " cloves " " " ¼ " "
4 drachms mace, infused in alcohol,
2 lbs. orris root (powdered), infused in 2 gals. alcohol, 95 per cent, for 15 days.

Mix,

41 gals. alcohol, 80 per cent,
90 " syrup, 25 degrees, Baumé, and add:
4 " perfumed spirits, as described above.

135 gals.

Stir and filter as already directed.

Curaçao d'Hollande. (20 gallons.)

2 lbs. of Curaçoa orange peel,
½ " Ceylon cinnamon.

Let them soak in water; boil them for 5 minutes with the juice of 32 oranges and 14 gallons of white plain syrup; then add 6 gallons of alcohol, 95 per cent; strain, filter; color dark yellow with sugar coloring. (See *page* 59.) This recipe will make a splendid curaçao.

Curaçao. (40 gallons.)

2 oz. essence of bitter oranges,
2 " " " neroly,
¼ " " " cinnamon,
3 drachms mace, infused in alcohol.

Dissolve the above essences in one gal. alcohol, 95 per cent, then put in a clean barrel.

13 gals. alcohol, 85 per cent,
26 " sugar syrup, 30 degrees, Baumé, and add:
1 " perfumed spirit, as above.

40 gals.

Color with saffron or turmeric. (See "*Coloring for Wines.*")

Champion Anisette. (135 gallons.)

Put into a barrel 30 gals. alcohol, 85 per cent. Add:

4 oz. essence of star anise, which dissolve in 2 gals. alcohol, 95 per cent. Add: 103 gals. sugar syrup, 10 degrees, Baumé.

Stir 15 minutes and let it rest 4 or 5 days, then filter. Add 2 or 3 sheets of filtering paper. (See "*Filtering Bags for Cordials.*")

Anisette. (40 gallons.)

Put in a barrel 13 gals. alcohol, 95 per cent. Dissolve 3½ oz. essence of green anise seed in 1 gal. alcohol, 95 per cent, and add: ½ gal. orange flower water, 8 or 10 drops infusion of mace, and 5 drops essence of cinnamon. Then put in the barrel 26 gals. sugar syrup, 25 degrees, Baumé. Stir and filter as directed in the last recipe.

Anise Seed Cordial. (10 gallons.)

3 drachms of oil of anise seed, dissolved in 2¾ gals. of alcohol, 95 per cent; then add 2½ gals. of fine white syrup, mixed with 4¾ gals. of water. Stir and filter.

Malliorca d'Espagne.

40 gals. alcohol, 55 per cent,
5 oz. essence green anise seed, } Dissolved in alcohol
5 " " star " } 95 per cent,
½ drachm ether (to give the cordial age).
Stir and filter.

Blackberry Brandy.

10 gals. blackberry juice,
25 " alcohol, 65 per cent,
8 " water,
20 lbs. white sugar,
⅛ oz. oil cloves,
⅛ " " cinnamon.

Dissolve the oils separately in ½ pint alcohol, 95 per cent; mix both together, and use one half the quantity; if the cordial is not sufficiently flavored, use the balance.

Blackberry Brandy.

¼ oz. of cinnamon,
¼ " cloves,
¼ " mace,
⅛ " cardamom.

Ground to a coarse powder; add to 16 lbs. of black berries, mashed, and 5 gallons of alcohol, 95 per cent. Macerate for two weeks; press it; then add 10 lbs. of sugar, dissolved in 3⅜ gallons of water. Filter.

Cherry Brandy.

16 lbs. of black cherries, mashed with the stones,
5 gals. alcohol, 95 per cent.

Macerate for two weeks; press it; then add 10 lbs. of sugar, dissolved in 3⅜ gallons of water. Filter. (See *No.* 12, *Wine Recipes*, page 154.)

For Cherry Bounce and Guignolet, see *Wine Recipes*, 15 to 18.

Peach Brandy.

18 lbs. of peaches, mashed with the stones; macerate them for 24 hours with 4¾ gallons of alcohol, 95 per cent, and 4 gallons of water.

Strain, press, and filter; add 5 pints of white plain syrup.

Color dark yellow with burnt sugar coloring.

Imperial Peach Brandy.

4½ oz. of powdered bitter almonds,
3¾ gals. of alcohol, 95 per cent,

5¼ gals. of water.

Mix together, and macerate for 24 hours; then add a strained syrup, made of 3¾ lbs. of sugar, 1 pint of peach jelly, 2¼ oz. preserved ginger, 1 lemon, cut in slices, 1 drachm of grated nutmegs, one drachm of allspice, in powder, and 5 pints of water, boiled for two minutes. Mix the whole, and filter.

Peppermint Brandy.

To 40 gals. spirit, 5 o. p., add:

4 oz. essence of pepperment, dissolved in alcohol, 95 per cent.

Color with ½ lb. powder of turmeric infused in 1 gal. spirit, 95 per cent. Use this infusion in such quantity as to get the proper shade.

Kirschenwasser.

100 gals. alcohol, 5 o. p.,

5 oz. essence of noyau,

2 drachms essence of rose.

Dissolve the latter ingredient in some alcohol, 95 per cent, and add a spoonful of magnesia.

2 lbs orris root (powdered), infused 15 days in 2 gals. alcohol, 95 per cent.

1½ gals. sugar syrup.

Stir, and filter if necessary.

Caraway Cordial.

6 drachms of oil of caraway dissolved in 3 gals. of alcohol, 95 per cent; add a syrup made of 12 lbs. of sugar and 4¾ gals. of water. Filter.

Berlin Caraway Cordial.

Take 8 gals. spirit, 50 per cent,
1 oz. oil of caraway, which you dissolve in spirit, 95 per cent,
5 lbs. sugar,
2 gals. water.

Dissolve your sugar in your water. Mix, stir, and filter. (see "*Doppelt Kummel.*" Appendix.

Ratafia.

This word is derived from the Latin *pax ratafia* (let peace be ratified). The Latins used to drink ratafia on signing their treaties of peace. Ratafia may be made with the juice of any fruit.

Take 3 gals. cherry juice,
4 lbs. sugar, which you dissolve in the juice.
Steep in 2½ gals. brandy 10 days:
2 drachms cinnamon,
24 cloves,
16 oz. peach leaves,
8 " bruised cherry kernals.
Filter; mix both liquors, and filter again.

We will here close our recipes for manufacturing cordials without distilation. Others may be found in the Appendix, pages 261 to 267.

RECIPES FOR MANUFACTURING CORDIALS BY DISTILLATION.

The following recipes are strongly recommended to those of our readers who contemplate the manufacture of cordials by distillation, as being among the best that have ever been published on the subject. Others will also be found in the Appendix.

Absinthe. (Swiss.)

Charge of the Still.

15 lbs. absinthe (large),
19 " " (small),
25 " green anise seed,
25 " long fennel,
25 " star anise (break the stars only),
3½ " coriander seed,
10 " hyssop, in pieces.

Put the ingredients into a cask, and pour upon them 100 gallons alcohol, 95 per cent. Digest for 15 days, and stir daily. Then distill, adding 10 gallons of water during the distillation. In managing the still, the fire should be proportioned to the ponderosity of the oil or flavoring, and the receiver should be changed before the faints come over, as the latter are unfit to be mixed with the cordial. If the distillation is carefully performed, this will produce a very good absinthe. You will easily know when the faints are coming off. *This is shown by the spirit, as it comes from the worm, assuming a reddish color.* The faints may be distilled apart, in a water-bath, which will give as good a spirit as the first.

Coloring.

5 lbs. mint leaves,
2½ " melissa leaves,
3½ " hyssop,
5 " absinthe (small),
5 " bruised liquorice root,
1½ " citron peel.

Put the above in the absinthe, and let it steep for 15 or 20 days, according to the depth of color you desire. Reduce to 70 per cent, Tralle's, and put the liquor into another cask, and let it rest.

Absinthe. (Swiss.)

Charge of the Still.

15 lbs. great absinthe,
12 " small absinthe,
20 " long fennel,
30 " green anise seed,
4½ " coriander seed,
15 " hyssop, in pieces,
2 " calamus,
2 oz. essence of absinthe,
120 gals. alcohol, 95 per cent.

Coloring.

8 lbs. melissa,
2 " hyssop
2 " small absinthe,
3 " liquorice root.

Treat as before. When the absinthe is of too high a color, add a little vinegar before filtering.

Curaçao. (Superfine.)

Charge of the Still.

35 lbs green orange peel, or 50 lbs. yellow,
25 gals. alcohol, 95 per cent,

Add 4 gals. water, making in all 29 gals., at 90 per cent. Digest for 10 days, and stir daily.

OBSERVATIONS.—1. Distill very carefully. 2. When you have drawn off 20 gals., add 10 gals. water, to draw off the faints, which may be distilled again in the next distillation. 3. To make superfine Curaçao, distill over again in a water-bath, adding 5 gals. water. 4. To know when the faints are coming off, take a little in a glass as it flows, and add ¾ water, as if for absinthe. When it no longer turns milky, the faints are coming off; reserve them for the next distillation.

Mixing.

Reduce the Curaçao to 82 per cent, Tralle's, which will give - - - - - - - 26 gals.

Add spirit, 82 per cent,	-	12 "
Coloring (as given below),	-	7 "
Syrup, 31 degrees, Baumé,	-	90 "
Total, - - -	-	135 "

Coloring.

3½ lbs. Brazil wood,
1¾ " Campeachy wood,
1¾ " yellow wood,
7 gals. alcohol, 90 per cent.

Mix the above and heat in a water-bath, putting on the head. When the head begins to get hot, rake out the fire and let the whole cool together in the bath.

Maraschino. (Superfine.)

Charge of the Still, Water-bath.

Take 70 lbs. peach or apricot stones, wash with tepid water, and put them into a barrel, making a square hole, 4 or 5 inches, in the head for that purpose. Cover them with 35 gals. alcohol, 95 per cent, and let them steep for one month. Then put the whole (70 lbs. and 35 gals. spirit) into the water-bath and distill.

Observations.—1. Before distilling, add 4 lbs. of peach flowers. 2. Keep the fire at the same degree of heat, or the Maraschino will have an oily taste. 3. When nearly finished, add 10 gals. water, to draw off the faints, which will do for another distillation.

Mixing.

Reduce the spirit above distilled to 82 per cent, and you will get 45 gals. If you have not that quantity, add spirit of the same strength to make it up. Then add 90 gals. sugar syrup, 32 degrees, Baumé.

Note.—When you have not used peach flowers in the distillation, take 2 lbs. orris root powder, and steep it in 2 gals. alcohol, 95 per cent, for 15 days; *then filter, and add it to the mixing, not to the distillation.*

Anisette. (Boitard. 135 gallons.)

Charge of the Still, Water Bath.

20 lbs. green anise (washed in river water),
3 " star anise (being careful to break the stars only),
1 lb. coriander seed (bruised),
40 gals. alcohol, 95 per cent.

Put the above into the water-bath with four gallons

water, and distill. After distilling 35 gallons, add 10 gallons of water to bring off the faints; which may be distilled again. The first 5 gallons of faints may be added to the distilled spirit, which will give 40 *gallons aromatized alcohol.* Reduce this to 80 per cent by adding, say, 5 gallons distilled water, and then add 90 gallons fine white sugar syrup, 31 degrees, Baumé. This will give 135 gallons fine anisette.

Anisette. (Chauvet. 135 gallons.)

Charge of the Still, Water Bath.

20 lbs. green anise,
1½ " coriander seed,
2 drachms neroly,
7¾ lbs. star anise (break the stars only),
1½ " orris root powder,
40 gals. alcohol, 95 per cent.

