The Bordeaux Wine and Liquor

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DEALERS GUIDE.

THE BORDEAUX

Wine and Liquor Dealers'

GUIDE.

J. Andrew Hamilton

THE

BORDEAUX

WINE AND LIQUOR DEALERS' GUIDE.

A Treatise

ON THE

MANUFACTURE AND ADULTERATION

OF

LIQUORS.

BY A PRACTICAL LIQUOR MANUFACTURER.

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PREFACE

TO THE FIRST AMERICAN EDITION.

It is proper to offer a few prefatory remarks in regard to the nature and design of any work to which the author would direct attention, showing the object he had in view in presenting to the public his ideas as contained therein.

This work is the result of many years' experience of a practical distiller, manufacturer, and chemist in Bordeaux and New York. Its design is not only to present a concise and practical treatise on the subject on which it treats, but also *to introduce an entirely new system of manufacturing and adulterating liquors, by which the use of poisons and poisonous compounds are avoided; and we wish it distinctly understood, that we do not in any case use in our imitations any material not found by chemical analysis to exist in the original spirit we seek to*

imitate. This is the basis of the theory on which this work is founded.

It is well known to the trade, and generally supposed by those not engaged in the sale of liquors, that adulteration is carried on to a very great extent in the United States, as well as in England. In France also, the source of more than three fourths of the liquors imported to this country, it is conducted on an extensive scale, though in a different and less objectionable manner. The systems in use in England and in the United States have been of a character to condemn the practice. Drugs of a deleterious nature and possessed of qualities poisonous in the extreme, have been, and are now more or less in use, though the system has been gradually undergoing a change for the better. The French have been the first to inaugurate, in the expensive products of their vineyards and distilleries, a system of adulteration that, if properly understood, would place imitation liquors in a new light altogether.

This system has been but little understood in this country, and the knowledge has been confined to a few individuals.

Although the adulteration of liquors has been generally condemned as pernicious in the effect produced, still it *ever has been and will continue to be resorted to*, that the dealer may extend his profits; nor will any amount of legislation or prohibition ever cause its discontinuance. That the system needs improvement all will admit; and that the principles laid down in this treatise do away

with the objectionable part of adulteration, experience has fully demonstrated.

Some may contend that there is no necessity for the adulteration of liquors. True, the necessity does not exist, more than exists the necessity for its consumption: each is coexistent with the other, and will thus continue so long as the depravity of human nature induces man to indulge in that which gratifies but his inordinate passions. So long, therefore, as he will, at any cost, gratify his depraved appetite, let us at least place before him that which will do the least harm; that which is the most wholesome, if indeed there is anything wholesome in the use of intoxicating drinks.

Were all liquors imported pure, and sold in the same state, the quantity sold would be a mere item compared with the amount now drank in this country. Indeed, France and the continental countries of Europe do not produce a sufficient quantity, if the entire products of their vineyards *were exported, to supply the natural trade of New York City alone.* So great is the demand for exportation beyond the supply, that the French are compelled to resort to imitations to supply the deficiency; and to such perfection has the system been brought, that by no test, chemical or otherwise, can these imitations be detected. The question is often asked, what becomes of the large quantities of whiskey that are shipped every month to France? It is well known in the latter country that a *good American corn spirit* may be so amalgamated with the juice of the grape, after

being deprived of its essential oil, that the distillation of the two in conjunction produces a spirit that cannot be detected. Also, after the brandy has been distilled in its pure state, so perfect a spirit may be produced by the re-distillation and rectification of corn whiskey, that its addition to the genuine, though in large quantities, is not apparent, except perhaps in a slight diminution of the rich flavor and odor pertaining to pure brandy. This is readily remedied by the addition of the same materials that give to the original its taste and odor. By this principle the French have been enabled to supply the great and increasing demand for brandy, and likewise to give to the exporter an article *in every respect as wholesome and as pure as the original brandy itself.* From the extreme high price of French liquors, every inducement is held out to the distiller and exporter to adulterate, and the consequent result is, that *but few brandies or other liquors are exported to this country free from adulteration*, at the hands of either the distiller or the exporter, or both. Not that we would include in one sweeping charge *all* French distillers and exporters. We know of some exceptions to the rule; but we will say, that the only guarantee the American importer has of the genuineness of his imported brandy, is in the character of the exporter or distiller from whom he receives his stock; for *so perfect are these Bordeaux imitations*, we again repeat, that their detection is utterly impossible by any test, chemical or otherwise.

One word more in regard to the large quantities of whiskey shipped to France and the Continent. A small portion only is used for chemical, medicinal or mechanical purposes, perhaps one fourth of the entire amount, the larger portion being returned to this country in the form of brandy, cordials, liqueurs, &c., at prices very much enhanced from its original cost of exportation from our ports.

As we have said before, France and the Continent could not supply the trade of New York alone, if every gallon of wine produced, and every gallon of brandy distilled, were exported to this port in its original state, as it is a well known fact, established on the most reliable statistical data, that, notwithstanding the immense amount of imitation and adulterated liquors shipped from the French ports, far exceeding the genuine in quantity, she does but little towards supplying the retail trade of the United States. *The city of New York alone sells three times as many "pure imported brandies," and four times as many "pure imported wines" annually, as all the wine-producing countries export.* It is estimated that 12,000,000 bottles of champagne are sold in the United States annually, while France exports less than 10,000,000 bottles.

If we can induce the adoption of a system of manufacturing that is free from the objections now existing, that is, the free use of poisonous compounds, we shall have accomplished some good, and the object we sought in giving to the public the result of years of experience and close study.

That some imperfections may be found, we will not deny; but that it is the most concise and practical work on the subject ever published in America, no one will deny after a careful perusal.

THE AUTHOR.

CONTENTS.

A TREATISE

ON

Manufacturing and Adulterating Liquors.

BRANDY.

BRANDY proper is the spirituous liquor obtained by the distillation of wine. When first distilled it is perfectly white, or colorless, and only acquires a yellowish tint from the wood of the cask, in which state it is known and sold as *pale* brandy. The natural color, however, which the spirit receives from the cask, never exceeds an amber tint, no matter how long it may remain therein. All dark brandies are produced by the addition of coloring to the extent desired. Various substances were formerly used to produce the proper color; but *burnt sugar* is now used exclusively.

The Brandies most esteemed here are those of

"*Cognac*," *France*, under which appellation they are known, with various marks, as "*Otard, Dupuy & Co.*," "*J. Hennessee & Co.*," &c. Brandies from *Rochelle* and *Bordeaux* are next in quality; while those of Spain, Portugal, and Italy, are of very inferior quality.

In France, there are several varieties of this spirit distilled, which are known by names descriptive of their quality and source. The "*eau de vie supérieure*," or *Cognac Brandy*, is generally obtained from pale wines by careful distillation, and is remarkable for its fine flavor and odor. When kept in glass it is called "*White Cognac Brandy*," and the same term is sometimes applied to it when put in casks, and not artificially colored; it, however, soon acquires an amber tint.

The "*eau de vie ordinaire*," or *Common Brandy*, is distilled from high-colored, white or red wines, and has generally a specific gravity of 0.948, and varies from 22 to 27 u. p.

The "*eau de vie marc*" is obtained from the lees of vinegar and other wines, the marc or cake of grapes from which the juice has been pressed, and the commonest red wines fermented and distilled together by a quick fire, to drive over as much essential oil and flavoring as possible.

The "*eau de vie seconde*" is the weak spirit that

fuses over, after the stronger spirit has been drawn off, and the receiver changed. It is used for common drink, or mixed with other brandy.

The "*eau de vie à preuve d'Hollande*" is of the specific gravity 9.420, the common strength at which it is retailed in France.

The "*eau de vie à preuve d'huile*" is the strongest brandy usually drank. Its specific gravity is 0.918.

The "*eau de vie fort*" is usually the distillation of common brandy, keeping the first portion separate. It answers to our spirits of wine. It is of different strengths, distinguished by names exhibiting the quantity of water required to reduce the sample to the "*preuve d'Hollande.*" Specific gravity 0.839.

The "*esprit de vie*" is brandy or spirits rectified at 0.890 and upwards.

The general principles of distillation in France do not differ materially from the method in use here, in the distillation of grain or molasses. The material used being superior, produces a superior quality of spirits. The quality of brandy varies with that of the wine from which it is distilled. The soil, climate, and the different variety of the grape, possesses some peculiarity confined to itself; and this wine when distilled produces a spirit possessing like distinctions. It is a general rule in France to

distil only such wines as are unsaleable, as the profits on the wine sold as such, are much greater than when it is converted into brandy.

The strength of brandy is determined in the same way as alcohol, with a suitable hydrometer.

The constituents of brandy, by a chemical analysis, we find to be: alcohol, water, sugar, volatile oil, acetic acid, acetic ether, œnanthic ether, and tannic acid. It is from the presence of the last five of these substances that the spirit derives its distinguishing flavor and odor. The quantity of alcohol in brandy varies from 45 to 65 per cent. It is generally 1 to 2 o. p. when distilled, but age lessens the proof; and it will, by standing a year or more, fall to 3 to 5 u. p. Brandies of the best qualities seldom exceed proof, and are generally below it; and it is a common practice in France to raise the proof by adding high-proof spirit. The very *finest brandies* average from 5 to 10 u. p. and seldom exceed proof; they, therefore, contain half their weight in water, and from their boiling point being higher, they come even more highly charged with essential oil and other volatile principles of the grape, and thus possess, in a great degree, that peculiar aroma and flavor for which they are so much esteemed.

When taken from bond here, the strength of brandy depends upon the age and the quality of the spi-

rit; a fine old brandy being, perhaps, 8 or 10 u. p., while that of last year's vintage may be as strong as 2 or 1 u. p.

THE CONSTITUENTS OF BRANDY.

1st. *Alcohol*—we define as pure spirits of the strongest class, highly rectified. It is obtained from various substances by distillation: from all kinds of grain; from wine, molasses and sugar; from all kinds of fruits containing saccharine matter. Diluted alcohol may be obtained by distillation from all kinds of fermented liquors. Its components are hydrogen, oxygen, and carbon, in such proportions as to render it a powerful stimulant, and highly intoxicating.

2d. *Sugar.*—This exists in small quantities in nearly every substance from which alcohol is distilled, and its general properties are the same as alcohol. Its presence in liquors softens the alcohol to the taste.

3d. *Volatile Oil*, known by the commercial name of "*Oil Cognac.*"—This is a highly odorous oil, that *comes off*, in the distillation of brandy,* to a certain extent, being separated, more or less, according to

* It is also obtained by the distillation of the thick lees of French wines.

the temperature at which the distillation takes place, only a portion of the oil remaining with the brandy; sufficient, however, to help to give the flavor and odor desired. This oil, with the acid and ether, is the combination that distinguishes brandy from alcohol.

4th. *Acetic Acid*, and *Acetic Ether*.—The former is vinegar in a concentrated state, and the latter the same substance, in different form.

5th. *Œnanthic Acid*.—This acid passes over in small quantities towards the end of the process, when wine is distilled. It is an oily liquid, very fragrant and odorous. From this particularly brandy derives its peculiar odor, as from the volatile oil and acids it receives its flavor; from the alcohol its strength and stimulating properties; from the sugar its softness to the taste, and from tannin its astringent properties.

6th. *Tannin*, or *Tannic Acid*, is a vegetable astringent existing in wood, and in the skin of the grape; it thus becomes incorporated by fermentation with wines, and by distillation with brandy.

We have now shown what a genuine brandy is, without adulteration, and as it is when distilled. The basis we have shown you to be composed of *water* and *absolute alcohol* in about equal quantities. This alcohol is without taste or smell when deprived of the other of its properties.

We by this theory take the same basis, and add the same properties found to exist in the genuine brandy. We take a perfectly odorless "*pure spirit*," which is *absolute alcohol diluted* to the required strength, and is in its principles, general and specific, precisely the same article existing in the imported spirit. For alcohol, deprived of all properties, so as to render it tasteless and odorless, no matter from what substance it is distilled, is the same—simply a combination of hydrogen, oxygen, and carbon; hence we claim a perfect corn spirit, or spirits distilled from other grains, from sugar or molasses, or from the juice of the grape, to be identical when deprived by rectification of all oils, acids, &c., and rendered tasteless and odorless.