Treat precisely as in the last recipe.

Mixing.—Reduce the perfumed alcohol to 82 per cent, by adding 4 gals. water, and further add 1½ gal. *double* orange flower water and 90 gallons white syrup, 31 degrees, Baumé. Stir well and let it rest 5 to 8 days, then filter through blotting paper. This will give 135 gallons superfine *anisette.*

Marasquino di Zara. (20 gallons.)

Charge of the Still, Water Bath.

18 lbs. raspberries,
6 " orange flowers,
12 " sour red cherries (*Morello*).

Mash the whole to a pulp with stones, macerate 24 hours with 7 gallons alcohol, 95 per cent, and 7 gallons

of water. Distill from off the water, 6 gallons flavored alcohol, and add 14 gallons of the whitest plain syrup, about 34 degrees, Baumé.

Malliorca d'Espagne.

Charge of the Still, Water Bath.

40 gals. alcohol, 55 per cent,
18 lbs. green anise seed,
5 gals. river water.

Put into the water-bath only 20 gallons of the alcohol, and 5 gallons river water. *When* 18 *gallons are distilled off, add the remaining* 20 *gallons of alcohol*, and continue the distillation until 18 gallons more are obtained, which mix with the 18 gallons previously obtained, and add one drachm of ether to give it age.

FININGS FOR CORDIALS.

(*See Finings for Wines, page* 169.)

Fining with Isinglass.

Take half an ounce of the best isinglass, and dissolve it over a gentle fire, in a pint of water slightly seasoned with *good* vinegar, or three teaspoonfuls of lemon juice. Beat it from time to time, adding a little of the seasoned water. When you obtain a complete solution, gradually add the foaming liquid to the cordial, stirring all the while. Then stir for 15 minutes after it is all added, and let it rest for three days; by that time the cordial will be bright and clear. The above quantity is sufficient to clarify 25 gallons of cordial.

Fining with Eggs.

Take the white of four eggs, beat them to a stiff froth, add a little alcohol, amd mix it gradually with 20 gallons of cordial, stirring all the while, and it will soon clarify the liquor.

Fining with Potash.

Two ounces of carbonate of potash (salts of tartar), dissolved in a quart of water, is sufficient to settle 20 gallons of cordial; add and stir as directed above.

Fining with Alum.

Six drachms of powdered calcinated alum, dissolved in alcohol, is sufficient to clarify 20 gallons of cordial, add as directed above.

Filter Bags for Cordials.

(*See Filters and Filtration, page* 24.)

The filter bags used for rendering cordials transparent are made of flannel, felt, Canton flannel, and other materials according to the thickness or density of the liquor, and are generally of a conical shape. In order to perform the operation of filtering cordials thoroughly, it is necessary that there should be placed inside of each bag one or two sheets of filtering paper prepared as follows: Rub each sheet of paper until it becomes soft and flimsy like a piece of cloth, then tear it in small pieces and place it in a pail, pour over it a little boiling water, and rub and beat it up until it becomes a soft pulp, afterwards add more water, and continue the same as if you were beating up eggs. When the pulp assumes the appearance of a fine paste, fill up the pail with water and throw the contents into the filter; as soon as the water has run

through, fill up the filter again so as to keep it full. When the liquid runs clear and limpid let it all run through, and commence filtering the cordial, being careful to keep the filter always full. If the liquor does not run clear, add about two ounces of *granulated animal charcoal* (*sifted and fanned from the dust*), to each filter. The charcoal should be washed with a little muriatic acid before being used.

To Color Cordials.

Blue, use indigo dissolved in sulphuric acid:

Green, mix the above solution with infusion of saffron:

Yellow, use infusion of saffron:

Red, rose, or different shades of red, by alcoholic infusion of cochineal.

Cochineal.

Take 1 lb. cochineal,

½ " Roche alum.

Reduce them both to powder in a mortar, and pour on them 16 lbs. of boiling water. The result is a red of greater or less strength according to the amount of cochineal used.

Wild Red Poppy.

This is a very fine color.

Take two pounds of the leaves, bruise them in a mortar; then pour over them one gallon of boiling water, adding one drachm of tartaric acid to facilitate and quicken the extraction of the color.

PUNCH ESSENCES.

Essence of Rum Punch

53⅛ lbs of sugar,
3⅛ gal. of water.

Boiled almost to the candy degree; add 1⅜ gallon of lemon juice (to the boiling sugar); stir till getting clear then put in a clean tub, and when near cool add 5 gallons of good Jamaica rum, and filter.

By observing the above proportions you can make any kind of punch essence, brandy, whiskey, arrack, or kirschwasser.

Prepared Punch.

Half an ounce of the oil of orange peel, half an ounce of the oil of lemon peel, dissolved in a half pint of spirits, 95 per cent, with two drachms of the oil of bitter almonds; two quarts of lemon or lime juice, three gallons of proof rum, one gallon of proof brandy, and two gallons of syrup; mix them all well together in a cask in such a way that it can be drawn from it; when put into the bowl or glass, add boiling water, as much as the quantity requires, a little hot porter, and lastly, some froth from warm beer, to give it a cream on the top. Never forget that this is the finest way for making punch, as it gives it a very rich appearance.

Wine and Rum Punch.

For the above punches see Appendix, pages 254 to 266.

PART XIII.

How to Manufacture Every Variety of Bitters.

Stoughton Bitters

12 lbs. dry orange peel,
3 " Virginia snake root,
1 " American saffron,
16 " gentian root,
1 " red saunders wood.

Grind all the above ingredients to a coarse powder, and macerate for ten days in 20 gallons alcohol, 65 per cent; then filter.

Stoughton Bitters. (Another Recipe.)

2 lbs. ginsing,
2 " gentian root,
1½ " dry orange peel,
½ " Virginia snake root,
1 oz. quassia,
¼ lb. cloves,
3 oz. red saunders wood,
3 gals. alcohol, 95 per cent,
3 " soft water.

Grind all the ingredients to coarse powder, and infuse ten days, and filter.

Brandy Bitters

3 lbs. gentian root,
2 " dry orange peel,

1 lb. cardamom seed, 2 oz. cinnamon,
2 oz. cochineal,
1 gal. brandy,
8 " water.

Grind all the ingredients to coarse powder, and infuse ten days, and filter.

Nonpareil Bitters.

2 oz. Peruvian bark,
½ " sweet orange peel,
½ " bitter " "
25 grains cinnamon,
25 " cloves,
25 " nutmeg,
15 Cayenne seeds,
2 gals. alcohol, 65 per cent.

Grind all the ingredients to coarse powder, and infuse ten days; then filter.

Bokers Bitters.

1½ oz. quassia (rasped),
1½ " calamus,
1½ " catechu (powdered),
1 " cardamom,
2 " dried orange peel.

Macerate the above ten days in ½ gallon strong whiskey, and then filter and add 2 gallons water. Color with mallow or malva flowers. (See page 163.)

Spanish Bitters.

5 oz. of polypody,
6 " calamus root,
8 " orris root,

2½ oz. of coriander seed,
1 " centaurium,
3 " orange peel,
2 " German camomile flower.

All the ingredients should be ground to coarse powder; then macerate with 4¾ gallons of alcohol, 95 per cent; and add 5¼ gallons of water, and 1½ ounce of sugar. Filter and color brown.

Aromatic Bitters.

2¾ lbs. of ground dried small orange apples,
¼ " " " orange peel,
2 oz. " " calamus root,
2 " " " pimpinella root,
1 " " " cut hops.

Macerate for 14 days with ten gallons of spirit at 45 per cent; press out the dregs, and add 2½ pints of brown sugar syrup. Filter. Color dark brown with coloring.

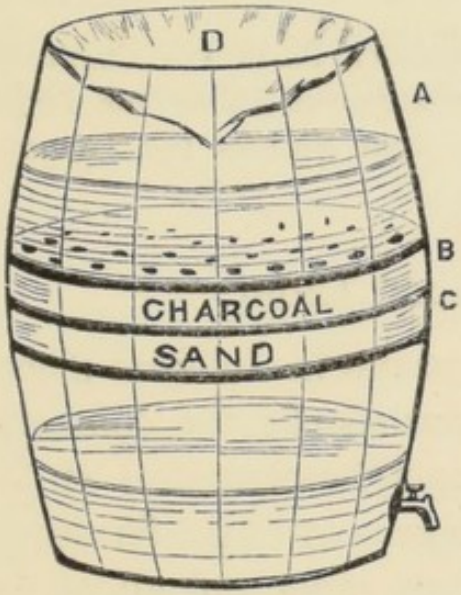
Stomach Bitters.

½ lb. of cardamom seed,
⅛ " nutmegs,
¼ " grains of Paradise,
½ " cinnamon,
¼ " cloves,
¼ " ginger,
¼ " galanga,
¼ " orange peel,
⅛ " lemon "

The ingredients should be ground to coarse powder; then macerate with 4¾ gallons of alcohol, 95 per cent, and add a syrup made of 4½ gallons of water and 12 lbs. of sugar; then filter.

Bitter Filter

The bitter filter is constructed similarly to the Cognac and Port wine filters, and is very simple in its arrangement. *A* is a common cask, *B* and *C* are false bottoms, fitting in perfectly air tight, but perforated with ¼ inch holes. *C* should be covered with canvas, and above that a sheet of cotton wadding; above the wadding is a bed of *perfectly clean* sand, three inches deep. The sand should be covered over with flannel, and above the flannel should be a bed of *granulated* animal charcoal (*sifted* and *fanned from the dust*), four inches in depth. After having done this, fit in the false bottom *B*, and cover it with a piece of cotton cloth. *D* is a bag made of Canton flannel to prevent the liquor being filtered from coming with too much force upon the false bottom. (See "*Cognac*" and "*Port Wine*" *Filters*, pages 78, 181.)



Angostura Bitters. French Cognac Bitters. Amazon Bitters. Bitters made with Essences.

For all the above bitters see recipes in the Appendix pages, 254 to 266.

PART XIV.

ON THE MANUFACTURE AND MANAGEMENT OF PLAIN AND CHAMPAGNE CIDER, GIVING THE LATEST AND MOST APPROVED RULES FOR FINING, PRESERVING AND IMPROVING CIDER, WITH RECIPES FOR IMITATING CIDER AND MAKING CIDER WINE.

How to Make Good Cider.

THE process of making cider varies in different places, but in every case essentially consists of: the collection of the fruit; the expression and fermentation of the juice; and the storing and management of the fermented liquor. Mixed apples make good cider, but all of one kind will make better. The most scrupulous cleanliness must be observed from first to last, as the least impurity injures the flavor. First, the barrels into which the cider is to be placed should be thoroughly washed out, and fumigated with sulphur, as follows: tear some cotton rags into strips, dip the strips into melted sulphur, set them on fire, introduce them through the bung-hole, and fasten the ends there by inserting the bung: this will do it effectually. Every article connected with the process, such as the mill, the funnels, press, tubs, etc., should also be thoroughly cleansed. The apples must be picked over and wiped clean of dirt. If any are part rotten, cut out the decayed part, or throw away the apple altogether. They may then be put in the mill and ground to a fine pulp.

The common way of laying up a cheese of pomace with wet straw has several disadvantages, particularly

the necessary use of water to wet the straw, which is equivalent to an addition of water to the juice: then, too, the straw always retains much of the juice. Small presses, which work without straw, yield a better article of cider. To judge of the quality of cider an apple will make, it is best to try an experiment, grinding a small quantity, letting the pomace stand half a day, stirring it occasionally, and then pressing it. The difference in the color and richness of flavor, and of sweetness, is quite remarkable. Sweet apples, though containing more sugar, are often watery and deficient in flavor, while many sub-acid, or even sour apples, contain as much sugar, and make a much richer cider. The juice, when first pressed, should be syrupy, clear, and the darker colored the better. Apples vary, also, greatly in the quantity of cider they will make; of many kinds, no more than eight bushels will make a barrel of cider, while some of the richer, finer kinds, it will take twelve bushels or more.

It is poor policy to grind and press at once. A bruised apple gains in sweetness, by some chemical change which takes place—and so the pomace should lie several hours to sweeten in this way; and besides, it should be stirred up occasionally to let the air get to it, so as to impart a better color. The dark-red color is very desirable and cannot be gained in any other way, and at the same time there is a positive gain in the sweetness and richness of the cider.

As the juice runs from the press, it is best received directly into barrels, flowing through a straw strainer. The strainer is easily made by putting a tube through the bottom of a pail, which makes a funnel, and then stuffing the pail full of clean, sweet straw. Almost all

the particles of apples, flies, etc., will be strained out and a clear liquid alone will pass through. The barrels, large or small, are filled full, bunged up, and moved to a cool cellar, where the bungs should be removed and the cider left to ferment.

The fermentation goes on quite rapidly, and a considerable portion of scum overflows and is thus removed. When the active fermentation and frothing cease, and the bubbles crackle as they rise in the surface and break, the bung-hole should be closed by a large cork, through which a glass or leaden tube, bent twice at right angles, is thrust, which rises from the bung and dips below water in some convenient, small vessel, through which tube this gas will escape, but air cannot enter. When the fermentation is over, and no more bubbling at the end of this tube occurs, and the cider is clear, draw it off into clean, fumigated barrels, bung up tight, and keep in the coolest place.

ON THE MANAGEMENT OF CIDER.

CIDER should be stored in a cool place, and should not be drank before it becomes sufficiently matured. To improve the flavor of a hogshead of cider, 1½ gals. of good brandy or rum are frequently added, with 2 oz. powdered catechu (dissolved in water), 7 lbs. good moist sugar or honey, ½ oz. each, bitter almonds and cloves, and 4 oz. mustard seed. These must be well stirred in, and occasionally stirred up for a fortnight, after which it must be allowed to repose for three or four months, when it will usually be found as bright as wine. Should this not be the case, it must be fined with a pint of isinglass finings, or a dozen of eggs, and in two weeks

more it will be fit for use. If the cider be preferred pale, omit the catechu, and instead of the isinglass fine with one quart of skimmed milk. If wanted of a light reddish or rose tint, use ½ oz. of cochineal, and omit the catechu. Preparatory to bottling cider, it should be examined to see whether it is clear and sparkling; if not, it should be clarified again, and left for two weeks. The night before it is intended to be put into bottles, the bung should be left out of the cask, and left so until the next day, when it may be bottled, but not corked down until the day after, as, if this be done at once, many of the bottles will burst by keeping. The best corks and champagne bottles should be used, and it is usual to wire and cover the corks with tin foil, after the manner of champagne. A few bottles may be kept in a warm place to ripen, or a small piece of lump sugar may be put into each bottle before corking, if wanted for immediate use, or for consumption during the cooler portion of the year; but for warm weather and for long keeping this is inadmissible. The *bottled stock* should be stored in a cool cellar, where the quality will be greatly improved by age. Cider for bottling should be of good quality, and at least twelve months old.

The above is considered the best way of managing cider; but there is another method esteemed by many, which we also give as follows. It is in use in England:

The cider is placed in a situation where the temperature does not exceed 45°, which retards the fermentation through November and December. It is generally put into a well sulphured cask, with 3 or 4 oz. mustard seed and ¼ lb. cloves added, both well bruised. In this way the fermentation is retarded till March

when it becomes pungent and vinous. Should fermentation at any time appear to be taking place, the cider should be racked, and one gallon of spirits added. This should be repeated as often as fermentation is perceptible.

In nine months it will usually be in condition for bottling or drinking; if it continues thick, use some isinglass finings; and if at any time it ferments and threatens acidity, the cure is to rack it, and leave the head and sediment behind.

To Improve New Cider.

When the cask is deposited where you intend it to remain, start the bung, and put into the liquor 8 ounces of stone brimstone; then stop it up for a week. Tincture a gallon of French brandy highly with cochineal, pour it into the cider, stir well, and in twenty-four hours afterwards add a pound of alum and four pounds of sugar-candy, both beaten fine, and mixed well. Stop it up securely, and in three months bottle it, using the best corks; wire and seal. These quantities are calculated for a hogshead, and will not only greatly improve the the flavor and color of the liquor, but adapt it for keeping a long time.

To Fine Cider.

Cider should be fined with isinglass the same as white wines and malt liquors. (See page 170.)

Concluding Remarks.

Much of the excellence of cider depends upon the temperature at which the fermentation is conducted; a point utterly overlooked by the manufacturers of this liquor.

nstead of the apple juice, as soon as it is expressed from the fruit, being placed in a cool situation, where the temperature should not exceed 50° or 52° Fah., it is frequently left exposed to the full heat of autumn. In this way much of the alcohol formed by the decomposition of the sugar is converted into vinegar, by the absorption of atmospheric oxygen, and thus the liquor acquires that peculiar and unwholesome acidity known as "hardness" or "roughness." When, on the contrary, the fermentation is conducted at a low temperature, nearly the whole of the sugar is converted into alcohol, and this remains in the liquor, instead of undergoing the process of acetification. The acetous fermentation, by which alcohol is converted into vinegar, proceeds most rapidly at a temperature of about 90° Fah., and at lower temperatures, the action becomes gradually slower, until at 46° to 50° Fah., no such change takes place. It is therefore evident, that if the saccharine juice of apples, or any other fruit, is made to undergo the vinous fermentation in a cool situation, less of the spirit resulting from the transformation of the sugar will be converted into acetic acid, and, consequently, more will be retained in an unaltered state in the liquor to improve its quality, and, by its conservative and chemical action, to preserve it from future change. This is the principal cause, other circumstances being alike, of the difference in the quality of the cider made by persons living in the same district. The one has probably a cooler barn and cellar than the other to store his liquor in, and is more careful to keep the pulp and juice cool during the early part of the process.

Champagne Cider.

This is a pale variety of cider, much used for "bottling," which has a great resemblance to inferior champagne. The following is a good form for a made cider of this class :

1 hhd. good pale vinous cider,
3 gals. pale proof spirits,
14 lbs. honey or sugar.

Mix well, and let them remain together for one month in a temperate situation ; then add 3 pints double orange flower water, and in a few days fine it down with ½ gal. skimmed milk. This will give a very fine champagne cider.

Champagne Cider. (Another Recipe.)

10 gallons of cider, old and clear.

Put it in a strong iron-bound cask, pitched inside (like beer-casks) ; add 2½ pints clarified white plain syrup, then dissolve in it 5 oz. tartaric acid ; keep the bung ready in hand, then add 7½ ounces of bicarbonate of potassa ; bung it as quickly and as well as possible.

How to Imitate Cider.

A very fair imitation cider may be produced by using the following recipe :

25 gallons soft water,
2 lbs. tartaric acid,
25 " New Orleans sugar,
1 pint yeast.

Put all the ingredients into a clean cask and stir them up well after standing 24 hours with the bung out. Then bung the cask up tight, add 3 gallons spirits, and let it stand 48 hours, after which time it will be ready for use.

Cider Wine.

When cider has fermented for about one week in a cask, add half a pound of white sugar to every gallon; then allow it to ferment further until it has acquired a brisk and pleasant taste. An ounce of the sulphite of lime is then added for every gallon of cider in the cask, and the whole agitated for a few minutes and then left to settle. The sulphite of lime arrests the fermentation, and in the course of a few days the clear cider may be poured off and bottled, when it will retain the same taste that it had when the sulphite was added. About an ounce of the sulphite of lime added to the gallon of cider in any stage of fermentation will preserve it from further change. A sparkling cider wine is produced by the mode described. The following is another method of making cider wine: Take pure cider as it runs from the press, and add a pound of brown sugar to every quart, and put it into a clean cask, which should not be filled to within about two gallons of the top. The cask is then placed in a moderately cool cellar or apartment, and the cider allowed to ferment slowly by the bunghole being left open until it has acquired the proper taste, and sparkles when a small quantity is drawn. The cask is then bunged up tight.

PART XV.

How to Manufacture Vinegar by the Quick Method, in the Short Space of Twenty-four Hours; with a Diagram and Description, Showing how to Make a Vinegar Generator.

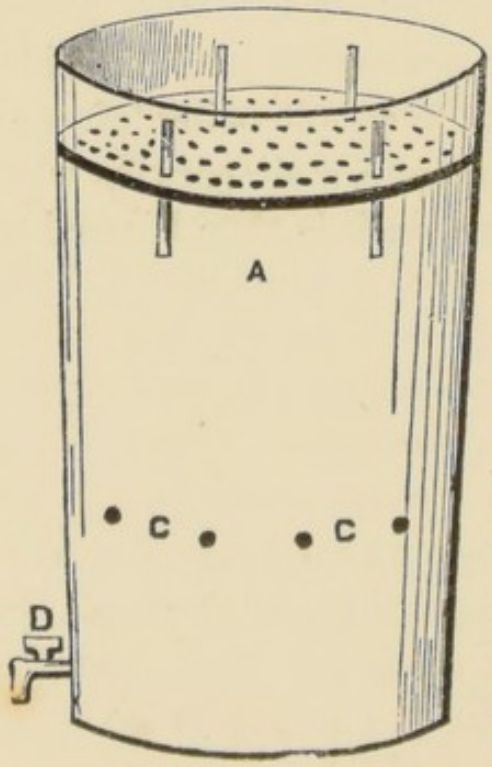
Vinegar.

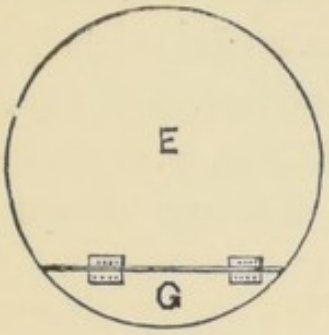
Many methods have been invented to produce vinegar; but that known as the "*German, or Quick Method,*" has superseded all others, and is now in general use in the United States. By this process (which is very simple) time and labor are both greatly abridged, and a very fine article is produced.

How to Make a Vinegar Generator

The construction of a vinegar generator is very simple. A is a tub, eight feet in height, three feet in diameter at the bottom, and three and a half feet in diameter at the top, with a cover, E, of which one part, G, is movable, in order to permit the liquid to be poured in when necessary. B is a shelf or false bottom perforated with a number of holes ⅛ of an inch in diameter. When this false bottom is placed in the generator it should be packed carefully on the sides with cotton batting, so as to prevent the liquid from escaping at any place except through the holes.

VINEGAR GENERATOR.





The shelf or false bottom also has four ¼-inch holes, in which are inserted four open glass or reed tubes as air vents, each having its ends projecting above and below the shelf, one end projecting at least 1½ inches above the top E, and the other end penetrating the contents of the generator. C C is a horizontal row of four holes at one-third the height of the generator, equi-distant and ½ an inch in diameter, bored in a vertical or slanting direction from the outside downward inside. It is essential to the success of the process that a current of air should pass through the tub. In order to establish this circulation, the above holes are made, and the air enters by them, and passes out through the tubes in the false bottom above. D is a stop-cock, or faucet six inches from the bottom of the generator, the discharging capacity of which must be controlled by the size of the generator Never draw off the vinegar below this faucet.