Our basis, then, is a perfectly "*pure spirit*," distilled from corn or rye, or a mixture of both, which we combine with the other constituents of brandy in such manner as to produce the desired result; bearing in mind, that much depends upon the material used, and the skill of the operator, to render the imitation perfect. His own judgment should be good in regard to both the liquor to be imitated and the material used in making the imitation, as the different brandies are to be varied to conform to the original. After the basis is prepared, as by "Formula No. 1," we proceed to add a small quantity of

the brandy to be imitated. To demonstrate in the most comprehensive manner, we have, by Formula 1, a *general brandy*. Now, as every particular kind of genuine brandy has a flavor and odor peculiar to itself, we add to this basis from 2 to 8 galls. of the imported brandy we desire to imitate, which will give the precise aroma desired. *Formula No.* 1, is intended for *Cognac brandy; No.* 2, for *Rochelle* and *Bordeaux*.

Formula No. 1.—*Cognac Brandy.*

To 40 galls. pure spirits, 12 to 18 o. p. add:

- 2 to 3 oz. oil Cognac (dissolved in 90 per cent. alcohol),
- 1½ lbs. loaf sugar, or its equivalent in white syrup.
- 2 oz. œnanthic acid,
- 2 oz. acetic acid, or acetic ether.
- 2 oz. tincture of kino (is equally as good as tannin).

To this body add from 5 to 10 galls. of the brandy to be imitated. Let it stand about 8 or 10 days. Color as desired; but the best guide is a sample of the brandy you desire to imitate before you, and color the same as the sample.

The proportion to be varied as your taste may dictate. If you desire a higher flavored brandy, use more of the Cognac oil; if a higher odor, use more of the œnanthic acid; if softer and richer, use more sugar or syrup; if stronger, increase the proof of the spirit. And thus, by a little practice, you can produce brandy in any form you desire.

But we wish again to repeat, that, by this *theory*, nothing is used that does not exist in the genuine brandy as distilled, nor is the imitation in its effect, medicinal or otherwise, different therefrom. This we have and shall repeat often, as it is important to the principle on which we operate.

FORMULA No. 2.—*Rochelle and Bordeaux Brandy.*

To 40 galls. pure spirits, 10 to 15 o. p., add:

2 oz. oil Cognac,
1 lb. sugar (white), or its equivalent in syrup,
3 oz. œnanthic acid,
3 oz. acetic acid,
5 oz. tincture of kino.

A few oz. black tea adds much to the flavor and astringency.

To this add from 4 to 9 galls. imported brandy of the kind to be imitated, and follow general

directions as laid down in Formula No. 1. Brandies made by Formula No. 2, should stand from three to five days, and then be racked off.

Formula No. 3.—*Other Medium Brandies.*

To 40 galls. pure spirits, 10 to 20 o. p., add

1½ oz. oil Cognac,
1 oz. loaf sugar,
2 oz. œnanthic acid,
2 oz. acetic acid,
4 oz. tincture of kino,

5 to 8 galls. of thé brandy to be imitated; and then confine yourself to principles, as laid down in Formulas 1 and 2.

These three formulas will apply to any and every style of brandy imported.

REDUCTION OF BRANDIES.

Brandies may be reduced with "*pure spirits*" to any required extent, but care should be taken to use only a spirit that is odorless, and of proof equal to the brandy. This reduction can be carried from 1 part of spirits and 4 parts of brandy, to parts of 2

and 2 each; or even to 3 of spirits to 1 of brandy. If found too *fiery*, soften with loaf sugar or syrup. A little "*oil Cognac*" may be used to increase the flavor and odor. Be particular to color correctly.

Domestic Brandies.—See Appendix.

GIN

Is a spirit distilled from grain or malt, with the addition of juniper berries. Its constituents are *alcohol*, *oil juniper*, *sugar*, *oil turpentine* in small quantities, and *acetic acid*.

Gin was originally wholly imported from Holland, and hence the name of *Hollands*, or *Holland Gin;* and was a rich, smooth spirit, chiefly flavored with juniper berries; hence the term "*Geneva*" formerly applied to it, of which "*Gin*" seems to be a corruption or diminutive.

The flavor of Gin is peculiar, and a *perfect* imitation otherwise than by distillation is *impossible;* and even by distillation, British or American manufacturers have never succeeded in producing more than a passable imitation.

Many manufacturers suppose that all that is necessary to produce a perfect *Gin*, is to use juniper oil or berries freely, in connexion with a proper pure spirit; but they have ever failed to produce the results desired.

The great number of receipts that have been published in books and otherwise, from time to time, have never been used successfully: some of them produce a flavored spirit, but it bears no resemblance to the genuine. Any person may satisfy himself of this by actual experiment. The cause of these continual failures has been, that the writers had no practical knowledge on the subject; hence the continuous attempts and failures that have succeeded each other with those who have experimented from these receipts.

"The materials employed in the distilleries of Schiedam are, two parts of unmalted rye, and one part of malted 'bigg,' the former weighing 54, and the latter 37 lbs. to the bushel. The mash tubs, which serve also as the fermenting tubs, have a capacity of 700 gallons each, being about 5 feet in diameter at the mouth, rather narrower at the bottom, and 4½ feet deep; the stirring apparatus is a long rectangular iron grid, made fast to the end of a wooden pole. About a barrel (36 galls.) of water, at a temperature of 162° to 168°, is put into the mash tun,

for every 1½ cwt. of meal, after which the malt is introduced and stirred, and lastly, the rye is added. Powerful agitation is given to the magma, till it becomes quite uniform, a process which a vigorous workman piques himself upon executing in a few minutes. The mouth of the tun is immediately covered with canvass, and further secured with a wooden cover, to confine the heat; it is left in this state for two hours. The contents being then stirred up again, the transparent spent mash of a preceding mashing is first added, and next, as much cold water as will reduce the temperature of the whole to about 85° F. The best Flemish yeast is now introduced, to the amount of 1 lb. to every 100 gallons of the mashed materials. The gravity of the wort is usually from 33 to 38 lbs., and the fermentation is carried on for 48 to 60 hours, at the end of which time the attenuation is from 7 to 4 lbs; that is, the sp. gr. of the supernatant mash is from 1.007 to 1.004. On the third day after the fermenting tub is set, the mash containing the grains is transferred to the still, and converted into low-wines. To every 100 gallons of this liquor, 2 lbs. juniper berries, from 3 to 5 years old, being added, along with ¼ lb. of salt, the whole are put into a low-wine still, and the fine spirit is drawn off by a gentle and well-regulated heat, till the magma becomes exhausted; the first and

last products being mixed together, whereby a spirit 2 or 3 per cent. above hydrometer proof is obtained, possessing the peculiar fine aroma that distinguishes pure Holland gin. The product varies from 18 to 21 gallons per quarter of grain; this large quantity being partly due to the employment of the spent mash of the preceding fermentation, an addition which contributes at the same time to improve the flavor." (Ure's Dict. of Arts.)

It will be seen from the preceding extract, that the superior flavor of gin depends more on the peculiar mode of its manufacture, than on the quantity of juniper berries employed; 2 lbs. of that substance, when new, being equivalent to less than 5 drachms of the essential oil, and when old to about 2 drachms, a quantity wholly insufficient to flavor 100 gallons of the spirit. Besides, as we have before noted, the flavor of gin differs considerably from that of juniper, the latter being merely employed as a modifying ingredient. Most of the Dutch distillers add a little *pure oil* of *turpentine*, and a handful or two of hops, to the spirits, along with the juniper berries, before rectification. The former substance has a pale yellowish-brown color, a very fragrant and agreeable smell, which tends materially to impart that fine aroma for which the best gins are so much

celebrated. The great secret lies in the careful management of the process of manufacturing.

Schiedam gin is considered the best; next in quality is that of Rotterdam, and afterwards that of Weesopper.

We now return to the starting point in gin, and say, that by other than the most careful distillation no one need think of imitating pure Hollands successfully. *We would, therefore, advise simple reduction with pure spirits* that is odorless, and without the slightest tinge of color; soften with sugar or syrup, but add nothing more. Gin may be thus reduced ¼ or ½ with but little seeming diminution of the aroma. Many *will experiment*, however.

We will give them the *best formulas* in use to produce imitations of gin, using as a basis a perfectly *pure spirit.* The whole of the casks and utensils employed for gin should be perfectly clean, and properly prepared, so as not to give color; as, if this spirit acquires the palest colored tint, its value is lessened, and, if much colored, it is unsaleable.

Formula No. 1.—*Gin.*

To 40 galls. pure spirits, 2 to 5 o. p., add:
3 do. gin to be imitated.

Take 2 lbs. good old juniper berries, digest the same in one gallon high-proof spirits for a week or ten days; then express the liquor and filter through blotting paper; add the liquor to the 40 gallons of spirits as above, and mix thoroughly.

Formula No. 2.—*Gin.*

To 40 galls. pure spirits, 2 to 4 o. p., add:
5 do. gin as before.
Take 2 lbs. juniper berries,
½ oz. sweet fennel seed,
2 oz. spirits of nitre,
1 lb. loaf-sugar,
½ gallon high proof spirits; mix thoroughly, let it stand one week, then filter, and add as in Formula No 1.

Formula No. 3.—*Gin.*

To 40 galls. pure spirits add:
3 do. gin.
Take ½ gill pure oil turpentine,*
½ oz. oil juniper,
9 each, lemons and oranges sliced,
1 lb. loaf-sugar.
Put these ingredients in ½ a gallon high-proof spi-

* The oil of turpentine for this use, should be of the best quality, and not that usually vended for painting, which contains rosin and fixed oils.

rits; let them stand ten days, then filter, and add the product as in No. 1.

These are the most approved formulas now in use, and if properly managed produce passable results; but we again repeat, that a perfect imitation of pure Holland Gin, *cannot be produced* except by distillation, and then only by great care and after a long experience.

Gin, American.—See Appendix.

RUM

Is obtained by the distillation of the fermented skimmings of the sugar boilers, the drainings of the sugar pots and hogsheads, the washings of the boilers, and from molasses, sugar, and the juice of the sugar cane. The process of distillation varies but little from that of other liquors already mentioned. Rum is exported from the West India islands, that from Jamaica and St. Croix being most in favor. Leeward Island rum is less esteemed.

The constituents of Jamaica rum are alcohol, volatile oil, butyric acid, sugar, and water.

FORMULA No. 1.—*Jamaica Spirits.*

To 40 galls. pure spirits, 8 to 10 o. p., add:

5 do. Jamaica rum,
½ oz. oil caraway,
1 oz. tincture kino,
2 oz. butyric acid,
1 lb. loaf-sugar.

Digest the last four ingredients in ½ gallon high-proof spirits. After standing two days, filter, and add product to the spirit; color with sugar coloring.

FORMULA No. 2.—*St. Croix Rum.*

To 40 galls. pure spirits, 8 to 10 o. p., add:

5 do. St. Croix rum,
1 oz. butyric acid,
2 lbs. loaf-sugar.

Let it stand two days. Color slightly with sugar coloring.

The same principle laid down in these two formulas will apply to other W. I. Rums, with some slight variation in the details, which the fancy of the manufacturer will readily suggest.

American and New England Rum.—See Appendix.

WHISKEY.—*Scotch and Irish.*

The name is derived from *Usquebaugh*, the Irish name originally applied to it. It is diluted alcohol, obtained by distillation from the fermented wort of malt or grain; that of the former is most esteemed. The inferior qualities are obtained by the distillation of potatoes, oats, rye, or barley, a small portion only being malted, or from potatoes mashed with a portion of barley malt, the resulting mash being carelessly fermented and distilled, and purposely suffered to burn, to impart the peculiar empyreumatic or smoky flavor so much relished by whiskey drinkers. The genuine malt whiskey, however, acquires but a slight impregnation of smoke from the peat used in its distillation.

The constituents of Scotch and Irish malt whiskey are: alcohol, sugar, pyrolignous acid and pyroxylic oil (creosote), acetic acid, and water. A very fine imitation of whiskey may be made by the following *formula*:—

To 40 galls. pure spirits, add:

5 do. Scotch or Irish whiskey,
¼ oz. creosote, dissolved in 1 pint alcohol,
1 lb. loaf-sugar.

Should stand at least ten days before using, and even two or three months greatly improves it.

Whiskey, common.—See Appendix.

FOREIGN WINES.