How to Pack a Vinegar Generator.

Having made the generator, the next part of the process of making vinegar consists in packing or charging it; this is done in the following manner: Fill the tub half full with corn cobs cut in pieces of from 1½ to 2 inches long, and let the cobs remain in the tub just as they are thrown there, *without further arrangement.* Then fill up the balance of the generator with *beech* shavings, and arrange the shavings so that those which touch the false bottom are more strongly pressed than the rest, as the degree of pressure should increase as you pack from the bottom to the top of the generator. The generator being

filled, the false bottom must be fitted in and rest level upon the shavings, and great care must be taken not to have the tubes stopped up, or the cobs packed too solid in the vicinity of the slanting holes. The generator may also be entirely packed with beech shavings or entirely with cobs.

Mode of Acetifying the Shavings.

The next step in the process of manufacturing vinegar consists in acetifying the shavings and cobs; and this is accomplished in the following manner: Preserve a temperature of between 75° and 85° Fah., and pour over the shavings and cobs every hour, 2 gallons of vinegar and ¼ gallon of common whiskey,* until there is 10 gallons in the generator above the faucet, but *not more*. Then draw off from the generator every hour two gallons, and add it again at the top: continue this until the fermentation commences; this usually begins at the top of the generator in the course of 4 or 5 days. The contact of the air with the minutely divided liquid promotes the acetification, which consists essentially in the oxidation of the alcohol. As the oxygen is absorbed, the temperature of the liquor rises to 100° or 105° Fah., and when the thermometer indicates that temperature when placed at the opening of the cover, the generator is ready, and in proper condition for the manufacturer. Pay special attention to the fermentation, for that is the principal point to be observed. It is scarcely necessary to say that the vinegar used for acetifying the shavings should be pure, or at all events free from the mineral acids.

Mode of Fabricating.

Keep your vinegar room at a temperature of from 75°

* This liquid should first be heated, to hasten fermentation.

to 85 Fah., and maintain the temperature of the generators at 95° to 100° Fah. Then make up a mixture or wash composed of the following ingredients:

3	gallons	common whiskey,
4	"	manufactured vinegar,
33	"	pure water.
40	gallons,	or a barrel.

The water if not clear must be filtered through charcoal. Draw off every hour four gallons of vinegar from each generator, and add four gallons of the above wash with an additional quart for waste in manufacturing, and pour the vinegar into another generator as soon as it is drawn. Vinegar is thus made by being passed only *once or twice* through the shavings according to the quality and degree of strength you wish to produce. Keep a large tank to hold the vinegar when made, and put ½ gallon of molasses into it every day until you get a bed two or three inches thick. The molasses will improve the vinegar and give it a fine color. This is the quickest process which has yet been obtained, and the vinegar made in this way finds ready sale.

CONCLUDING REMARKS.

THE success of the whole process of making vinegar by the German or quick method, depends almost entirely upon the free circulation of air throughout the generator. It sometimes happens that the vinegar when it comes from the generator is not perfectly clear and transparent; to remedy this, some manufacturers have two false bottoms to each generator, and have a bed of white sand, fifteen inches deep, upon the lower one. The sand will have to be packed in before the chips are, as fol

lows: first cover the false bottom with flannel to prevent the sand from coming through the holes, then put in a layer of sand five inches deep, cover this with two thicknesses of flannel, and then another layer of sand; repeat this again, and then pack in the chips as already directed. This will produce an article of a fine color, and will pass for a fine wine-vinegar if colored. Persons who are skeptical about this way of making vinegar may test it at a trifling expense on a small scale by experimenting with a keg arranged on the same principle as the generators. Those who desire to go into the business extensively, can have a series of generators, one arranged above the other on the same plan that the barrels are arranged for making wine by our process (see page 144). The generators may be connected from floor to floor by gutta percha tubes, and thus vinegar may be made by passing once through three generators, instead of two or three times through one generator.

Vinegar is very commonly adulterated with sulphuric acid; indeed, it has been proven by analysis that nearly all the vinegar offered for sale at public auction is nothing more than diluted solutions of sulphuric acid, with a small portion of pure vinegar made by the generators, just sufficient to give it a natural odor. Pure vinegar can be manufactured by the use of the generators so very cheap that adulteration seems useless.

The value of vinegar is in proportion of the amount of acetic acid it contains. Many methods of estimating this are in use. The use of vinegar testers, areometers, etc., has been proposed, but the results have never been obtained sufficiently exact, unless performed by persons accustomed to such chemical manipulation.

PART XVI.

ON THE MANUFACTURE OF SYRUPS AND FRUIT ESSENCES, INCLUDING A VALUABLE RECIPE FOR MAKING RASPBERRY SYRUP WITHOUT RASPBERRIES, AND TWENTY RECIPES FOR SODA-WATER SYRUP.

IN the preparation of syrups care should be taken to employ the best refined sugar, and either distilled water or filtered rain water; by which they will be rendered much less liable to spontaneous decomposition, and will be perfectly transparent, without the trouble of clarification. When inferior sugar is employed, clarification is always necessary. This is best done by dissolving the sugar in the water or fruit juices cold, and then beating up a little of the cold syrup with some white of egg, and an ounce or two of cold water, until the mixture froths well; this must be added to the syrup in the boiler, and the whole "whisked up" to a good froth; heat should now be applied, and the scum which forms removed from time to time with a clean "skimmer." As soon as the syrup begins to slightly simmer it must be removed from the fire, and allowed to stand until it has cooled a little, when it should be again skimmed, if necessary, and then passed through a clean flannel. When vegetable infusions or solutions enter into the composition of syrups, they should be rendered perfectly transparent, by filtration or clarification, before being added to the sugar.

The proper quantity of sugar for syrups will, in general, be found to be two pounds (avoirdupois) to every pint of water, or thin aqueous fluid. These proportions

allowing for the water that is lost by evaporation during the process, are those best calculated to produce a syrup of the proper consistence, and possessing good "keeping qualities." They closely correspond to those recommended by *Guibourt* for the production of a perfect syrup, "which," he says, "consists of 30 parts of sugar to 16 parts of water.

In the preparation of syrups it is of great importance to employ as little heat as possible, as a solution of sugar, even when kept at the temperature of boiling water, undergoes slow decomposition.

The plan which we adopt, is, to pour the water (cold) over the sugar, and to allow the two to lie together for a few hours, in a covered vessel, occasionally stirring, and then to apply a gentle heat (preferably that of steam or a water-bath) to finish the solution.

Some persons (falsely) deem a syrup ill prepared unless it has been allowed to boil well; but if this method be adopted, the ebullition should be only of the gentlest kind (*simmering*), and should be checked after the lapse of one or two minutes.

When it is necessary to thicken a syrup by boiling, a few fragments of glass should be introduced, in order to lower the boiling point.

To make highly transparent syrups the sugar should be in a single lump, and by preference taken from the bottom or broad end of the loaf; as, when taken from the smaller end, or if it be powdered or bruised, the syrup will be more or less cloudy.

Syrups are judged, by the manufacturer, to be sufficiently boiled, when some taken up in a spoon pours out like oil; or, a drop cooled on the thumb nail gives a proper "*thread*" when touched. When a thin skim ap-

pears on blowing upon the syrup, it is judged, by the party, to be completely saturated.

These rude tests often lead to errors, which might be easily prevented by employing the proper proportions, or determining the specific gravity.

A fluid ounce of saturated syrup weighs 577½ grs ; a gallon weighs 13⅓ lbs. (avoirdupois) ; its sp. gr. is 1.319 to 1.321, or 35° of Baumé's Saccharometer, its boiling point is 221° Fah., and its density at the temperature of 212° is 1.260 to 1.261, or 30° Baume. The syrups prepared with the juices of fruits mark about 2° or 3° more on Baumé's scale than the other syrups.

In most works direction is given to completely saturate the water with sugar. Our own experience, which is extensive, leads us to disapprove of such a practice ; since we find, that, under all ordinary circumstances, a syrup with a very slight excess of water keeps better than one fully saturated. In the latter case, a portion of sugar generally crystallizes out on standing, and thus by abstracting sugar from the remainder of the syrup, so weakens it, that it rapidly *ferments* and *spoils*. This change proceeds at a rapidity proportionate to the temperature. Saturated syrup kept in a vessel that is frequently uncorked or exposed to the air soon loses sufficient water, by evaporation from its surface, to cause the formation of minute crystals of sugar, which, falling to the bottom of the vessel, continue to increase in size, at the expense of the sugar in the solution. We have seen a single six-gallon stone bottle, in which syrup has been kept for some time, the inside of which, when broken, has been found entirely cased with sugar candy, amounting in weight to 16 or 18 lbs. On the other hand, syrups containing *too much water* also rapidly ferment, and become

sour; but of the two this is the less evil, and may be more easily prevented. The proportions of sugar and water given above will form an excellent syrup, provided care be taken that an undue quantity be not lost by evaporation.

The decimal part of the number denoting the specific gravity of a syrup, multiplied by 26, gives the number of pounds of sugar it contains per gallon, very nearly.

In boiling syrups, if they appear likely to boil over, a little oil, or rubbing the edge of the pan with soap, will prevent it.

Syrups may be discolored by agitation with, or filtration through, animal chorcoal.

The preservation of syrups, as well as of all saccharine solutions, is best promoted by keeping them in a moderately cool, but not a very *cold* place. "Let syrups be kept in vessels well closed, and in a situation where the temperature never rises above 55° Fah." They are better kept in *small*, rather than in *large* bottles, as the longer a bottle lasts, the more frequently it will be opened, and, consequently, the more it will be exposed to the air. By bottling syrups whilst boiling hot, and immediately corking down, and tying the bottles over with bladder, perferctly air-tight, they may be preserved, even at a summer heat, for years, without fermenting or losing their transparency.

The "candying," or crystallization of syrup, unless it be over saturated with sugar, may be prevented by the addition of a little acetic or citric acid (2 or 3 drachms per gallon).

The fermentation of syrups may be effectually prevented by the addition of a little sulphite of potassa or of lime. A celebrated French chemist recommends the

addition of some (about 3 to 4 per cent) sugar of milk with the same intention. Fermenting syrups may be immediately restored by exposing the vessel containing them to the temperature of boiling water. The addition of a little spirit is also good.

Plain Syrup.

Put into a very clean copper 100 lbs. of loaf sugar, and 3 gals. of water; take the white of 12 good eggs, whisk them up to a froth in a pan, and put them into the copper before the fire is lighted: stir them well in the sugar, make a good fire, and let the mixture be still. As it comes towards boiling, the scum will rise; be particular not to let it bubble or boil, but simmer; as soon as the scum is seen to break through the edge of the copper, damp the fire, and take off the first scum; then stir it up and let it simmer; keep skimming it until it becomes clear and bright, and the scum as white as milk; then draw your fire, and take it out of the copper, and it will be fit for use. The quantity thus made will be ten gallons. This syrup is used to dulcify or soften new brandy and other liquors, and is also employed in making cordials, cherry bounce, and wines. (See page 185, "*Champagne.*")

Gum Syrup.

20 lbs. of best clear white gum arabic dissolved in 4 gals. of water, nearly boiling hot; take 60 lbs. of sugar melt and clarify it with 1 gallon of water, add the gum solution, and boil for two minutes.

Lemon Syrup.

5 gals. lemon juice,
1 oz. best oil of lemons.

Dissolved in half a pint of alcohol, or the *rinds* of 16 lemons rubbed with sugar to extract the essential oil dissolve 80 lbs. of sugar in the juice, and boil for two minutes; skim, then strain.

Orgeat Syrup.

10 lbs. of sweet almonds,
4 lbs. of bitter almonds.

Cover them with boiling-hot water; let them stand till near cold, and peel them by pressing through your fingers; beat them in a *stone* or *brass* mortar to a very fine paste with some sugar, adding water slowly; press through a linen cloth, so as to get 5 gals. of liquid, resembling rich milk; dissolve in this liquid 80 lbs. of sugar; boil up once, and add one pint of orange-flower water; then strain.

Arrack Punch Syrup.

53⅛ lbs. of sugar,
3⅛ gals. of water.

Boil up well, then add 1⅜ gals. of lemon juice (to the boiling sugar), and stir till the liquid is clear; pour it in a clean tub, and, when nearly cool, add 5 gals. of Batavia arrack, then filter.

How to make Raspberry Syrup without Raspberries.

Recipe for making 16 *gallons.*

First make a syrup with 36 lbs. of white sugar and

10 gallons of water (see page 229,) and put it in a clean mixing barrel. Then dissolve ¼ lb. tartaric acid in 1 quart of *cold* water, and add it to the syrup. Next take ½ lb. powdered orris root, and pour over it ½ gal. *boiling* water; let it infuse until cold, then filter and put it in the mixing barrel, being careful to stir it well. The syrup is now made, but to give it a raspberry tint, it should be colored with the following mixture: Take 1 lb. mallow or malva flowers (see page 163), and macerate them in 1 gal. *cold* water for six hours. Then mash in a mortar, ¼ lb. cochineal and ¼ lb. alum, and pour over these two ingredients ½ gal. *boiling* water, and when cold, filter. Then mix *both colors together*, and add them to the syrup, and stir well for fifteen minutes.

This is a very valuable recipe, for by following the above directions, the manufacturer will get sixteen gallons of good raspberry syrup, at a very trifling cost per gallon. If it is desirable to produce a richer syrup, add more sugar.

A good color may also be given to the syrup by the addition of a sufficient quantity of either aniline-red, or cherry juice.

TWENTY RECIPES FOR MAKING SODA-WATER SYRUPS.

Simple Syrup.

To eight pounds of finest white sugar, add two quarts of water and the whites of two eggs; stir until all the sugar is dissolved; simmer for two or three minutes; skim well, and strain through a fine flannel bag.

Lemon Syrup.

Add to Simple Syrup, when cold, twenty drops of fresh oil of lemon and half an ounce of citric acid (previously dissolved in three ounces of water) to each gallon. Mix by shaking well in a bottle, then add four ounces of a gum solution, made by dissolving two ounces of fine white gum arabic in two ounces of warm water.

Sarsaparilla Syrup.

To Simple Syrup add ten drops of oil of anise, twenty drops oil of wintergreen, twenty drops of oil of sassafras, and six ounces of caramel, or coloring, to the gallon.

Before the oils are added to the syrup, they should be cut by grinding them in a mortar, with as much sugar as they will moisten; or mix with a small quantity of alcohol.

Ginger Syrup.

Bruised Jamaica ginger, two ounces; boiling water, one pint; macerate for four hours; add fine white sugar, two pounds, and strain through a fine flannel bag.

Ginger syrup may also be made by adding two ounces of the extract of ginger to one gallon of Simple Syrup.

Gum Syrup.

Dissolve pale and picked gum arabic in an equal weight of water, by a gentle heat, and add the solution to twice its weight of Simple Syrup; simmer for two or three minutes; remove the scum; strain and cool. The addition of one or two ounces of orange flower water to each pint, renders it very agreeable.

Vanilla Syrup.

To Simple Syrup add half an ounce of extract of vanilla to the gallon.

Wild Cherry Syrup.

Steep four ounces of wild cherry bark, well bruised, in one pint of cold water, for thirty-six hours; press out the infusion; let it stand till clear; decant, and add one pound and a half of fine white sugar; mix and strain.

Strawberry Syrup.

Take fresh strawberries and inclose them in a coarse bag; press out the juice, and to each quart add one pint of water and six pounds of white sugar; dissolve by raising it to the boiling point, and strain; bottle and cork hot, and keep in a cool place.

To Make Strawberry Syrup Without the Fruit.

Add to one gallon Simple Syrup two tea-spoonfuls of essence of strawberry, and a quarter of an ounce of tartaric acid. Color with coloring made as follows:—Boil one ounce of cochineal with half a tea-spoonful of cream of tartar. Strain.

Raspberry Syrup.

Make as above, either with the fruit or the essence The flavor of this syrup is improved by using one pint of currants to five of raspberries.

Blackberry Syrup.

Make as directed for strawberry, and add to each quart one ounce of the best French brandy.

Pine Apple Syrup.

Take of the fruit a convenient number, pare them, and mash them in a marble or porcelain mortar, with a small quantity of sugar; express the juice, and for each quart take one and a half pints of water and six pounds of fine sugar; boil the sugar and water, then add the juice; remove from the fire, and skim and strain. Or make it with the essence, as directed for strawberry.

Orange Syrup.

Take of fresh and ripe oranges a convenient number; grate off the outside yellow peel; cut the oranges and express the juice; and to each quart add one pint of water and six pounds of sugar, previously well mixed with the grated peel. Dissolve by gentle heat, then strain.

Pear Syrup.

Make as directed for pine apple syrup, or use the essence of pear, by adding to each gallon of Simple Syrup two tea-spoonfuls of essence of pear and a quarter of an ounce of tartaric acid.

Apple Syrup.

Make as directed for pine apple syrup, or with the appropriate fruit essence and acid, as above.

Banana Syrup.

Make as directed for pine apple syrup, or with the appropriate fruit essence, as before directed.

Orgeat Syrup.

Take three ounces of sweet almonds and half an ounce of bitter almonds, gum arabic, in powder, half an ounce;

sugar, in powder, three ounces. Rub together in a mortar, adding water from time to time, until the mixture measures one quart. Strain through a cloth, and mix with one gallon of Simple Syrup.

Orange Flower Syrup.

Add to one gallon of Simple Syrup half an ounce of extract of orange flowers.

Nectar Syrup.

Add to Orgeat Syrup one pint of best Port wines and half an ounce of extract of vanilla to the gallon; or, flavor one gallon of Simple Syrup with two tea-spoonfuls of extract of nectar.

Cream Syrup.

Take of fresh cream one pint, fresh milk one pint, fine powdered sugar three pounds; beat the sugar with the milk and the whites of two eggs, then mix with the cream. Flavor with vanilla, lemon, or strawberry. Keep in a cool place, well bottled.

Artificial Fruit Essences.

Several of the compound ethers have been found to possess the odor and flavor of certain fruits, a property which has led to their employment as flavoring materials.

Butyric Ether is much used to impart a pineapple flavor to rum. Dissolved in eight or ten parts of alcohol it forms the pineapple essence. From twenty to twenty-five drops of this essence, added to a pound of sugar containing a little citric acid, imparts to the mixture a strong taste of pineapple.

Amylo-Acetic Ether is a preparation of fusil oil and other ingredients, and when diluted with alcohol it is

sold as *essence of Jargonelle pear*, and is used for flavoring different liquors. Fifteen parts amylo-acetic ether, with half a part of acetic ether, dissolved in 100 parts of alcohol, form what may be called the *Bergamot pear essence*, which, when employed to flavor sugar, acidulated with a little citric acid, imparts the odor of the Bergamot pear, and a fruity, refreshing taste.

ACETATE OF AMYLIC ETHER (same as amylo-ether), mixed with BUTYRIC ETHER, forms another fruity compound which recalls the odor of the banana, and forms in alcoholic solution, the *banana essence*.

PELARGONATE OF ETHYLIC ETHER (pelargonic ether) has the agreeable odor of the quince, and when dissolved in alcohol in due proportion, forms the *quince essence*.

VALERIANATE OF AMYLIC ETHER, an alcoholic solution of this ether, in the proportion of one part to six or eight of alcohol, forms a flavoring liquid under the name of *apple essence*.

It is thus perceived that the bases of the fruit essences are certain etherial compounds of organic acids with the oxides of ethyl and amyl. Besides the essences here described, there are found in commerce the strawberry, raspberry, mulberry, green gage, apricot, and black currant essences, all of which may be viewed as various mixtures of the ethers of the amyl and ethyl series, modified by the addition of pure nitrous ether, vanilla, volatile oils, etc., to bring about a resemblance of the fruit, the odor and taste of which it is the object to imitate. (See *Butyric Ether*, *Pear Oil*, *Apple Oil*, *Pelargonic Ether*.)

PART XVII

On the Management and Preservation of Ale and Porter, with Receipes for Fining and Improving Malt Liquors.

All malt liquors require good management to preserve them from bad cellaring, and a variety of other causes, as the heat of the weather, thunder and lightning, etc. Beers ferment in the cask, and consequently turn thick, sour, etc. In order therefore to obviate these results, you should, at different periods, carefully watch their progress, by drawing a little into a glass from the peghole, to ascertain their state of brightness or transparency, for that quality cannot be produced without the liquor going through the several stages which it has to pass after fermentation. The density of the atmosphere tends greatly to impede the vivacity of beer for a time, but good vivid beer will of itself resume its original brilliancy, when the atmospheric air becomes rarefied. And though fermentation may be occasioned in malt liquor by a change of weather, bad cellaring, or other causes, the beer will often fall fine of itself, and grow mellow: but its progress requires constant watching.

The same care that it is required to stop the fermentation of malt liquor in hot weather, is required in cold weather to promote it; or it will be quickly spoiled and become thick from any inattention in this respect. You should therefore be very careful, especially when the weather is frosty and intensely cold, to keep the cellar warm, and in that degree of heat (viz., 60 deg.) which

is necessary to promote fermentation. When the weather is frosty, shut up all the lights or windows of your cellar, and cover them close with horse-dung, by which precaution your wine, beer, etc., will be kept in a proper and temperate heat. A good thermometer is also a very necessary appendage to every cellar, in order to ascertain the requisite temperature.

The defects of ale and beer, which liquor dealers are particularly interested in redressing, are when those liquors become hard, stale, flat, dead, tart, or ropy; the remedies to remove these defects, and to fine, preserve, or recover these liquors, are as follows:

When beer drinks hard and stale, to correct the acidity, put 1 lb. of clarified sugar, 2 oz. of salt of tartar, and 1 lb. of chalk, into a hogshead of such beer, and then agitate the mixture with the fining-stick for the space of ten minutes, for the purpose of promoting the incorporation of the materials. By this method, hard and stale beer may, after having stood undisturbed before it is tapped, be considerably improved both in taste and quality.

When your beer or ale is becoming stale, stir well into a hogshead of the commodity ½ lb. of fresh-slacked lime, and leave out the bung a few hours.

When your ale or beer is on draught, should they become stale, put into the vessel or glass from which it is to be drunk, a small portion of salt of tartar, or carbonate of soda, in powder (in the proportion of a teaspoonful to a quart of liquor), and draw the liquor upon it; by doing so you will produce a fine creaming head to your liquor, and completely remove the staleness.

To restore or recover flat or dead beer or ale, take 4 or 5 gals. out of the hogshead, and boil them with about

4 lbs. of honey for the space of half an hour; take off the scum, and when cold pour the mixture into the hogshead, stirring the whole well for about ten minutes; then bung down, and in the space of a few days the beer will be fit for use, and drink brisk and pleasant, by reason of the slight fermentation that has been occasioned. Or withdraw 1 gal. of the beer, and having steeped ½ lb. of hops in it for the space of 10 or 12 hours, and boiled the mixture with the addition of 3 lbs. of honey for half an hour, put the preparation into the cask, and having agitated the whole with the fining-stick for the space of 10 or 12 minutes, bung down as soon as you observe the frothing to subside.