Of all liquors, Wine seems to be the most ancient. Even (as it is supposed) 2348 years before *Christ*, "Noah planted a vineyard, and he drank of the wine and was drunken." This seems to be the earliest reliable date at which mention is made of fermented liquors. Though earlier profane and mythological historians speak of wine, there is nothing reliable in their writings on which to base correct conclusions. The earliest period at which wine was submitted to distillation is undecided. By some, the Chinese are thought to have possessed the earliest knowledge of this process; others claim the northern nations of Europe as the first to apply the principle of distillation.

Herodotus, however, mentions date-spirits, as an

article of commerce, as early as the year 145 before Christ.

Albacacis, in the twelfth century, taught the method of procuring spirits from wine, but the process was doubtless known long before that time.

Wine is the fermented juice of the grape. The general character and qualities of wine are principally influenced by the climate, soil, and the maturity of the grape, as well as by the method of conducting the fermentation.

The constituents of wine are:—*Alcohol*, which is one of the principal ingredients, and on which its power of producing intoxication depends. *Sugar*, which has escaped the process of fermentation, and which is most abundant in sweet wines. *Extractin*, derived chiefly from the husk of the grape; its quantity diminishes by precipitation, owing to the gradual action of the atmosphere. *Coloring matter.*—This exists in the husk also, and is extracted by the newly-formed alcohol; its natural color is blue or purple; its red tint is owing to the action of acids. *Tartar* and *bitartrate* of *potassium* constitute the most important portion of the saline matter of wine, and appears to exercise an important influence over the fermentation. It is gradually deposited, along with coloring matter, by age. *Odoriferous matter.*—The characteristic vinous odor ap-

pears to depend upon the presence of œnanthic acid and ether; but the *bouquet of wine* arises from the essential oil. We also find small quantities of *tannin*, *gum*, *acetic* and *malic acids*, *lime*, etc., to exist in wines.

The specific gravity of wine depends on the richness and ripeness of the grape used in its manufacture, the nature of the fermentation, and its age.

We will note first in order—

The Vintage.—"Not only do the opinions of individuals in wine countries differ very widely upon the management of the vintage, but in some the period of gathering is regulated by authority, as if the vine-grower was not the judge of the state of his produce, and did not know when his property was in the best order for yielding him a profitable return.

"The signs which usually regulate it are observed in the south of Europe about the end of September or commencement of October. In the north the fear of autumnal frosts, which injure the grape, makes the seizure of the exact moment proper for the vintage a matter of great importance. The time of the vintage being fixed, it is begun as early in the day as possible, after the sun has dissipated the dew. The red grape is generally ripe before the white. In the north they are not so particular respecting the dryness of the fruit when gathered

as in the south; in fact, it is often gathered in the north of France with the dew upon it. The gathering is uniformly continued with as much rapidity as possible, if the weather continues fine, so as to finish the pressing in one day. If this cannot be done, the vintage is suspended, for the fermentation in a warm, or even a moderate temperature, is far more energetic than in cold, damp weather. It ruins the durability of the wine if the fruit is gathered and fermented at such a time.

"The fruit in some countries is cut off with a knife; in France the scissors are used, by which the stems of the bunches are rapidly severed. In other countries the hand only is applied, a mode injurious to the grape, as well as to the vine. The most approved plan is to make three distinct gatherings of the fruit. The *first* includes all the finest and ripest bunches. The green, rotten grapes, or such as have been eaten into by insects, are cleared from the bunches, which are then carefully carried home. The *second* gathering implies, naturally, a second pressing. The grapes are not quite as ripe as the first. The last gathering and pressing consists of the inferior grapes. The gathered bunches are deposited as lightly as possible, to prevent the grapes from being bruised. All dry or spoiled grapes are cast aside, where proper care is used, if fine or deli-

cate wine is intended to be made. Each laborer places his gathering in an osier basket, or a sort of wooden dossier, carried with the least possible motion. In France, in the department of Marne, the grapes are carried on horseback, covered with cloths. The grapes, in some countries, are plucked from the bunches; in others they are placed entire in the press, stems and all. The best grapes only are used for making the better kinds of wines. The astringent principle lodged in the stems is thought to be beneficial, and to impart to the wine a capacity for endurance, or long keeping. When picked, it is only for red wine, and is generally done by the hand. White wine grapes are rarely picked from the clusters.

"Grapes were anciently trodden out, after being exposed on a level floor, to the action of the solar rays, for ten days; they were then placed in the shade for five days more, in order to mature the saccharine matter. This practice is still followed in some of the islands of the Grecian Archipelago; at St. Lucar, in Spain; in Italy, at least in Calabria, and in some of the north-eastern departments of France. The fermentation is facilitated greatly by this process. In some parts of France a laborer with sabots treads the grapes out as they come from the vineyard, in a square box, having holes in the bot-

tom, and placed over a vat—a very barbarous method. The murk is then removed, and he proceeds with fresh grapes, till the vat is full.

"The wine-press differs in construction in different countries. There are several kinds. For red wine the grapes are trodden before they are pressed, in order to disengage the coloring matter from the skins; but in making white wine, this operation is never performed. In either case, where the wine-press is applied, the first pressing is despatched as quickly as possible.

"At first the press is used gently, that the wine may not overflow. The pressure is then gently increased, until the murk becomes moderately compressed. This is the *first pressing*. The grapes that did not sustain pressure, being scattered over the edges of the heap, are now gathered up, the press relaxed, and being placed upon the murk, the press is tightened again. The wine from this is called of the *second pressing*. The edges of the whole mass are now squared down with a cutting instrument, so that the mass of fruit is reduced to the form of an immense oblong cake, upon which the cuttings of the edges are heaped, and the press worked again, which makes wine of the *third pressing*, or, as the wine-maker calls it, *wine of the first cutting*. The pressing and cutting are repeated two or three times,

and what liquor flows after is called *wine of the second or third cuttings.*

"The great wine-press is capable of making no less than *twenty-five pieces of wine in four hours.* Where vineyards are extensive, as it is desirable to press the produce of the gathering in one day, however large in quantity, this press is useful; but it is the instrument of making a large quantity of secondary wine, rather than a little of a choice character, and is used principally by the larger vine-growers. There is only one species of wine which is made without beating, treading, or pressing; this is what they call in Spain *lagrima.* The grapes, melting with ripeness, are suspended in bunches, and the wine is the produce of the droppings. This can only be effected with the *muscatel* grape of the warm south. In this way the richest Malaga is made. In Cyprus the grapes are beaten with mallets, on an inclined plane, with the reservoir at the end." (Wonders of the World.) After the juice is thus prepared, the next step is the process of

Fermentation, which, according to Liebig, is the decomposition of a substance containing no nitrogen, or a metamorphosis by the elements of a complex molecule group themselves, so as to form more intimate and stable components, whose action depends upon the joint influence of warmth, air, and

moisture, is excited by the contact of all bodies, the elements of which are in a state of active decomposition or fermentation. "In nitrogenized substances of a very complex construction, fermentation is spontaneously established when water is present, and the temperature sufficiently high, and it continues till the original compounds are wholly destroyed. Substances destitute of nitrogen, on the contrary, require, in order to their undergoing this metamorphosis, the presence of nitrogenized substance already in a state of fermentation." The substances which promote this change are termed ferments; and among these, the principal are gliadine, gluten, vegetable albumen, and all substances in a state of spontaneous decomposition. Yeast, the ferment most commonly employed for inducing the vinous fermentation, is such a substance in an active state of decomposition, and whose atoms are in continual motion.

Chemists divide fermentation into five different processes, viz.: 1st. The *saccharine fermentation*, by which starch and gum are converted into sugar. 2d. The *alcoholic* or *vinous fermentation*, by which sugar is converted into alcohol. 3d. The *viscous* or *mucilaginous fermentation*, which converts sugar into mucilage, instead of alcohol. 4th. The *acetous fermentation*, by which alcohol is converted into

vinegar. 5th. The *putrid fermentation*, which is exhibited in its most marked form in the putrefaction of animal substances.

As the first applies more particularly to the process of fermenting grain, it will be alluded to again under the head of "Malting."

The second, the *alcoholic* or *vinous fermentation*, we will now speak of in detail, as applicable to the fermentation of the juice of the grape. This stage of fermentation converts sugar into alcohol, by the peculiar decomposition which sugar undergoes under certain circumstances, by which carbonic acid is eliminated and alcohol obtained. The presence of a ferment is essential to excite this fermentation, as a solution of perfectly pure sugar will remain unaltered, even though exposed to a temperature of 70° to 75° F., which is the most favorable for its production. But if a small portion of yeast, or of a similar saccharine solution, whose molecules are in a state of motion, be added, the usual symptoms of fermentation will rapidly occur, and will continue until nearly the whole of the sugar is decomposed, when the liquid will become clear, and be found to consist of diluted alcohol, while the yeast will have precipitated to the bottom and have lost its power of fermentation.

In the juices of *sweet fruits*, and in those vegetable

solutions that spontaneously run into the state of fermentation, the ferment is supplied by nature, and is intimately associated with the saccharine matter. In such cases, the nitrogenous matters present are the first to suffer decomposition or fermentation; and this particular motion of their atoms is communicated to the sugar, and continues till the latter has entirely disappeared from the liquid, or the former is wholly precipitated in the shape of decomposed yeast or ferment. In those vegetable solutions which scarcely pass into the state of fermentation, or among whose molecules such changes progress slowly and irregularly, there is a deficiency of nitrogenized matters or exciters of fermentation, and it becomes necessary to add a ferment. Recently expressed grape-juice (must) offers a lively instance of the former class of substances; and infusion of malt (wort) of the latter. When grapes are squeezed in the air, the limpid juice soon manifests the usual symptoms of fermentation, the liquid becomes turbid, carbonic acid gas is developed, and the nitrogenized principles which the juice previously contained are decomposed and precipitated under the form of ferment, which immediately induces the decomposition of the sugar; and this state continues until the whole of the yeast is precipitated in an insoluble and inert form, or the whole of the sugar is decomposed. In the juice of

those grapes that produce the most perfect wines, the relative proportions of the exciters of fermentation and the sugar are so accurately proportioned by nature, that the whole of the former are decomposed, and nearly the whole of the latter converted into alcohol; so that the liquid (wine) is left in a state not liable to future change. The chief product of the vinous fermentation is alcohol, but there are other substances simultaneously produced and which remain associated with fermented liquor. Among the principal of these are œnanthic acid and œnanthic ether; neither of which exists previous to fermentation, and are generally supposed to result from the action of the nitrogenized matters of the solution on the sugar.

It has been determined by the researches of *MM. Colin* and *Thénard*, and more recently by those of *Fremy* and *Rousseau*, that the peculiar condition of the nitrogenized matter constituting the ferment materially influences the nature of the fermentation. The essential condition of a ferment, to be able to excite the vinous fermentation, is to be sufficiently acidulous to act on colored paper; and this acidity should arise from the presence of certain vegetable acids and salts, capable of conversion into carbonic acid and carbonates, by their spontaneous decomposition. Those acids and salts which are found to

pre-exist in fermentable fruits and liquors, as the tartaric, citric, malic, and lactic acids, and their salts, should be chosen; and of these the preference should be given to the bitartrate of potassa, from its presence in the grape. The addition of any of these substances to a saccharine solution renders its fermentation more active and complete.

In the practical production and proper regulation of the vinous fermentation, consists the art of the wine maker. The circumstances most favorable to this fermentation are,—a certain degree of warmth, and a sufficient quantity of active ferment, and its due distribution through the liquor. The temperature of from 68° to 77° is most propitious for the commencement and progress of fermentation. The conversion of alcohol into vinegar proceeds with most rapidity at about 95° Fahr.

We are thus particular in this connexion to show the principle by which the fermentation of vinous liquors is produced, as in the *imitation* of *wines* the utmost care is required, as well as a correct knowledge of the principles of fermentation.

The other stages of fermentation will be found in their appropriate place under the heads of "Malting," "Vinegar," &c.

As alcohol forms the basis of all fermented as well as all distilled liquors, we append the following tables

showing the quantity of alcohol existing in different kinds of foreign wines.

1st TABLE, by Dr. Christison.

NAMES, &c.		Alcohol of 0·7939 per cent. by volume.	Proof Spirits per cent. by volume.
Port,	Weakest,	14·97	30·56
	Medium,	16·20	33·91
	Strongest,	17·10	37·27
Sherry,	Weakest,	13·98	30·84
	Mean of 13 samples, long in casks,	15·37	33·59
	Strongest,	16·17	35·12
	Mean of 9 samples, long in cask in E. Indies	14·72	32·30
	Madre-da-Xeres,	16·90	37·06
Madeira,	Strongest, long kept in casks in E. Indies,	16·90	36·81
	Weakest,	14·09	30·86
Teneriffe,	Long in casks in Calcutta,	13·84	30·21
Cercial,		15·45	33·64
Lisbon,	Dry,	16·14	34·71
Shiraz,		12·95	28·30
Amontillado,		12·63	27·60
Claret,	Growth of 1811,	7·72	16·95
Château Latour,	Do. 1825,	7·78	17.06
Rosan,	Do. 1825,	7·60	16·74
Claret,	Ordinary,	8·99	18·95
Riversaltes,		9·31	22·35
Malmsey,		10·86	28·37
Rudesheimer,	1st quality,	8 40	18·44
Do.	Inferior,	6·90	15·90
Hambacher,		7·35	16.15

2ND TABLE. Quantity of Alcohol (sp. gr. 0·825, at 60° Fahr.) in 100 parts of Wine, by volume.

NAME OF WINE.	Alcoholic Contents.	Authority.
Alba Flora,	17·26	Brande.
Barsac,	13·86	Do.
Bucellass	18·49	Do.
Burgundy (average),	14·57	Do.
Do. (do.),	12·16	Prout.
Calcavella (do.),	18 65	Brande.
Cape Madeira (do.),	20·51	Do.
Do. Muscat,	18·25	Do.
Champaigne (average),	12·61	Do.
Do. (do.)	12·20	Fontanella.
Claret, (do),	15·10	Brande.
Colares,	19·75	Do.
Constantia (white),	19·75	Do.
Do. (red),	18 92	Do.
Do. (average),	14·50	Prout.
Cote-Roti,	12·32	Brande.
Currant,	20·55	Do.
Elder,	8 79	Do.
Frontignac,	12·79	Do.
Gooseberry,	11·84	Do.
Grape,	18·11	Do.
Hermitage (red),	12·32	Do.
Do. (white),	17·43	Do.
Hock (average),	12·08	Do.
Lachryma Christi,	19 70	Do.
Lisbon,	18·94	Do.
Lissa (average),	25·41	Do.
Do. (do.),	15·90	Prout.
Lunel (do.),	15·52	Brande.
Madeira (do.),	22·27	Do.
Do. (do.),	21·20	Prout.
Malaga,	17·26	Brande.
Do.	18·94	Do.
Malmsey Madeira,	16·40	Do.
Marsala (average),	25·09	Do.
Do. (do),	18·40	Prout.
Nice,	14·63	Brande.
Orange (average),	11·26	Do.

NAME OF WINE.	Alcoholic Contents.	Authority.
Port (average,)	20·64	Prout.
Do. (do.),	22·96	Brande.
Raisin (do.),	25·41	Do.
Do. (do.),	15·90	Prout.
Red Madeira,	20·35	Brande.
Roussillon do.,	18·13	Do.
Sauterne,	14·22	Do.
Shiraz,	15·52	Do.
Sherry (average),	19·17	Do.
Do. (do.)	23·80	Prout.
Syracuse,	20·00	Do.
Do.	15·28	Brande.
Teneriffe,	19·79	Do.
Tent,	13·30	Do.
Tokay,	9·80	Do.
Vidonia,	19·25	Do.
Vin-de-Grave,	13·94	Do.
Zantee,	17·05	Do.

DIVISION AND NOMENCLATURE.

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

Red wines are derived from the must of black grapes fermented with their husks.

White wines, from white grapes, or from the juice of black grapes fermented apart from their skins.

The other qualities of wines, enumerated above, depend on the relative proportions of the constituents of the must, and on the mode in which the fermentation is conducted. The essential ingredients

of the must as a fermentable liquor (as stated under the head of *Fermentation*) are water, sugar, and a ferment. If the juice be very saccharine, and contain sufficient ferment to sustain the fermentation, the conversion of the sugar into alcohol will proceed until checked by the production of a certain amount of the latter, and there will be formed a *spirituous* or *generous wine*. If, while the juice is highly saccharine, the ferment be deficient in quantity, the production of alcohol will be less, and the redundancy of sugar proportionably greater, and a *sweet wine* will be formed. When the sugar and ferment are in considerable amount, and in the proper relative proportions for mutual decomposition, the wine will be strong-bodied and sound, without any sweetness or acidity, and of the kind called *dry*. A small proportion of sugar can give rise to only a small amount of alcohol, consequently the less saccharine grape will generate a comparatively weak or *light wine*, which will be sound and stable in its constitution in case the ferment is not in excess, but otherwise liable to pass into acetous fermentation and become acescent. In case the wine is bottled before the fermentation is fully completed, the process will proceed slowly in the bottles, and the carbonic acid generated, not having vent, will impregnate the wine and render it effervescing and

sparkling. The *rough* or *astringent* wines owe their flavor to a portion of tannic acid derived from the husks of the grapes; and the *acidulous* wines to the presence of tartaric acid. Several of the above qualities often co-exist. Thus a wine may be spirituous and sweet, rough and sweet, light and sparkling, etc.

PORTUGAL produces *Port* and *Lisbon.*

SPAIN—*Sherry*, *St. Lucar*, *Malaga*, and *Tent.*

FRANCE—*Champagne*, *Burgundy*, *Hermitage*, *Vin-de-Grave*, *Sauterne*, and *Claret.*

GERMANY—*Hock* and *Moselle.*

HUNGARY—*Tokay.*

SICILY—*Marsala*, or *Sicily Madeira*, and *Lissa.*

CAPE OF GOOD HOPE—*Constantia.*

MADEIRA AND THE CANARIES—*Madeira* and *Teneriffe.*

Wine, considered as the name of a class, may be characterized as a spirituous liquid, the result of the fermentation of grape juice. It is unnecessary for us to describe all kinds of wines here enumerated, and we will therefore particularize only the most leading in a commercial point of view.

"*Sherry* is of a deep amber color, and when good possesses a dry, aromatic flavor and fragrancy, without any acidity. It ranks among the stronger white wines. It is prepared in the vicinity of

Xeres in Spain, hence the English name of Sherry. Its dryness, or freedom from acidity, is said to arise from the use of lime in its manufacture."

"*Madeira* is the strongest of the white wines in general use. It is a slightly acid wine, and when of proper age, and in good condition, has a rich, nutty, aromatic flavor. As it occurs in the market, however, it is of very variable quality, on account both of less care taken in its manufacture than formerly, and of the adulterations and mixtures to which it is subjected after importation. The Madeira consumed in this country is generally better than that used in England; its adulteration being practised to a less extent with us, and our climate being more favorable to the improvement of the wine."

"*Teneriffe* is a white wine of a slightly acid taste, and when of good quality of a fine aromatic flavor. Its average strength is about the same as Sherry. It is made from the same grape as the Madeira, to which it bears a strong resemblance."

"*Port* is of a deep purple color, and, in its new state, is a rough, strong, and slightly sweet wine. When kept a certain length of time, it deposits a considerable portion of its astringent matter, loses the greater part of its sweetness, acquires more flavor, and retains its strength. If too long kept, it depo-

sits the whole of its astringents and coloring matter, and becomes deteriorated. Considerable quantities of brandy are usually added to it, which causes its heating quality on the palate. It is the strongest of the wines in common use."

"*Claret*, or *vin de Bordeaux*, as it is called in France, is a red wine, and from its moderate strength is ranked as a light wine. It has a deep purple color, and, when good, a delicious taste, in which the vinous flavor is blended with acidity and astringency. The most esteemed kinds are the *Medoc Clarets*, called *Château-Lafite*, *Château-Margaux*, and *Château-Latour*. Another celebrated variety is the *Château Haut Brion* of the Pays de Grave. Claret is the variety of French wine most consumed in the United States."

"*Champagne* is a white wine, light bodied, rich, and sparkling, and highly esteemed as a beverage."

MANAGEMENT OF WINES.—*Age*.—"The sparkling wines are in their prime in from 18 to 30 months after the vintage, depending on the cellaring and climate. Weak wines, of inferior growths, should be drank within 12 to 15 months, and be preserved in a very cool cellar. Sound, well-fermented, full-bodied wines are improved by age, within reasonable limits, provided they be well preserved from the air,

and stored in a cool place, having a uniform temperature. To promote the ripening of wine, some persons cover the mouths of the casks or bottles with bladder, and others remove them into a warmer situation. A small quantity of pure acetic or tartaric acid may be added to the coarser grades for the same purpose ; 2 or 3 drops added to a bottle of some kinds of new wine, immediately gives it the appearance of being 2 or 3 years old."

Bottling.—"The secret of bottling wine with success consists in the simple exercise of care and cleanliness. The *bottles* should be *sound*, *clean*, and *dry*, and perfectly free from the least *mustiness* or other odor. The *corks* should be of the best quality, and immediately before being placed in the bottles, should be compressed by means of a 'cork squeezer.' For superior or very delicate wines, the corks are usually prepared by placing them in a copper, or tub, covering them with weights to keep them down, then pouring over them boiling water, holding a little pearlash in solution. In this state they are allowed to remain for 24 hours, when they are drained, and re-immersed for a second 24 hours in hot water, after which they are well washed and soaked in clean cold water, drained, dried out of contact with dust, put into paper bags, and hung up in a dry place for use. The *wine* should be *clear* and

brilliant, and if it is not so, it must undergo the process of '*fining*' before being bottled. In fact, it is a common practice with some persons to perform this operation whether the wine requires it or not, as, if it has been mixed and doctored, it amalgamates and ameliorates the various flavors. The bottles, corks, and wine being ready, a fine clear day should be preferably chosen for bottling, and the utmost cleanliness and care should be exercised during the process. Great caution should also be taken not to shake the casks, so as to disturb the bottoms. The remaining portion that cannot be drawn off, should be passed through the 'wine-bag,' and when bottled should be set apart as inferior to the rest. The bottlers, to prevent breaking and loss, should place each bottle, before corking it, in a small bucket, having a bottom made of soft cork. If care is taken thus, there need be no breakage, though the corks should be 'flogged' in very hard. When the wine is all bottled, it is stored in a cool cellar, but *on no account on the bottle's bottom or in damp straw, but on their sides, in sweet, dry saw-dust or sand.*"

Cellaring.—A wine cellar should be dry at bottom, and either covered with good hard gravel or be paved with flags. Its gratings or windows should open toward the north, and it should be sunk sufficiently below the surface to insure an equable tem-

perature. It should also be sufficiently removed from any public thoroughfare, as not to suffer vibration from the passing of carriages. Should it not be in a position to maintain a regular temperature, arrangements should be made to apply artificial heat in winter, and proper ventilation in summer. A celebrated wine establishment known to the writer, whose cellars are above ground, have a number of thermometers suspended on the walls, and whenever the mercury sinks below 48° F., several Arnot's stoves, arranged for that purpose, are immeditaely lighted, and their action properly watched and regulated.

Coloring.—Wines are as commonly doctored in their color as their flavor. A *fawn yellow* and *golden sherry yellow* are given by means of a tincture or an infusion of saffron, turmeric, or safflower, followed by a little spirit coloring to prevent the color being too lively. All shades of *amber* and *fawn* to *deep brown* and *brandy* color, may be given by burnt sugar. *Cochineal* (either alone or with a little alum) gives a pink color; beet-root and red sanders give a *red* color; the extracts of rhatany and logwood, and the juice of elder berries, bilberries, &c., a *port wine* color. A hogshead of inferior pale sherry or white cape is commonly converted into a full-flavored *brown sherry* by the "honest" wine

dealer, by the addition of ½ pint of spirit coloring, a gallon of brandy, and a few drops of the essential oil of bitter almonds dissolved in spirit; the hole being well mixed and fined down.

Decanting.—This only refers to small quantities of wine, ready for consumption. In decanting wine, be careful not to shake or disturb the crust when moving it about or drawing the cork, particularly port wine. Never decant wine without a wine-strainer, with some fine cambric in it to prevent the crust and bits of cork going into the decanter. In decanting port wine do not drain it too near; there are generally two thirds of a wine-glass of thick dregs in each bottle, which ought not to be put in. But in white wine, there is not much settling; pour it out, however, very slowly, and raise the bottle up gradually; it should never be decanted in a hurry. Be careful not to jostle the decanters against each other when moving them about, as they easily break, especially when full.