When malt liquor has become heady, thick, or tart, a circumstance which frequently happens during the heat of summer, throw in a handful of pulverized calcined oyster-shells, and briskly stir the whole with the fining-stick; or when you find malt liquor becoming stale, draw off 4 or 5 gals. of the liquor, and put about 1 lb. of fresh-slacked lime into the butt, stirring as before; when you bung down, return the liquor you withdraw; but recollect to leave the spile-peg out as long as any air escapes.

Malt liquor becoming stale, may also be preserved in a mellow state for a long time, by mixing 2 lbs. of molasses with 2 lbs. of calcined pulverized oyster-shells into a stiff paste, and putting the same in narrow strips, or long pieces, into the butt.

When beer becomes ropy, the defect may be removed in the course of a few hours, by hanging a small bunch of hyssop in the cask, attached by means of a string, to the bung-hole.

When beer has become foul or turbid, and deficient in color, from insufficient fermentation, you may cure the

defect by either of the following methods: 1. Dissolve shredded isinglass, by boiling it in stale and perfectly clear beer. When cold, put the mixture into the butt, and stir well with the cleft-stick. Of this preparation, 1 pint is the usual proportion for 1 barrel, but sometimes 2 or even 3 pints are found necessary. 2. Dissolve isinglass in some stale beer, and to a quart of the mixture add a handful of salt, the same quantity of well-dried chalk, scraped fine, and 2 quarts of molasses; mix the whole with 1 gal. of the beer to be fined; pour the composition into the butt, and stir it well, to incorporate the ingredients. When the frothing has subsided, bung up, and in the course of a few days the liquor will be fit for use. 3. Dissolve 2 oz. of isinglass and 2 lbs. of loaf sugar in a sufficient quantity of the beer, and with the addition of 2 qts. of water, whisk the composition together; then stir the beer well with the fining-stick, at the same time throwing in the composition; bung up, and in the course of two or three months the beer will appear of a fine color.

Half an ounce of isinglass boiled in a little water, and when the fermentation has subsided, poured into the cask, with a few waste hops, will fine or clear a thirty-gallon cask of ale in the course of a week.

As beer may be deficient in color and heading, defects which may probably affect your interests in the estimation of your customers, it seems necessary to state those remedies which are harmless in themselves for removing these defects. They are as follows:

Having boiled 14 lbs. of sugar and 1 pint of water until it becomes apparently black, add to the composition as much lime-water as will make it into a syrup. A very small quantity of this composition will produce a rich

brandy color when added either to spirits or pale beer And when you find your beer deficient in heading, make use of salt of tartar or carbonate of soda, as before directed.

The method of bringing new beer forward is, having well-mixed oil of vitriol and water together, in the proportion of eight parts of water to one of acid, add the mixture gradually to the new beer until the requisite hardness is produced. You will thus impart the flavor and quality of twelve months' age to the beer.

As small portions of beer and ale are often left in different casks, on account of some imperfections in regard to taste or color, it may be useful to merchants to apprize them, that by mixing the whole together in a vat, and, after having well rummaged the same with the fining-stick, to proceed as follows: take an adequate portion of malt and hops, and having mashed the malt, draw off the wort on the hops; then boil the hops, wort, and stale or refuse beer for about the space of an hour; dip the liquor, cool, tun, and ferment as usual. You must proportion your materials according to the quantity of stale beer; if you have about 30 gals. of it, add 3½ bhls. of malt, and 5 lbs. of hops, with a sufficient quantity of water to form a hogshead of beer when tunned.

Finings for ale or beer are made by dissolving isinglass, cut small, and dissolved in stale ale or beer, until it becomes of a glossy consistence, like size. One ounce of isinglass is sufficient for a cask. Beer fined with isinglass should be soon tapped, the isinglass being liable to turn it flat as well as to fine it. In very hot weather, a few handfuls of river or silver sand is the best fining for ale, and will carry down ale bright, when all other finings will not succeed.

The flavor of malt spirits may be greatly improved and made almost equal in flavor to brandy, by putting 3½ oz. of finely powdered charcoal, and 4½ oz. of ground rice into a quart of spirits; and when it has stood for fifteen days. frequently stirring it during the period, strain it.

PART XVIII.

FOURTEEN USEFUL RULES FOR LIQUOR MERCHANTS, SHOWING HOW TO REDUCE OR RAISE THE STRENGTH OF SPIRITS BY THE ADDITION OF STRONGER SPIRITS OR WATER, ACCORDING TO TRALLE'S AND GENDAR'S HYDROMETERS, HOW TO ASCERTAIN THE COST OF ANY QUANTITY OF ALCOHOL AT ANY DEGREE ABOVE OR BELOW PROOF, HOW TO ASCERTAIN THE QUANTITY OF PURE OR ABSOLUTE ALCOHOL IN ANY GIVEN AMOUNT OF LIQUOR, ETC.

THE following excellent rules for the convenience of the liquor merchant were derived from various sources, but principally from the note-books and memoranda of friends in the "*trade*," both in Europe and this country, and have been in almost constant use by the author during an experience of over twenty years. They contain, and will yield to the manufacturer, much information of a very useful character.

To Ascertain the Cost of any Quantity of Alcohol at any Degree or Per Centage of Strength Above or Below Proof.

Alcohol is always bought and sold at so much above or below proof. To ascertain the price of a quantity of alcohol, add the percentage over proof, or deduct the per centage under proof, and multiply by the price per gallon. Thus, what will 40 gallons of alcohol, 25 per cent over proof, cost at 28 cents proof? We first find 25 per cent of 40, which is 10; we then add that number to 40, the number of gallons and we get 50; we then multiply 50 by 28, the price per gallon proof, and get $14.00 or 35 cents per gallon.

Again, what will 40 gallons alcohol 25 per cent under proof cost, at 28 cents per gallon proof? Again, we find that 25 per cent of 40 is 10 ; we then deduct 10 from 40, this leaves us 30 ; by multiplying 30 by 28, we get $8.40, or 21 cents per gallon.

An Easy Method to Ascertain how much Water Should be Added to Spirits, to Reduce it from a Given Degree of Strength to a Lower Degree, or Per Centage, of Strength.

The manufacturer may sometimes find it necessary to reduce or increase the strength of spirit according as circumstances may require. To accomplish this, we give the following rules, which will be found useful to the dealer : multiply the number of gallons by the actual degree of strength of the spirit, and divide the amount by the degree of strength sought to be obtained, and from the answer subtract 100 ; the amount thus obtained will show the quantity of water to be added to the spirit in order to reduce it to the degree sought. For example : suppose you have 100 gallons of spirit at 80° by Tralles' hydrometer and wish to reduce it to 50° or "proof." You multiply 100 by 80, and divide the amount by 50, then from the answer subtract 100 ; this will show that you must add 60 gallons of water to the spirit in order to reduce it to 50° Tralles', or "proof."

Thus,

100
80

5.0)800.0(160.0
100

60.

To Ascertain the Quantity of Pure or Absolute Alcohol in any Given Amount of Liquor.

The quantity of alcohol contained in *any amount* of liquor is readily ascertained after testing the strength with Tralles' hydrometer at 60°, by simply multiplying the figures expressing the quantity of liquor by the ascertained strength; for example: a barrel of brandy, containing 32 gallons, 60° strong at 60° Fah., contains 19⅕ gallons pure alcohol.

RULE.—Multiply the number of gallons by the ascertained degrees of strength, and divide by 100. Thus

Example.

32 gallons,
60 degrees strength at 60°,

19.20, or 19⅕ gallons pure alcohol.

To Ascertain the Number of Gallons at any Required Number of Degrees Below Proof, in any Given Number of Proof Gallons.

Multiply the *given* number of proof gallons by 100, and then divide the product thus obtained by a number, found by deducting the *required* number of degrees below proof from 100. The quotient will be the answer.

Example.

How many gallons, 25 degrees below proof, are there in 35 gallons proof?

100	35 gallons proof,
25 B. P.	100
75	)3500(46⅔ gals., 25 degrees below proof.

We thus see by the above example that 35 gallons

proof spirit is equal to 46⅔ gallons 25 degrees below proof.

To Increase the Strength of a Spirit from any Degree to a Higher given Degree, or Per Centage.

To increase the degree of strength of a spirit, multiply the number of gallons by the actual degree of strength of the spirit, and divide by the degree of strength sought to be obtained. For example: suppose you have 100 gallons of spirit at "proof," or 50° by Tralles' hydrometer and wish to increase its strength to 80 degrees or per cent, Tralle's. You should multiply 100 gallons by 50 and divide by 80; the answer will give you the number of gallons of spirit, 62½, to be added to the 100 gallons in spirit in order to increase its volume to 80° by Tralle's hydrometer.

Thus,

100
50

8.0)500.0

62.4, or 62½.

Rule to Reduce Spirits a Given Number of Degrees Above Proof to a Required Number of Degrees Below Proof, by the Addition of Water.

Multiply the number of gallons of spirit by the *sum* of the *given degree above proof* and the *required degree below poof*, and divide the product by a number to be found by subtracting the *required proof* from 100. The quotient will give the number of gallons of water to be added.

Example.

Suppose you want to reduce 40 gallons spirit 20 degrees above proof to 10 degrees below proof, how much water must be added to accomplish the result?

	100	40 gallons.
Required proof,	10	30

90)1,200(13⅓ gallons water.

It will thus be seen that, to reduce 40 gallons spirit 20 above proof to 10 below proof, it will be necessary to add 13⅓ gallons of water, making 53⅓ gallons in all.

Rule to Reduce High Proof Spirit of a Given Degree to a Required Lower Degree, or Proof, by the Addition of Water.

First multiply the number of gallons by a number expressing the difference in degrees of strength between the *given proof* of the spirit to be reduced and the *required degree, or proof*, to which it is to be reduced. Divide the product thus ascertained by a number to be found by adding the required proof to 100.

Example.

Suppose you desire to reduce 72 gallons spirit at 30 degrees above proof to 10 degrees above proof, how much water must you add?

Req'd strength,	10	72, No. of gals.	30, given str'gth.
	100	20, difference.	10, req'd str'gth.
			20, difference.

110)1,440(13$\frac{1}{11}$ gals., *Answer.*

Thus it will be seen that, to reduce 72 gallons spirits at 30 degrees above proof to 10 degrees above proof, it is necessary to add 13 1-11 gallons of water, making in all 85 1-11 gals.

Rule to Reduce Spirits of a Given Number of Degrees Above Proof to a Required Number of Degrees Below Proof, by the Addition of Water.

Deduct the *number* of degrees *below proof* from 100, and multiply the *number of gallons* by the *remainder*. Then add the number of degrees which the given liquor is above proof to 100, and divide the above product by the number thus obtained. The quotient, deducted from the original number of high proof gallons, will give the answer required. All small fractions may be rejected.

Example.

Suppose you want to reduce a cask of 40 gallons spirits at 20 degrees *above proof* to 10 degrees *below proof.*

100
10
—
Multiply 90
by 40
——
To 100 add 20=120)3,600(30

Original number of gallons, 40
Deduct quotient, 30
—
Answer, 10 gallons.

Thus it will be seen that 10 gallons should be removed,

and their place supplied with water, in order to make the mixture equal to 10 degrees below proof.