Decoloring.—The color of wines is precipitated by age and by exposure to the light. It is also artificially removed by the action of milk, lime-water, or fresh-burnt charcoal. Wine merchants avail themselves of this property for the purpose of whitening wines that have acquired a brown color from the cask, or which are esteemed pale; and also for turn-

ing "pricked" red or dark-colored wines, into white, in which a small degree of acidity is not so much perceived. The milk should be well skimmed before being mixed with the wine, and should be used in the same manner as ordinary finings, for which it will be found a good substitute. In this way *brown sherry* is commonly converted into *pale* or *gold-colored sherry*. For the latter purpose 1 to 3 pints are usually sufficient, but to decolor red wine 2 to 3 quarts or more will be required, according to the nature and intensity of the color, or the shade of color desired. Charcoal is seldom used, as it removes the flavor as well as color, but a very *little* milk of lime may sometimes be advantageously substituted for milk, when the wine has much acidity.

Fining.—Wine is clarified in a similar manner to beer. White Wines are usually fined by isinglass, in the proportion of about 1½ oz. (dissolved in 1½ pints of water, and thinned with some of the wine) to the hogshead. Red Wines are generally fined with the whites of eggs, in the proportion of 12 or 18 to the pipe; they must be well beaten to a froth with about a pint of water, and afterwards with a little of the wine, before adding them to the liquor. Sometimes hartshorn shavings, or pale sweet glue, is substituted for isinglass; and for some strong red

wines, abounding in tannin, a little sheep's or bullock's blood is very commonly employed. The use of blood is not, however, to be recommended, as it communicates a very trifling, but still an unpleasant flavor and odor, which is easily recognised by the palate of a professed "wine-taster;" besides which, the practice is dirty and disgusting. Gypsum is frequently used to clear muddy white wines; as also milk of lime. Some persons add about 1 oz. of sugar of lead dissolved in water to a hogshead of such wine, and after well mixing it in, further add a like quantity of bisulphate of potash (sal enixum), also dissolved in water, and rummage well. In this process the sugar of lead is decomposed and falls down as an insoluble sulphate, and hence it is argued that it is not so dangerous as has been generally represented by Accum, and others afflicted with the poison mania. The use of lead, however, in any shape is objectionable, and should never be adopted by the wine-dealer, however *plausible* the above statements may appear. In France a person known to employ lead in wine would subject himself to fine and imprisonment.

Flatness.—This is best removed by the addition of a little new brisk wine of the same kind; or by rousing in two or three pounds of honey, or bruised sultana raisins, and three or four quarts of good

brandy per hogshead. By this treatment the wine will usually be recovered in about a fortnight, unless in very cold weather. Should it be wanted sooner, add a table-spoonful or two of yeast, and remove it to a warmer situation.

Flavoring.—Various ingredients are added to inferior wines to give them the *flavor* of others more expensive, and to American wines to make them resemble those imported. Substances are also added in a similar manner to communicate the *aroma* of the highly-flavored grape wines. Among the *first* are *bitter almonds*, or the *essential oil of almonds*, or preferably its *alcoholic solution*, which are used to impart a SHERRY OR NUTTY FLAVOR to weak-flavored wines, as sherry, white cape, malt, raisin, parsnip, and other similar British wines; *rhatany*, *kino*, *oak sawdust* and *bark*, *alum*, etc., to convey ASTRINGENCY; and *tincture of the seeds of raisins* to impart a PORT WINE FLAVOR. Among the substances employed to communicate the BOUQUET of the *finer wines*, may be mentioned, *orris root*, *eau de fleurs d'oranges*, *neroli*, *vanilla*, *violet petals*, *cedrat*, *sweetbrier*, *clary*, *elder flowers*, *quinces*, *cherry-laurel water*, etc. There are but few of those extracts used in this system, nor would we recommend the use of any not particularly specified under the proper head of *imitation wines*.

"*Improving.*—This is the cant term of the wine-trade, under which all the adulteration and 'doctoring' of wine is carried on. A poor *sherry* is improved by the addition of a little *almond flavor*, *honey*, and *spirit;* a *port* deficient in body and astringency, by the addition of some red tartar (dissolved in boiling water), some kino, rhatany, or catechu, and a little honey and brandy.

"*Mixing.*—Few wines are sold without admixture. It is found that the intoxicating properties of wine are increased by mixing them with other wines of a different age and growth. In many cases the flavor is at the same time improved. Thus, a *thin port* is improved by the addition of a similar wine having a full body, or by a little Malaga, Teneriffe, or rich old sherry; and an *inferior old sherry* may be improved by admixture with a little full-bodied wine of the last vintage. In this consists the great art of 'cellar management,' and to such an extent is this carried, both here and in England, that it may be confidently asserted that but little wine ever reaches the consumer in an *unmixed* or *natural* state.

"*Mustiness.*—This is easiest removed by violently agitating the wine for some time with a little of the sweetest olive or almond oil. The cause of the bad taste is the presence of an essential oil,

which the fixed oil seizes on and rises with it to the surface, when it may be skimmed off. A little coarsely-powdered fresh-burnt charcoal, or even some slices of bread toasted black, will frequently have a like effect. A little bruised mustard is used by some persons.

"*Perfuming.*—This is chiefly performed on American wines for family use. For its application to foreign wines, see *flavoring*. Wines may be perfumed by the simple addition of any odorous substances previously well mixed with a little of the wine, or dissolved in a few ounces of spirit.

"*Racking.*—This should be performed in cool weather, and preferably early in the spring. To avoid disturbing the dregs, a clean syphon, well managed, will be found better than a cock or faucet. The bottoms, or foul portion, may be strained through a wine-bag, and added to some other inferior wine.

"*Ripening.*—To promote the maturation of wine, various plans are adopted by the growers and dealers. One of the safest ways, especially for strong wines, is not to rack them till they have stood fifteen or eighteen months upon the lees, at the same time regulating the temperature upon the principles described under FERMENTATION. In this way, the slow or insensible fermentation which causes the maturation of wine, will be promoted, without the

access of the acetous fermentation, or that which causes acidity.—*Another safe method* is, to remove the racked wine into a rather warmer situation than usual, observing properly to exclude the action of the air, which cannot be done with wine in wood, if the place be very dry.—*A third method* is, to remove the corks or bungs, and to substitute bladder, tied or fastened over air-tight. Bottled wine treated in this way ripens very quickly in a temperate situation.

"*Roughening.*—A roughness or astringency is readily communicated to wine by the cautious use of kino, catechu, or rhatany.

"*Ropiness or viscidity.*—This arises from the wine containing too little tannin or astringent matter to precipitate the gluten, albumen, or other azotized substance, occasioning the malady. Such wine cannot be clarified in the ordinary way, because it is incapable of causing the coagulation or precipitation of the finings. The remedy is to supply the principle in which it is deficient. M. François of Nantes prescribes the bruised berries of the mountain ash (1 lb. to the barrel) for this purpose. A little catechu, kino, or the bruised foot stalks of the grape, may also be conveniently and advantageously used in the same way. Any other substance that precipitates albumen may

likewise be employed. See MALT LIQUORS and BREWING."

Second Fermentation.—(La-pousse of the French.) Inordinate fermentation, either primary or secondary, in wine or any other fermented liquor, may be readily checked by racking it into a cask which has been previously fumigated with burning sulphur; or one-half of the wine may be drawn off from the cask, and a lighted match, made by dipping some rags in melted brimstone, may be held by a pair of tongs in the bung-hole, slightly covered, so as to impregnate the liquor with the fumes. The decanted portion of the wine is then returned to the cask, which is immediately bunged down close, and well agitated for a few minutes. 1 oz. of brimstone thus employed is sufficient for a hogshead. This is the common plan adopted in the wine districts of France, either to allay the fermentation of wine, or to preserve *must* or grape juice in the sweet state. *Another method*, which is very convenient and harmless, is to mix about ½ lb. to 1 lb. of bruised mustard seed with each hogshead. *A fourth method* is to add to the wine about 1-1000 part, or less, of sulphite of lime. This substance seldom fails of arresting the fermentation. In addition to the above remedies, a little sulphuric acid is sometimes employed, and the use of black oxide of manganese, or chlo-

rate of potash, has been proposed on theoretical grounds; but we do not recommend their use.

Souring.—This is either occasioned by the wine having been imperfectly fermented, or from its having been kept in a cellar where it has been exposed to too much heat or air, or to continual vibrations, occasioned by the passage of loaded vehicles through the adjoining thoroughfare. The common remedy recommended in books for this purpose, is to saturate the acid with chalk, milk of lime, or calcined oyster shells; but such additions, made in sufficient quantity to effect this object, destroy the character of the wine, and render it sickly and vapid. Formerly it was a very common practice to add litharge to alleviate the acidity; but the wine was thus rendered highly injurious to health, and frequently converted into a certain and deadly poison. Owing to the exertions of the Council of Salubrity, this practice has been wholly put down in France; and this example, combined with the easy method of detecting *lead* in wine, which are now so generally known, has led to its discontinuance elsewhere.

The best and safest remedy is to mix it with a considerable portion of full-bodied new wine, adding, at the same time, a little brandy, and in two or three weeks to fine it down, and either

put it into bottles or to consume it as soon as possible.

Sparkling, Creaming, and Briskness.—These properties are conveyed to wine by racking into close vessels before the fermentation is complete; and while there still remains a considerable portion of undecomposed sugar, wine of this description, which has lost its briskness, may be restored by adding to each bottle a few grains of lump-sugar, or rock-candy. This is the way in which champagne is treated in France. The bottles are afterward inverted, by which means any sediment that forms, falls into the necks, when the corks are partially withdrawn, and the sediment is immediately expelled by the pressure of the gas. If the wine remains muddy, a little solution of sugar and finings are added, and the bottles are again placed in a vertical position, and after two or three months the sediment is discharged as before. Sometimes this process is repeated three or four times, if the wine continues muddy.

Taste of Casks.—See *Mustiness.*

IMITATION OF FOREIGN WINES.

Cider or apple juice properly fermented, is the article usually employed to produce imitations of foreign wines.

The various *imitations* are produced by a process very similar to that of making the wine from the juice of the grape, and its perfection depends upon nearly the same principles. The fruit should be sound, and not gathered until it has arrived at a perfect state of maturity, as evinced by its flavor when tasted; for, if it be used when unripe, the wine will be harsh, disagreeable, and unwholesome. If the fruit is decayed, the wine will be insipid and nauseous to the taste. The juice is then pressed out and used after being prepared. The juice of the *Crab Apple* is preferable. Much care is required to produce the fermentation properly.

In the cider counties the culture of the apple engages especial attention. Dry rising ground, sheltered from the northerly and easterly winds, is best suited for an orchard. The fruit, after being gathered, is usually left for fourteen or fifteen days, in a

barn or loft, to mellow or mature, during which time a considerable portion of the mucilage is decomposed, and alcohol and carbonic acid developed. The spoiled apples should then be separated from the sound ones, as they not only impart a bad flavor to the cider, but prevent its spontaneous clarification. Unripe apples should also be avoided, as they do not contain sufficient sugar to undergo the vinous fermentation, while they contribute to render the liquor rough and acidulous. Sour and rough-tasted apples are usually preferred by farmers for making cider, but fruit abounding in sugar would be preferable, provided the same skill were exercised in the manufacture of cider as in the process of brewing malt liquor.

The process of cider making is nearly the same in all parts of the civilized world, and consists essentially of collecting the fruit, the expression and fermentation of the juice, and the storing and management of the liquor. The apples are crushed or ground in a mill; the liquor which runs off, is put into casks, and should be allowed to ferment in the shade in an airy situation at a temperature of 60° to 70° Fahr. It must be carefully watched, and as soon as the sediment has subsided, the cider must be racked off into clean casks, and material for its preparation should be added as follows:—

To 40 galls. cider, add:

3 do. pure spirits, 10 u. p.,
3 lbs. sugar, or its equivalent in syrup,
½ lb. crude tartar.

These should be well stirred in, the cask filled up, and left with bung open. The temperature being suitable, the second or vinous fermentation soon commences, when the cider should be frequently skimmed (if necessary), and well roused up, and after six or eight days of this treatment, depending upon the fermentation and the attenuation of the *must*, it is again racked off, the cask filled, and bunged down close. In four or five weeks more, the cask is again filled up, and after some weeks is "pegged" or "spiled" to ascertain if it be fine and transparent; if so, it again undergoes the operation of racking; but if, on the contrary, it continues muddy, it must previously pass through the process of *fining*.

It is absolutely necessary to the production of a proper basis for *imitation wines*, that the fermentation be conducted at a low temperature, so as to convert the whole of the sugar into alcohol, and that this should remain in the liquor instead of undergoing the process of acetification. The acetous fermentation, or the conversion of alcohol into vinegar, proceeds most rapidly at a temperature of 95° F.,

and at lower temperatures the action becomes slower until at 46 to 50° F., no such change takes place. It is therefore quite evident, that if the saccharine juice of apples, or any other fruit, be 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, and tend not only to improve its quality, but by its conservative and chemical action, to precipitate the nitrogenous substances, or exciters of a future change. In practice it has been found that sour and rough tasted apples produce the best cider. This arises because they contain less sugar and more malic acid, and the presence of the latter impedes the conversion of alcohol into vinegar. But cider for *imitation wines* made with such apples can never equal in quality that prepared *at a low temperature from fruit abounding in sugar.*

As the juice of apples contains less sugar in proportion to the amount of acid and nitrogenized matter than that of grapes, the addition of some of this article would render it more suitable for the production of a *vinous liquor.* Good West India Sugar* is the best for this purpose. I have tasted cider made

* For red Wines; best white sugar or syrup must be used for white Wines.

in this way, and that had been stored in fresh emptied rum puncheons, that had all the pungency and vinosity of foreign wine.

The basis being thus prepared, care will be necessary to produce perfect imitations. And we would state, in this connexion, that not only is care necessary, but the operator must see that every part of the process is conducted strictly according to the rules as laid down in this treatise; nor do we say that *any* person can, without former experience, conduct the process with proper care. Experience and care are absolutely necessary in this as in any other branch of trade, to insure entire success.

After the sugar, spirit, &c., has been added, and the cider has passed through the second or vinous fermentation, and the process of fining has been duly attended to, it is in a suitable state for use, and called *prepared cider*. In this state it will remain for months unless exposed to a high temperature, and then will requireas great a degree of heat to commence the acetous fermentation as would be required for good foreign wines; and its conversion into vinegar is therefore impossible, unless treated in the same way as would be necessary for the conversion of wine.

The same rules as laid down for the management of foreign wines, apply to the imitations made by

the formulas here given; and reference is given to our articles on bottling, coloring, decanting, decoloring, fining, ripening, &c.

Formula No. 1.—*Champagne.*

To 40 galls. "prepared cider," add:

3 lbs. loaf-sugar,
2 oz. crystallized tartaric acid,
½ qt. yeast,
3 galls. water, and
4 " spirits, 15 u. p.

Let it stand 10 days, fine and bottle it, if sparkling. If not sparkling, again fine it, and add more acid, and this process should be repeated until it is suitable for bottling. When bottled, put into each bottle a piece of white sugar the size of a pea, then cork and wire the bottles, covering with tin foil, after the manner of champagne.

Formula No. 2.—*Champagne.*

To 40 galls. prepared cider, add:

5 " wild grape juice, } pressed and
2 lbs. white sugar, } strained,

1 gall. spirits, 15 u. p.,
½ pt. lemon juice,
3 galls. clear water.

Add tartaric acid, and manage as in No. 1.

Formula No. 3.—*Champagne.*

To 40 galls. prepared cider, add:
3 " water,
1 " spirits,
1 lb. Narbonne honey,
½ lb. sweet yeast,
5 lbs. raisins,
½ pt. lemon juice, and manage as directed in Formula No. 1.

For champagnes, the cider should be discolored.

The finest imitation of champagne may be made from the native wine of the West, the Catawba, Missouri, &c., mixed with prepared cider as follows:

Formula No. 4.—*Champagne.*

20 galls. prepared cider,
20 " native wine (white),
3 lbs. loaf-sugar,

½ lb. lemon juice,
1½ gall. water,
2 oz. tartaric acid, and manage as directed in No. 1.

Formula No. 5.—*Sherry.*

To 40 galls prepared cider, add:
2 do. spirits,
3 lbs. raisins,
6 galls. good sherry,
½ oz. oil bitter almonds (dissolved in alcohol).
Let it stand 10 days and draw it off carefully; fine it down and again rack it into another cask.

Formula No. 6.—*Sherry.*

To 20 galls. prepared cider, add:
20 do. teneriffe wine,
½ oz. oil bitter almonds (cut in alcohol) and
1 gall. spirits. Same directions as in No. 5.

Formula No. 7.—*Sherry.*

To 20 galls. prepared cider, add:
20 do. cape or native white wine,

½ oz. almond oil (cut in alcohol),
1 gall. spirits, 3 lbs loaf-sugar,
Same directions as in No. 5.

Formula No. 8.—*Madeira.*

40 galls prepared cider,
6 do. pure madeira wine,
2 do. spirits, ¼ lb. tartaric acid,
⅛ oz. almond oil (cut in alcohol),
5 lbs. raisins. Let the whole stand 10 days until thoroughly amalgamated, then observe general directions for managing, after racking and fining as in No. 5.

Formula No. 9.—*Madeira.*

To 20 galls. cape or native white wine, and
20 galls. cider, add:
5 do. sherry,
2 do. brandy,
8 oz. oil almonds,
4 oz. cream tartar. Manage as directed in No. 8.

X. Formula.—*Teneriffe.*

To 40 galls. prepared cider, add:
6 do. good Teneriffe,

½ pt. lemon juice,
1 lb. loaf sugar,
2 galls. spirits. Manage as directed in No. VIII.

XI. Formula.—*Teneriffe.*

To 20 galls. prepared cider add:
20 do. cape or native white wine,
½ pt. lemon juice,
1 pt. honey,
3 lbs. raisins,
1 gall. spirits. Manage as directed in No. VIII.

XII. Formula.—*Port.*

To 40 galls. prepared cider add:
6 galls. good port wine,
10 qts. wild grapes (clusters),
½ lb. bruised rhatany root,
3 oz. tincture of kino,
3 lbs. loaf sugar,
2 galls. spirits. Let this stand ten days; color, if too light, with tincture of rhatany, then rack it off and fine it. This should be repeated until the color is perfect and the liquid clear. These directions apply to all *ports.*

XIII. Formula.—*Port.*

To 20 galls. prepared cider and
20 do. dark native wine add:
4 lbs. bruised raisins,
3 oz. tincture of kino,
4 lbs. N. O. sugar,
2 oz. alum, and
3 galls. spirits.

XIV. Formula.—*Port.*

To 40 galls. prepared cider add:
10 do. red cape wine,
2 do. Bordeaux brandy,
3 lbs. N. O. sugar,
3 oz. pounded catechu,
3 lbs. bruised raisins.

XV. Formula.—*Claret.*

To 40 galls. prepared cider add:
6 do. port wine,
3 do. water,
2 lbs. cream of tartar,

1 lb. loaf sugar,

the juice of 10 lemons. Color with the juice of the red beet, fine and rack it, after standing 12 days.

XVI. Formula.—*Claret.*

To 20 galls. prepared cider add:

20 do. red cape or red native wine,

½ lb. crude tartar,

3 galls. water,

1 lb. sugar. Color as above, fine, &c.

XVII. Formula.—*Malaga.*

To 40 galls. prepared cider add:

6 do. good Malaga,

4 lbs. N. O. sugar,

½ lb. crude tartar,

2 lbs. raisins,

2 oz. tincture of kino. Color with sugar coloring, let it stand two weeks, and rack it off, fine, &c.

XVIII. Formula.—*Malaga.*

To 20 galls. prepared cider add:

20 do. red cape or native wine,

2 oz. tincture of kino,
3 lbs. N. O. sugar,
2 lbs. raisins. Color, fine &c., as above.

The foregoing embraces the usual varieties of foreign wines imitated, though the same principle with care may be applied to any wine imported. We will, therefore, give, as a *general formula:*

To 40 galls. prepared cider add from 6 to 10 galls. of the wine to be imitated.

If a sweet wine, add sugar, honey, or syrup to sweeten; if an astringent wine, add tincture of kino; if a rough wine, add tincture of rhatany; and then color according to the shade of the wine. Color as follows:—

A Sherry color, with tincture of saffron;
Light amber to deep brown, with sugar coloring;
Brandy color, with sugar coloring;
Red, beet root, or red saunders;
Port wine color, extract of rhatany.
Coloring should always be put in before fining.

CIDER.

There seems to be but little difference in the mode practised in different countries in the production of cider.

The apples, after being plucked, are left in heaps in the orchard for some time, to complete their ripening, and render them more saccharine. They are then crushed between grooved cylinders, surmounted by a hopper, or in a circular trough, by two vertical edge-wheels of wood moved by a horse; after passing through which they are received into large tubs or sieves, and are then called pommace.

They are afterwards laid on the vat in alternate layers of the pommace and clean straw. They are then pressed, a little water being occasionally added. The juice passes through a hair sieve, or similar strainer, and is received in a large vessel, whence it is run into casks or open vats, where every thing held in mechanical suspension is deposited.

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, one and one half gallons of good brandy or rum are frequently added, with 2 oz. powdered catechu (dissolved in water), 7 lbs. good moist sugar or honey, one half 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 3 or 4 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 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 the cider be 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 12 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 1 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.

CHAMPAGNE CIDER.

Prep. Good pale vinous cider 1 hogshead; proof spirit (pale) 3 gallons; honey or sugar 14 lbs.; mix, and let them remain together in a temperate situation for 1 month; then add orange-flower water 1 quart; and fine it down with skimmed milk ½ a gallon.

Remarks. This will be very pale; and a similar article, when bottled in champagne bottles, silvered, and labelled, has been often sold to the ignorant for champagne. It opens very brisk, if managed properly.

FRENCH CIDER.

After the apples are mashed in a mill, it is allowed to remain in a tun or *vat* for 14 or 15 hours before pressing. The juice is placed in casks, which are kept quite full, and so placed upon skids that small tubs may be put under them, to receive the matter that works over. At the end of 3 or 4 days for

sweet cider, and 9 or 10 days for *strong cider*, it is then racked into sulphured casks and stored in a cool place.

The same rules for bottling cider of all kinds as are laid down for wines.

VINEGAR.

Vinegar is diluted acetic acid, more or less mixed with gum, sugar, and other vegetable matter which has gone through the process of acetification. Many processes are in use to produce vinegar from different vegetable substances. The process most in use in the eastern cities, is known as the "*German method*," and is generally considered preferable to the old or slow methods formerly in use.

GERMAN, OR QUICK METHOD OF MAKING VINEGAR.

Acetification consists of the mere oxidation of alcohol in contact with organic matter. This fact

led to the adoption of an improved system, which consists in the direct employment of diluted alcohol, and in vastly enlarging the surface of the liquid exposed to the air. This is effected by causing a mixture of 1 part of alcohol at 80 per cent., 4 to 6 parts soft water, or say 5 galls. alcohol, 20 to 30 galls. soft water, and ½ lb. honey, to trickle down through a mass of *beech shavings* steeped in vinegar, and contained in a vessel called a vinegar generator. It is an oak or pine tub, narrower at the bottom than at the top, furnished with a false bottom having a number of small holes loosely filled with pack thread about 6 inches long, and prevented from falling through by a knot at the upper end. The shelf is also perforated with four open glass tubes, as air vents, each having its ends projecting above and below the shelf. The tub at its lower part is pierced with a horizontal row of eight equidistant round holes, to admit atmospheric air. One inch above the bottom is a syphon-formed discharge pipe, whose upper curvature stands one inch below the level of the air holes in the side of the tub. The body of the tub being filled with beech shavings, the alcoholic liquor, first heated to between 75 and 85° F., is put in the tub. It trickles slowly down through the holes by means of the pack thread, after passing through the shavings slowly, collects

at the bottom of the tub, and then runs off by the syphon pipe. The air enters by the circular row of holes, circulates freely in the tub, and escapes by the glass tubes. As the oxygen is absorbed, the temperature of the liquor rises to 100 or 105° F., and remains stationary at that point while the action goes on favorably. The liquor requires to be passed through the cask *two* or *three* times before the acetification is complete, which is generally effected in 24 to 36 hours.

A mixture of 80 galls. water, 14 galls. common whiskey, 10 oz. acetic acid, 3 lbs. sugar or honey, forming together 94 galls., yields on an average an almost equal quantity of vinegar. The color will be white, but, if desired, any color may be added.