Rule to Reduce Spirits of a Given Number of Degrees Above Proof to Proof Spirits, by the Addition of Water

Multiply the number of gallons by 100, then add the number of degrees which the spirit is *above proof* to 100, and divide the above product by the number thus obtained; subtract the quotient from the number expressing the original quantity of spirit, and the answer will give the number of gallons to be removed from the spirit and replaced with water, in order to reduce the *high* proof spirits to proof.

Example.

Suppose you want to reduce a cask of 24 gallons of spirit 20 degrees *above proof* to *proof* spirit.

Above proof,	20	24	Orig. quan.,	24
	100	100		20
	120)2,400(20		*Answer*,	4

It will be seen by the above example that four gallons should be taken from the spirit and the same quantity of water added to reduce it to proof.

Rule to Raise Spirit of a Given Number of Degrees Under Proof to a Required Degree of Strength Above Proof, by the Addition of High Proof Spirit.

Multiply the number of gallons by the number expressing the difference in degrees of strength between the high proof spirit to be added and the *required* degree to

which it is to be raised. Divide the product thus found by a number to be obtained by adding the *given* number of degrees below proof to the number of degrees the high spirit is above proof; then subtract the quotient from the original number of gallons, and the remainder will show the quantity of low spirit to be removed and its place supplied by the addition of the same quantity of high proof spirit.

Example.

Suppose you desire to raise a cask of 40 gallons at 10 degrees below proof to 15 degrees above proof, with spirit 40 degrees above proof:

	40	40 A. P.	40 Number of gals.
	15	10 B. B.	25 multiplied by diff.
Difference	25	50	)1000(20

40 gals. original quantity to be raised.
20 deduct quotient.

20 answer.

The above example shows that 20 gals. should be taken from the low-proof spirit, and the same quantity of spirit added at 40 degrees above proof, in order to raise it to 15 degrees above proof.

Rule to Raise Spirit of a Given Number of Degrees Below Proof to Proof Spirit, by the Addition of High Proof Spirit

Multiply the number of gallons by the number of degrees which the high spirit is above proof, divide the product by a number to be found by adding the given number of degrees the spirit is below proof to the num-

ber of degrees the high spirit is above proof; subtract the quotient from the original number of gallons and the remainder will show the quantity of low-proof spirit to be removed, and its place to be supplied by the addition of high-proof spirit.

Example.

Suppose you desire to raise a cask of 40 gallons at 5 degrees below proof, to proof, with spirit 35 degrees above proof:

35 A. P. — 40 Number of gals.
5 B. P. — 35 deg. above proof.

40)1400(35 quotient.
40 gallons,
35 quotient,
5 answer.

It will thus be seen that 5 gallons should be taken from the low-proof spirit, and the same quantity of spirit added at 35 degrees above proof, in order to raise it to proof strength.

Rule to Raise Spirit of a Given Number of Degrees Above Proof to a Still Higher Degree of Strength, by the Addition of High Proof Spirlts.

First multiply the number of gallons by a number expressing the difference in degrees of strength between the *given proof* of the spirit to be raised, and the *required degree* to which it is to be raised. Divide the product thus ascertained, by a number to be found by subtracting the difference in degrees between the spirit to be raised and the high-proof spirit employed to raise

it. The quotient will show the number of gallons of a higher proof which must be added.

Example.

Suppose you desire to raise a cask of 35 gallons spirit 15 above proof, to 20 above proof, by the addition of spirit 30 degrees above proof:

20 required proof,
15 given proof,
—
5 difference.

From 30	35 number of gals.
Subtract 15	5 multiplied by difference.
—	—
15	)175(11$\frac{3}{5}$ answer.

Rule to Reduce Low Proof Spirit of a Given Degree to a Still Lower Proof, by the Addition of Water.

First multiply the number of gallons by the difference in degrees of strength between the *given* proof of the spirit to be reduced, and the *required* degree or proof to which it is to be reduced. Divide the product by a number ascertained by subtracting the *given* proof from 100, and the quotient will give the number of gallons of water to be added.

Example.

Suppose you want to reduce 40 gallons spirit 10 degrees below proof, to 15 degrees below proof:

Required proof,	15	100	40 gals.,
Given "	10	10 given proof,	5 difference,
	—	—	—
	5	90	)200(2$\frac{2}{9}$ gals. water

Rule to Raise a Low Proof Spirit of a Given Degree to a Higher Required Degree of Low Proof by the Addition of High Proof Spirit.

Multiply the number of gallons by a number expressing the difference in degrees of strength between the *given* proof of the spirit to be raised, and the required degree to which it is to be raised. Divide the product thus ascertained by the *sum* of the degree of the *given* proof, and the degree of the *high proof* spirit to be added, and the quotient will give the answer.

Example.

Suppose you desire to raise 40 gallons spirit 15 degrees below proof to 10 degrees below proof with spirit 10 degrees above proof.

Given proof,	15	40 gals.,	15 given proof,
High "	10	5 difference,	10 req'd "
	25	)200(8 gals.,	5 difference.

Answer.

PART XIX.

APPENDIX.

Valuable Hints on the Distillation of Whiskey and New England Rum.

The process of distillation commences with the fermentation of grain or molasses by the presence of yeast, and this is called *mashing*, or preparing the mash. Strictly speaking, indeed, the spirits are not produced by distillation; that is done by the previous step of fermentation, and distillation merely separates the spirits from the mixture in which they already exist. The object of fermentation is to convert the starchy principle of the grain into sugar, or to *saccharify* it. After being agitated for two or three hours, the saccharine infusion, called *wort*, is drawn off from the grains and cooled.

To this wort is now added a certain quantity of yeast or leaven, which induces the vinous fermentation, and resolves the saccharine matter into alcohol and carbonic acid, accompanied by a rise of temperature. The alcoholic mixture which results is called the *wash*, and is now ready for distillation.

How to Prepare Yeast for Rye Whiskey or New England Rum.

No. 1.

To prepare yeast for 80 gallons mash, take two pounds of wheat meal and dilute it with sufficient warm

water to make a thin paste. Then boil two ounces of hops in a quart of water, and when cold take out the hops and throw them away. Then dilute one quart of malt in a quart of water. Mix, *cold*, the hop water, paste and malt well together, and add half a pound of leaven. Cover the jar containing the mixture with a piece of cloth, and keep it three or four hours in some warm place until it rises. The fermentation will be perfect *after the whole has risen and then sunk down.* Then add two gallons of the mash, stir the whole, mix it with 80 gallons of the mash, and begin the fermentation. This recipe is the very best for Rye Whiskey.

No. 2.

To 80 gallons mash, add one gallon brewer's yeast, and half a pound carbonate of ammonia dissolved in a pint of water. Stir well, and begin the fermentation. Good for New England Rum.

No. 3.

To 80 gallons of mash, add one gal. yeast, five quarts of malt and one pound of molasses. Dilute the malt with two quarts of water, *and add the molasses.* Keep the whole in a warm place until it rises, as described in No. 1. Add the *yeast to the mash and stir, afterwards add the molasses and malt and stir again.* Then begin the fermentation. Good for Rye Whiskey.

How to Prepare Mash for New England Rum.

FOR A STILL BY STEAM OR FIRE.

To prepare 80 gallons mash, reduce the molasses 18 degrees by the saccharometer, add yeast No. 2, and stir

well. Let it ferment at a temperature of 75 degrees Fahrenheit, until the mash is reduced to 0. But as it is very difficult to get such a reduction, the operator may begin to distil when the mash marks 2 or 3 degrees by the saccharometer. Charge three-fourths of the still, and begin distilling.

How to Prepare Mash for Rye Whiskey.

FOR A STILL BY STEAM OR FIRE.

To prepare 80 gallons mash, grind the rye into coarse powder, then charge the fermenting tubs in the proportion of 110 lbs. of rye to 80 gals. of water, and mix yeast No. 1 or 3. Let it ferment at a temperature of 75 or 80 degrees Fahrenheit, until the fermentation is completed. *The fermentation will be perfect after the mash rises and sinks.* When this is done, charge three-fourths of the still and begin distilling.

*** In preparing the mash, the operator may use all rye, as directed above—this makes the best quality of whiskey—or use three-fifths rye and two-fifths corn, or three-fifths corn and two-fifths rye.

Distillation With or Without a Heater.

Distillers usually employ a *heater* to hasten the process of distillation. When the heater is employed, the mash passes from the fermenting tubs into the heater. During the time occupied in distilling over the charge of the still, it is necessary to keep a heat of 125 degrees in the heater. The mash passes directly from the heater into the still by means of a pipe or gutter, according to the general arrangement of the apparatus.

Distil until the spirit which runs from the worm

marks 10 degrees below proof. This first run is called *high wine.* Then remove the receiver that contains the high wine, and substitute another. Continue to distil until the low wine ceases to blaze when it is thrown in the fire. Whenever this occurs, stop the operation, and keep the low wine for the next distillation. Then clean the still and charge it with fresh mash.

When the operator does not employ the heater, the mash passes from the fermenting tubs immediately into the still. No uniform disposition is necessary for the fermenting tubs or heater, all depends upon the general arrangement of the apparatus. The distiller need not be informed that the apparatus must be arranged so as to save labor. If the mash tubs are above the still, connect them by a gutter or pipe; if on a level with the still, employ a hand pump. (*See pages* 18 *to* 24.)

How to Pack a Rectifying Tub.

TO RECTIFY FROM 10 BELOW PROOF TO 50 ABOVE PROOF.

30 bushels of maple charcoal are required for a tub seven feet high and four feet in diameter; a tub of this size will give a clear bed of 14 inches. At two inches from the bottom of the tub place a false bottom perforated with ½-inch holes, and cover this bottom with *sailcloth* or blanket. Then pack in the charcoal regularly and very tightly with a wooden pestle. Great attention should be given to this part of the operation, in order to *prevent the occurrence of holes or crevices* in the charcoal during the process of filtration. Pack the *sides of the tub thoroughly.* Cover the charcoal with sailcloth, place laths over the cloth, and use heavy stones to keep the charcoal down.

*** It is absolutely necessary to have a tub with a clear surface-bed of 14 inches charcoal, to insure a perfect rectification. After rectification, high wine is called spirit, and this spirit when again distilled is called French or Cologne spirit. (*See page* 17.)

Tincture of St. John's Bread.

Mash or cut in small pieces 16 lbs. beans, and let them infuse 3 days in 4 gals. water. Stir twice or more a day. This has a tendency to extract the sugar from the beans. Then rack off and put the tincture in a barrel. After this operation, pour over the beans 4 gals. spirit, 95 per cent., to extract the oil, let it infuse 8 days, then add spirit, tincture and beans to the first tincture.

Let it settle, and use the tincture according to prescription for Rum, Bourbon Whiskey; also for Cognac Brandy, in the proportion of one quart for 40 gals. liquor.

ANOTHER WAY TO PREPARE THE ABOVE TINCTURE.

Cut 16 lbs. St. John's Bread in small pieces, pour over 8 gals. spirit, 50 per cent., *say proof*, let infuse 10 days *at least*, stir every day twice or more, and use the tincture according to prescription. (*See page* 65.)

Prune Tincture.

Mash 1 box, say 25 lbs., prunes, stones, kernels, the whole together. Pour over 5 gals. French spirit, proof. Let infuse 15 days *at least* before using the tincture, according to prescription for Brandy. Stir every day.

(*See page* 64.) This tincture imparts a fine taste as well as age to any whiskey or brandy, and is cheaper and better than the imported prune wine, juice, or extract ; these are so weak in spirit that the quantity required to impart flavor will be sufficient to reduce below proof the spirits to which they are added. By making the tincture proof, each gallon of tincture adds a gallon to the quantity of proof spirit, costing only the price of the prunes, say about 36 cents a gallon.