MALT VINEGAR

Is prepared from malt, which is mashed with hot water, and the resulting wort is fermented as in the common process of brewing. The liquor is then run into barrels placed endwise, tied over with coarse canvass, and arranged, side by side, in a dark room, moderately heated by a stove, and properly supplied with air. Here it remains till the *acetous*

fermentation is nearly complete, which usually occupies several weeks, or even months. The vinegar is next run off into two large tuns furnished with false bottoms, on which "rape" (the pressed cake from making domestic wines, or the green twigs or cuttings of vines) is placed. One of these vessels is wholly, and the other only three-fourths, filled. The fermentation commences and proceeds more rapidly in the latter than in the former tun, and the liquor it contains, consequently, matures sooner. When fit for sale a portion of the vinegar is withdrawn from the smaller quantity, and its place supplied with a like quantity from the full tun, and this, in its turn, is refilled from the barrels before noticed. This process is carried on with a number of tuns at once, which are all worked in pairs. The general properties of this kind of vinegar are well known. Its pleasant and refreshing odor is derived from acetic acid and acetic ether.

WINE VINEGAR

Is prepared in wine countries by a similar process to that employed for making malt vinegar. That prepared from white wine (*White Wine Vinegar*) is most esteemed. It is purer and pleasanter than

malt vinegar. It usually contains from 5 to 6 per cent. of acetic acid.

OTHER VINEGARS.

Cider Vinegar.—From cider worked as malt vinegar.

Sugar Vinegar.—Brown sugar 4 lbs. to each gallon of water; worked as last.

Gooseberry Vinegar.—From bruised gooseberries and brown sugar, 1½ lbs. to each gallon of water; worked as last.

Raisin Vinegar.—From the marc left from making raisin wine. 1 cwt. to 15 gallons of water, along with a little yeast; worked as malt vinegar.

Pickling Vinegar.—As malt vinegar, but paler and stronger.

Ale Vinegar.—From strong pale ale, worked upon fine cuttings or rape; as the last.

Crystal Vinegar.—Pickling vinegar 1 gallon, agitated with fresh-burnt animal charcoal for 24 hours, and then decanted or filtered. Used for pickles.

Argol Vinegar.—White argol or cream of tartar ¼ lb., boiling water 2 gallons; dissolve, cool, add proof spirit 3 pints, and keep it lightly covered in a warm place till ripe. White and pleasant.

German Household Vinegar.—Soft water 7½ gallons; honey, or brown sugar, 2 lbs.; cream of tartar 2 oz.; corn spirit 1 gallon;—as last.

FRENCH LIQUEURS AND CORDIALS.

LIQUEURS.

Diluted alcohol, aromatized and sweetened. The French liqueuristes are proverbial for the superior quality, creamlike smoothness, and delicate flavor of their cordials. This chiefly arises from the employment of very pure spirit and sugar, and the judicious application of the flavoring ingredients. The French liqueuristes distinguish their cordials into two classes, viz.: *waters*, or liqueurs, which, though sweetened, are perfectly devoid of viscidity —and *creams*, *oils*, and *balms*, which contain sufficient sugar to impart to them a considerable degree of consistence. The first part of the process is the preparation of the aromatized or flavoring essences. These are usually prepared by infusion or maceration in very pure spirit, at about 2 to 4 u. p. (sp. gr.

0·922 to 0·925), placed in well-corked glass carboys, or stoneware bottles. The maceration is continued, with occasional agitation, for four or five weeks, when the aromatized spirit is drawn off, and either distilled or filtered; usually the former. These spirits are called, by the French, "*infusions.*" The *outer* peel of cedrats, lemons, oranges, limettes, bergamottes, &c., is alone used, and is obtained either by carefully peeling the fruit with a knife, or by rubbing it off with a lump of hard white sugar. Aromatic seeds and woods are bruised by pounding before being submitted to infusion. The substances employed by the French to *color* their liqueurs are, —for *blue*, sulphate of indigo nearly neutralized with chalk, or the juice of blue flowers or berries;—*fawn and brandy color*, burnt sugar; *green*, spinage or parsley leaves digested in spirit; also by mixing blue and yellow;—*red*, powdered cochineal, either alone or mixed with a *little* alum;—*violet*, blue violet petals, or litmus;—*yellow*, an aqueous infusion of safflowers or French berries, or a spirituous tincture of turmeric.

CORDIAL.

Aromatized and sweetened spirit employed as a beverage.

Cordials are prepared by either infusing the aromatics in the spirit, and drawing off the essence by distillation, which is then sweetened, or without distillation, by flavoring the spirit with essential oils, or simple digestion on the ingredients, adding sugar or syrup, as before.

Pure spirit is the basis used in making all kinds of cordials, and for this purpose should be *perfectly flavorless;* or, if not entirely so, the cordial will be inferior. The solid ingredients should be coarsely pounded or bruised before digestion in the spirit, and this should be done immediately before putting them into the cask or vat; as, after they are bruised, they rapidly lose their aromatic properties by exposure to the air. The practice of drying the ingredients before pounding them, adopted by some workmen for the mere sake of lessening the labor, cannot be too much avoided, as the least exposure to heat tends to lessen their aromatic properties, which are very volatile. The length of time the ingredients should be digested in the spirit, should never be less than three or four days, but a longer period is preferable when distillation is not employed. In either case, the time allowed for digestion may be advantageously extended to ten days or a fortnight, and frequent agitation should be had recourse to. When essential oils are employed to give the flavor, they

should be first dissolved in a little strong alcohol, or rectified spirit of wine, so as to make a perfectly transparent solution; and when added to the spirit, they should be mixed up with the whole mass as rapidly and as perfectly as possible by laborious and long-continued agitation. 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. 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 capillaire or syrup before adding it to the aromatized spirit; and this should not be added until the latter has been rendered perfectly fine by filtering or fining. Some spirits, as aniseed, &c., frequently require this treatment, which is best performed by running them through a fine and clean wine-bag, 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 this not be the case, they may be fined with the whites 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 a fortnight the liquor will be clear.

A most convenient and easy way of manufacturing cordials, especially where it is wished to avoid keeping a large stock, is always to keep two casks of sweetened spirit ready prepared, at the strength of 60 or 64 u. p. The one should contain 1 lb. of sugar to the gallon, the other 3 lbs. per gallon. From these may be made spirit of any intermediate sweetness, which may be flavored with any essential oil dissolved in alcohol, or any aromatic spirit, prepared either by digestion or distillation. As a general rule, the concentrated essences may be made by dissolving 1 oz. of the essential oil in 1 pint of the strongest rectified spirit of wine. This solution should be kept in well-corked bottles, and used by dropping it cautiously into the sweetened spirit until the desired flavor is produced. During this operation, the cordial should be frequently and violently shaken, to produce a perfect admixture. Should sufficient essence to foul the liquor be added by accident, the transparency may be restored by the addition of a little more spirit, or by clarification.

The most frequent cause of failure in the manufacture of cordials is the addition of *too much flavoring*. Persons unaccustomed to the use of strong aromatics and essential oils, seldom estimate power, and conse-

quently generally add too much of them, and thus not only is the liquor rendered disagreeably high flavored, but the quantity of oil present turns it "*milky*" or "*foul*," on the addition of the water. This again is another source of annoyance, as from the consistence or viscidity of the fluid, it is less readily "*fined down*" than unsweetened liquor, and often gives much trouble to inexperienced operators. The most certain way to prevent this, is to use *too little*, rather than *too much* flavoring; for, if the quantity prove insufficient, it may readily be "*brought up*," even after the cordial is made. A careful attention to the previous remarks will render this branch of manufacturing far more perfect and easy of performance than it is at present, and will, in most cases, produce *at once* a satisfactory article, "*fine, sweet, and pleasant.*"

ANISEED CORDIAL.

1 lb. aniseed bruised, or
2 drachms of the essential oil,
6 galls. pure spirits, at proof. Macerate for eight days. Then add:
2 galls. clear soft water, and
1 do. clarified syrup.

This will make nine gallons of cordial at twenty-

five per cent. under proof, which is as weak as "aniseed" should ever be made. It may be reduced with sweetened water.

CARAWAY CORDIAL.

3 lbs. caraway seed bruised, or
½ oz. essential oil,
20 lbs. sugar,
40 galls. pure spirits, at proof,
16 galls. clear soft water.
Macerate for ten days.

CINNAMON CORDIAL.

This is seldom made with cinnamon, but with either the essential oil or cassia bark. It is preferred colored, and therefore may be very well prepared by simple digestion. If the oil be essential, one drachm will be found to be enough for 2 or 3 gallons of spirit. The addition of 2 or 3 drops, each, of essence of lemon and orange peel, with about a spoonful of essence of cardamom to each gallon, will improve it. Some persons add to the above quantity one drachm of cardamom seeds, and one ounce each

of dried orange and lemon peel. One ounce of oil of cassia is equal to eight pounds of the buds or bark. If wanted dark, color with burned sugar; the quantity of sugar is one-half pound to the gallon.

CITRON CORDIAL.

3 lbs. yellow rind of citrons,
1 lb. orange peel,
2 oz. bruised nutmegs,
13 galls. proof spirits (at proof); macerate, add water sufficient,
2 lbs. fine lump sugar for every gallon of the cordial.

CLOVE CORDIAL.

1 oz. bruised cloves, or
1 drachm essential oil, to every 4 galls. of proof spirits, at proof.

It is preferred of a very deep color, and is therefore strongly colored with cochineal or with burned sugar. It should have 3 lbs. sugar to the gallon, and this need not be very fine. The addition of 1 drachm of bruised pimento, or five drops of the oil for every ounce of cloves, improves this cordial.

CORIANDER CORDIAL.

1 lb. coriander seeds,
1 oz. caraway seeds,
1 orange, to every 3 galls. proof spirits.

LEMON CORDIAL.

Digest one ounce, each, of fresh and dried lemon peel, and one ounce fresh orange peel, in one gallon of proof spirits, for one week; strain it, add clear soft water to reduce it to the desired strength, and lump sugar in the proportion of 2 half-pounds to 3 pounds to the gallon.

ORANGE CORDIAL.

Like lemon cordial; one-half pound fresh orange peel to the gallon.

PEPPERMINT CORDIAL.

Add 2 ounces oil of peppermint to 1 quart spirits of wine; agitate well in a corked bottle that will

hold three pints or more, then pour it into a cask that will hold upwards of 100 gallons; add 36 gallons of perfectly flavorless proof spirits. Agitate well for ten minutes, then add 2 cwt. of the best refined lump sugar, previously dissolved in twice its weight of pure rain water. Stir it up well, and further, add sufficient clear rain water to make up the whole quantity to exactly 100 gallons; again stir it up; add two ounces of alum dissolved in one quart of rain water, and a third time agitate for fifteen minutes; after which put in the bung and let it stand twelve days, when it will be fit for sale.

SPORTSMAN'S CORDIAL.

One pint, each, peppermint, water, and spirits of wine; half pound lump sugar. Dissolve the sugar in the water and add it to the spirit.

BREWING.

THE ART OF MAKING BEER.

General notice.—Before entering on a description

of the process of brewing, it will be necessary to notice the apparatus and materials required for its conduct.

The apparatus consists of

1. *A copper* or *boiler* capable of holding fully two-thirds of the quantity proposed to be brewed; with a gauge-stick to determine the number of gallons of fluid at any given depth therein. A copper holding about 140 gallons is a convenient size for brewing a quarter of malt.

2. *A mash-tub* or *tun*, capable of containing rather more than the copper.

3. *One or more tuns*, or *vessels*, to ferment the beer in.

4. *Three or four shallow coolers* to reduce the wort as rapidly as possible to a proper temperature for fermenting.

5. *One or two copper* or *wooden bowls*, for bailing, &c.

6. *A thermometer* with a scale reaching from zero to above the boiling point of water.

7. *A suitable number of casks* (clean) to contain the beer.

8. *One or more large funnels or tunnels.*

9. *Two or more clean pails.*

10. *A hand-pump* of a size proportionate to the brewing.