Raisin Tincture.

Mash 1 box, say 25 lbs., raisins, stems and all together, infuse them 20 days in 5 gals. French spirits, proof. Stir every day twice or more, and use the tincture according to prescription for Brandy. (*See page* 65.)

N. B. Prune and raisin tincture, when combined with rum and sherry wine, are the finest of brandy flavors.

Cognac Brandy.

40 gals. French spirit, 10 A. P., 20 drops oil of cognac, 15 drops oil of bitter almonds. Dissolve the oils in a little spirits, 95 per cent. 2 pints tincture of raisin, 2 pints tincture of prunes (prepared as directed on page 258), 3 pints Jamaica rum (best), 3 pints sherry wine (best), ½ oz. ether (acetic). Color. The addition of 1 pound glycerine will impart age.

Brandy.

Take 40 gallons French proof spirit ; infuse for 8 hours 1 drachm star-anise, breaking the star only, in 1 pint 95 per cent. alcohol, and add the infusion to the spirit ; with one drachm oil of cognac, and 12 drops oil of bitter almonds, each dissolved in 95 per cent.

alcohol ; ½ gallon best sherry or madeira wine, and 1 pint wine vinegar.

Brandy.

Take 40 gallons French proof spirit, 1 gallon brandy flavor (*see page* 59), 1 quart hickory-nut tincture (*see page* 117), 1 drachm oil of cognac dissolved in 95 per cent. alcohol. and 1 pint wine vinegar. Color with caramel

Bitters made with Essences.

40 gals. spirit, proof, 1 drachm each oil of anise, caraway, lemon, orange, and cinnamon, ½ drachm each bitter almonds and cloves, 1 gal. sugar syrup.

Cut the oils in alcohol, 95 per cent., and mix. Color with brandy coloring.

Amazon Bitters.

A SPLENDID RECIPE.

90 gals. plain proof spirit, 3¼ lbs. red Peruvian bark, 3¼ lbs. calisaya bark, 1⅛ lbs. calamus root, 4¾ lbs. orange peel, 3½ oz. each cinnamon, cloves, and nutmeg, 2 oz. cassia buds, 6½ lbs. red saunders.

First mash all the ingredients, put them in the spirit, and let them infuse fourteen days, being careful to stir the mixture well twice every day. Then rack off and color with 11 pints (1⅜ gals.) brandy coloring, to get a dark red tint. Stir a quarter of an hour. Dissolve 30 lbs. of white sugar in 30 gals. water, add, and again stir half an hour. Let the mixture rest 4 or 5 days, and when bright, bottle. If the red saunders is not used, the color will be a bright amber.

By substituting New England rum for the spirit, the celebrated *Plantation Bitters* may be obtained.

*** This is the finest bitters in the market. Com-

pounded according to the above directions, the dealer will obtain 120 gals., 25 below proof.

Rum Punch. (Quick Method.)

18 gals. spirit, 30 A. P. (or 20 gals. New England rum, and ½ lb. Jamaica rum essence), 2 gals. Jamaica rum, 1 lb. Jamaica rum essence (or ½ lb. if very strong), 5 drachms oil of lemon, ½ drachm oil of cloves, 2½ lbs. tartaric acid, 18 gals. sugar syrup, 3 oz. allspice. Cut the essential oils in spirit, 95 per cent. Dissolve the tartaric acid in 2½ gals. water. Make the sugar syrup in the proportion of 6 lbs. white sugar to 1 gal. water. Mash the allspice, and infuse ten days in a quart of alcohol, 95 per cent. First add to the spirit the rum essence, and stir, then the Jamaica rum, stir. Then the lemon oil, stir. Then the tartaric acid, stir. Lastly, color, and stir again.

Wine Punch. (Quick Method.)

10 gals. spirit, proof, 10 gals. Marseilles or Catalonia wine, 10 gals. syrup (3½ lbs. sugar per. gal. water), 3 oz. ground allspice, infused ten days in a pint of spirit, 95 per. cent., 2½ drachms lemon oil, cut in spirit, 95 per cent., ½ lb. tartaric acid, dissolved in ½ gal. water, ½ drachm oil of cloves, cut in alcohol, 95 per cent. If not red enough, add some cherry juice.

To make Wine Punch. Another Method.

To 10 gallons proof spirit, add 10 gallons Marsala or Catalonia wine. Take 10 gallons syrup made of 35 pounds sugar; peel the rind, thinly, of 120 lemons; bring the syrup to a boil, and simmer the lemon rinds in it for ½ hour or more, then strain it through a fine flannel. Mix all the above with the juice of the lemons. Instead of boiling the lemon peel in the syrup, it may

be infused for 5 or 6 days in 95 per cent. alcohol. The color can be deepened with cherry juice. Brandy, rum, whiskey and arrack punch may be made as above, substituting the liquor for the wine and spirits.

To make French Cognac Bitters.

Take 1½ pounds each red Peruvian bark, calisaya bark, bitter orange peel, and sweet orange peel ; 2 ounces calamus root ; 4 ounces cardamom seeds ; 1½ ounces each cinnamon, cloves, and nutmegs ; 4 ounces caraway seed, and 3 pounds wild cherry bark. Pound or granulate all the above ingredients well, and steep for 15 days in 45 gallons proof spirit (or 60 gallons spirit 25 below proof), stirring occasionally. Then rack it off, and mix sufficient caramel to make it a dark red ; add 15 pounds white sugar dissolved in 15 gallons water ; let the whole settle, then filter. If the bitters are required to be of an amber color, omit the wild cherry bark and the caramel coloring. This splendid bitters is even superior to the Amazon bitters, which it very much resembles.

To make Angostura Bitters.

Take 4 ounces gentian root ; 10 ounces each calisaya bark, Canada snake-root, Virginia snake-root, liquorice root, yellow bark, allspice, dandelion root, and angostura bark ; 6 ounces cardamom seeds ; 4 ounces each balsam of tolu, orangetis, Turkey rhubarb, and galanga ; 1 pound orange peel ; 1 pound alkanet root ; 1½ ounces caraway seed ; 1½ ounces cinnamon ; ½ ounce cloves ; 2 ounces each nutmegs, coriander seed, catechu, and wormwood ; 1 ounce mace ; 1¼ pounds red saunders, and 8 ounces curcuma. Pound these ingredients and steep them as in the last receipt, in 50 gallons

spirit ; and, before filtering, add 30 pounds honey. This splendid bitters is much esteemed for making cocktails.

The Aroma of Cordials.

It requires a great deal of experience to combine different perfumes to produce any certain required aroma ; a knowledge is necessary of the effect produced by perfumes in combination. The mere facts laid down in receipts will not be sufficient for a liquor manufacturer ; he must know just what, and how much of it to use, to counteract what is objectionable, and produce or increase the correct aroma. He will frequently find that a single aromatic perfume fails to give the effect he anticipated ; and yet the addition of a mere atom of some other perfume may be all that is required. Thus, the flavor of star-anise is accompanied by a slight, but objectionable odor of bed-bugs ; a very small addition of green anise and fennel counteracts this. Ambergris, alone, gives scarcely any perfume, but musk brings it out. The quince has a peculiar taste which is corrected by cloves ; the aftertaste of cinnamon is also destroyed by cloves ; vanilla has more flavor if pounded with sugar than when ground with it. Absinthe requires the zest of the lemon to take away its naturally bitter taste. These examples will show that considerable experience is needed to be able to blend perfumes with any degree of success.

To make Absinthe by Distillation.

Put the following ingredients into a cask :—1½ pounds large absinthe, 2 pounds small absinthe, 2½ pounds long fennel, 2½ pounds star anise (breaking the star only), 2½ pounds green anise seed, 6 ounces cori-

ander seed, and 1 pound hyssop ; moisten the whole with a little water, allowing it time to soften and swell ; then add 12 gallons 95 per cent. alcohol, and steep for 2 or 3 days ; next add 10 gallons water, and let the whole steep for 1 day more. The water will reduce the alcohol to about 23 gallons of proof spirit. Distill it, and it will produce nearly 15 gallons absinthe of 65 to 70 per cent. strength. Change the receiver as soon as the spirit, as it comes from the worm, begins to assume a reddish tinge. Color the distilled product, by steeping in it for 10 or 15 days ½ pound mint leaves, ¼ pound melissa leaves, ½ pound small absinthe, 2 ounces citron peel, and ½ pound bruised liquorice root. Strain and filter.

Doppel Kummel.

To 5 gallons 94 per cent. alcohol add 4 ounces oil of caraway, ½ drachm (30 drops) oil of anise, 5 drops oil of coriander, 5 drops oil of bitter almonds, and 10 drops oil of calamus. Add 20 gallons French proof spirit ; and 15 gallons water in which 10 pounds white sugar have been dissolved. This will make 40 gallons Kummel of a strength of 36¾ per cent. If for cordial, more sugar may be added.

To make Curacoa.

Slice the outside peel very thin from 60 bitter oranges ; infuse for 15 days with 4 drachms bruised cinnamon, and 2 drachms bruised mace, in 5 gallons 95 per cent. French spirit, stirring every day. Then add 25 pounds white sugar dissolved in 2 gallons water ; color with caramel ; stir thoroughly, and filter.

To make Doppelt Kummel or Caraway.

Dissolve separately, each in a little 95 per cent.

alcohol, ½ drachm oil of anise, and 5 drops each of the oils of calamus, bitter almonds, and coriander; dissolve also 4 to 4½ ounces oil of caraway in sufficient alcohol (95 per cent.) to make a clear solution. Incorporate these with 40 gallons French proof spirit; and add 10 pounds sugar dissolved in 5 gallons water.

Absinthe by Distillation.

Take 16 pounds large absinthe, 20 pounds green anise, 20 pounds fennel, and 1 pound coriander; place them in a cask, first moistening them with a little water; then add 40 gallons 75 per cent. spirit, and let them steep for 2 or 3 days, occasionally stirring. Next, add 20 gallons water, and distil, changing the receiver before the faints come over. After distillation, put the products again in the still with 4 pounds small absinthe, to give the color; heat very slowly, and remove the fire as soon as the hand can no longer be borne on the head of the still. When the distillate is cold, rack off, let it rest, and finally filter it. This second distillation requires to be conducted slowly, the fire must be therefore carefully managed, so as not to allow the boiling heat to be reached.

To make Claret.

Take 55 gallons wine made by fermentation (see page 140),
5 gallons Marseilles wine,
½ ounce gum kino dissolved in 2 ounces 95 per cent. spirit.

If not red enough, add a little cherry juice.

To make Sauterne.

Take 55 gallons of wine by fermentation (see page

140), and add 5 gallons of Grave's wine. This will make an excellent sauterne.

To make Hock.

To 55 gallons of wine by fermentation add 5 gallons harsh German wine. The addition of a little infusion of sage gives a very fine Rhine wine bouquet. This is prepared by infusing sage in 95 per cent. spirit.

To Improve Wine by Electricity.

The process consists in plunging into the vat containing the wine, two plates of platinum or of silver, having attached to them two wires of the same metal, which are connected with the poles of an electric battery. The Bunsen and Daniell's batteries are much used in France for this purpose. The time necessary to transform a low grade wine to one of an agreeable and superior quality, is from two to three weeks, with the battery continually working. By this method, wines which were considered only fit for making vinegar, are changed to such an extent that they are used as good, and in some cases superior table wines. (See page 120.)

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