These articles will vary in value from £50 upwards, to many hundreds, according to the extent of the brewing; but the whole of them necessary for a private family may be bought for less than the former amount. By proper care they will last for thirty or forty years, and still be in a useful state. The place where these vessels are kept, and the operations carried on, is called the "*Brewhouse.*"

The materials necessary to brew beer are, *good malt*, *hops*, and *water*, and a little *yeast.*

The *malt* is bruised or crushed in a mill before brewing, that it may be acted on the more readily by the water. It should not be ground too small, as it would then make the wort thick; the crushed malt may advantageously lie for a few days in a cool situation, by which it will attract a considerable quantity of moisture from the air, and consequently its soluble portion will be the more easily dissolved out by the water used in mashing. Pale malt may be used coarser than amber or brown malt. A bushel of malt should make a bushel and a quarter when ground, and a quarter should yield between 9½ and 10 bushels, the quantity slightly varying according to the degree of bruising it has undergone. On the large scale, malt is ground in crushing mills, furnished with iron rollers; and on a small scale, by wooden rollers or small mills worked by hand. For

private brewing, the malt is generally bought ready ground, for convenience sake. (See MALT.)

The hops should be those of the previous season, and for general purposes those grown in this State are preferable; but when it is intended to be kept for a long time, strictly prime western hops must be employed. The quantity of hops required to a given measure of malt varies from 2 lbs. to 8 lbs. of the former, to 1 quarter of the latter, according to the nature of the brewing. For good strong beer, 4 lbs. or 4½ lbs. is usually sufficient, but when the liquor is very strong, and it is intended to be highly aromatic, and to be kept for a long period, 1 lb. of hops may be used to every bushel of malt, or 8 lbs. to the quarter. Mild porter has about 3 lbs. to the quarter, and weak common beer has frequently only about ¼ lb. hops to the bushel of malt. A portion of hops is also frequently added to the finer sort of beer, after it is casked, as we shall presently explain.

The water should be *soft* and *clear*, the *yeast sweet* and *good*, and all the vessels and casks both *sweet* and *clean*. If this be not the case, with the latter especially, the best brewing in the world will be useless.

PROCESS OF BREWING.

I. *The Mashing.*—This operation consists in placing the ground or bruised malt in a large tub or "*tun*," known by the name of the "*mash tub*," macerating it for some time in hot water, and lastly drawing off the wort from a hole in the bottom, over which a bundle of straw or a strainer or false bottom is placed, to prevent the malt passing out along with the liquor. During the process of mashing, a peculiar principle, called by chemists *diastase*, reacts upon the starch also contained in the malt, and converts it first into a species of gum, called by the French chemists "*dextrine*," and then into a species of sugar resembling that produced by the action of sulphuric acid. The greater the quantity of starch converted into sugar in this way, the stronger and finer will be the wort. It therefore becomes a desideratum with the brewer to mash at a temperature that will most fully promote this object. It has been found that the best temperature for this purpose varies from 157° to 160°, but when more than one liquor is used, the first should be something lower than the former, the next may be between the two, and the third may slightly exceed the latter, or be about 165° or 170°. The action of the first mash is

merely to extract the sugar contained in the malt already formed; that of the second to convert the starch into sugar by the action of the diastase; the third to fully complete this object, as well as to carry away the remaining portions of the extract.

The mashing is usually performed by filling the copper with water, and, as soon as it acquires the temperature of 145° in summer, or 167° in winter, 45 galls. are run off into the mash-tun, and 1 quarter of crushed malt gradually thrown in and well mixed by laborious working, until it becomes thoroughly incorporated and no lumps remain; the agitation is then continued for 30 or 40 minutes, when 36 gallons of water from the boiler at a temperature of 200° are added, and the whole again well agitated, until thoroughly mixed. The mash-tun is now closely covered up, and allowed to stand for an hour or an hour and a half. At the end of that time the tap is set, and the wort is drawn off into the "underback," and generally amounts to about 50 to 52 gallons; 60 gallons of water, at a temperature of 200°, are next added to the mash-tun, previously well drained, and after being well worked, the whole is covered up as before. This mash is allowed to remain an hour, when it is drawn off, and the malt again drained, ready for the third mash. This time only 35 gallons of water are added at 200°,

and allowed to stand for half an hour, when it is run off in the same manner as before, and the malt allowed to drain. The worts are now ready for boiling.

In some cases, only the first and second mash is used for strong beer, and the third kept for the table, or as water to mash a fresh quantity of malt with. In Scotland the brewer only mashes *once*, and afterwards mashes his malt by frequent showers or "sponges" of water, by which he gets a wort of greater strength in proportion to its quantity. In operating as above, the average temperature of the mash is 145°, of the second 170°, and the third 180°. In winter the mean temperature may be reckoned 6° or 7° lower. A quarter of malt in this way will produce a specific gravity by the saccharometer of 1.234, or equal to 84 lbs of extract. It is calculated that 32 gallons of the water employed in the washing remain in the grains, after the wort is drawn off.

II. *Boiling.*—The wort is next transferred to the copper, and heated to the boiling point as soon as possible. In large breweries where several coppers are employed, the first mash is no sooner run into the underback, than it is transferred to the wort copper and immediately boiled, and the successive mashings added as soon as drawn off; but, in smaller houses, where there is only one copper, the boiling

cannot be commenced until the water for the last mashing is removed. In some cases the worts are brewed separately, thus producing 2 or 3 qualities of beer, viz: *strong ale or stout, beer, and table beer.* No sooner has the boiling commenced than the hops may be added, and the boiling continued for 2 or 3 hours or more. In some breweries the ale is boiled for several hours, and in Belgium it is said that this is even continued for 10 or 12 hours, but too much boiling drives off the flavor of the hops. In general, two hours' good boiling will be found sufficient. In small brewing the first wort should be sharply boiled one hour, and the second two hours. But if intended for beer of long keeping, the time should be extended half an hour. The hops should be strained from each preceding wort, and returned into the copper with the succeeding one. Between the boilings the fire should be damped with wet cinders, and the copper door set open.

For small beer, only half an hour is necessary for the first wort, one hour for the second, and two hours for the third.

It is reckoned that $\frac{1}{8}$ to $\frac{1}{16}$ part of the wort is dissipated in steam, during the process of boiling; but this must of course depend altogether on the evaporative power of the boiler, and the length of time the boiling is continued.

III. *Cooling.*—The boiling being finished, the wort is run off from the copper into the "hopback," which is furnished with a strainer to keep back the hops. It is then pumped into large square shallow vessels, called "*coolers*," where it is exposed to a good current of air to cool it down to a proper fermenting temperature, as quickly as possible. This is of the utmost importance, for the success of the brewing. The wort should be laid so shallow as to cool within 6 or 7 hours to the temperature of about 60°. In warm weather, the depth should not exceed 3 or 4 inches. As soon as the heat has fallen to about 60°, it should be instantly tunned and yeasted. It is reckoned that by the joint evaporation from the boilers and coolers, there is a loss of about 40 gallons per quarter.

IV. *Fermentation.*—When the wort is sufficiently cool, it is run into the fermenting tuns or vessels, which in small brewings may be casks, with one of their heads removed. These are called "*gyle tuns*," and should not be more than ⅔ full. The yeast, previously mixed with a little wort, and kept until this latter has begun to ferment, may now be added, and the whole agitated well; the tun should then be covered up, until the fermentation is well established. During this process the temperature rises from 9° to 15°.

The quantity of yeast employed, and the tempera-

ture of the wort when it is added, differ in different breweries and for different kinds of beer. From ½ to 1⅛ of yeast, taken from a previous brewing of the same kind of beer, is the quantity usually employed. The higher the temperature the less yeast necessary. In England, the temperature at which the yeast is usually added, varies from 55° to 65° Fahr. In cold weather, the heat in the coolers should be 5° to 6° higher than in mild and warm weather. For ale, in cold weather, it should be tunned as soon as it has fallen to 60° in the coolers. For porter, to 64°, and for table beer to 70°; and in warm weather, strong beer should be 4° or 5° less, and table beer 7° or 8°. Care should be also taken that the worts do not get cold before the yeast is mixed to produce fermentation. The common rule for mixing the yeast is 1½ lbs. to every barrel of strong beer wort, and 1 lb. to every barrel of table beer wort.

The commencement of the fermentation is indicated by a line of small bubbles round the sides of the tun, which, in a short time, extends over the surface. A crusty head follows, and then a fine rocky one, followed by a light frothy head. In the last stage, the head assumes a yeasty appearance, and the color is yellow or brown, the smell of the tun becoming strongly vinous. As soon as this head begins to fall, the tun should be skimmed, and the skimming con-

tinued every two hours till no more yeast appears; this closes the operation, and the beer should then be put into casks, or, in technical language, "*cleansed.*" A minute attention to every stage of this process is necessary to secure a fine flavor and a brilliant beverage.

In Scotland the temperature at which the yeast is added, is generally much lower than in England; for ale, it is from 51° to 52°, and the whole process is conducted in the cooler part of the year, so that the temperature seldom rises higher than 65° or 66°. The Bavarian beer, so much celebrated on the continent, as well as the finest kinds of East India ale, are fermented at very low temperatures.

It may be generally regarded as a rule, that the lower the temperature, and the slower, more regular and less interrupted the process of fermentation, the better will be the product and the less likely to change by age. More yeast is required in winter than in summer. Should the fermentation become slack in the gyle tun, a little more yeast is frequently added, and the whole is roused up; but on the contrary, should the temperature rise considerably, or the fermentation become too active, the wort should be cooled a little and skimmed, or at once cleansed.

V. *Cleansing.*—When the fermentation has proceeded to a certain extent, the liquor undergoes the

operation called "*cleansing*." This consists in drawing it off from the gyle tun into other vessels, or casks, set sloping, so that the yeast, as it forms, may work off the one side of the top, and fall into the vessel placed below to receive it. In small brewings, the beer is often at once transferred from the gyle tun to the store casks, which are sloped a little until the fermentation is over, when they are skimmed, filled, and bunged up. When the operation of cleansing is not employed, the yeast is removed from the surface of the gyle tun with a skimmer, and the clear liquor drawn off into the store casks.

The process of cleansing should always commence as soon as the gravity of the liquor falls to 10 or 11 lbs. per barrel, which it usually does in about 48 hours, provided the fermentation has been well conducted. Some brewers add ¼ to ½ lb. of wheat or bean flour to the beer in the gyle tun, shortly before cleansing, to quicken the discharge of yeast, but it is not clearly ascertained whether such a plan be advantageous or the contrary.

VI. *Storing*.—As soon as the fermentation is concluded, which generally takes from 6 to 8 days, or more, the clear liquor is drawn off into the store casks, or vats, which are then closely bunged down, and deposited in a cool cellar.

VII. *Ripening*.—After a period, varying from 1

to 12 months, or more, according to to the nature of the brewing, the liquor will have become fine, and sufficiently ripe for use. All the attention required during this interval, is to look occasionally to see that there is no leakage, and to open the vent holes, should any oozings appear between the staves of the casks.

VIII. *Fining.*—It frequently happens that malt liquor, especially porter, with all the care bestowed upon it in brewing, will not turn out sufficiently fine to meet the taste and eye of the consumer, in which case it is usually subjected to the operation of "*clarifying.*" For this purpose 1 oz. of isinglass is put into 1 quart of weak vinegar, or still better, hard beer, and when dissolved, a sufficient quantity of good beer may be added to make it measure one gallon. This mixture is called "*finings;*" 1 to 2 pints of which is the proper quantity for a barrel. The method of using it, is to put the finings into a bucket, and to gradually add some of the beer, until the bucket is three parts full, during which time it is violently agitated with a whisk, and this is continued until a good frothy head is raised upon it, when it is thrown into the barrel of beer, and the whole well rummaged up, by means of a large stick shoved in at the bung-hole. In a few days the beer will usually become fine.

In some bad sorts of beer isinglass will have no effect. This may be ascertained beforehand, by trying some in a long glass tube, or vial, with a little of the finings. These should be well shaken together, and then set aside for a short time, when it will be found that the finings will rise to the top, leaving the central portion of the beer clear, if it be in a proper condition for clarifying; but if, on the contrary, they sink to the bottom, and the liquor still keeps foul, no quantity of finings, however great, will ever clarify it. This latter defect may be remedied by proceeding to fine it after the manner above described, and then adding, *after* the finings have been well rummaged up, either 1 spoonful of oil of vitriol, or gum catechu, dissolved in ½ a pint of warm water, again rummaging well for a quarter of an hour. Or 1 or 2 oz. of tincture of catechu may be used instead, mixed with a little water. Either of these additions acts chemically on the finings, in the same way as good beer does, precipitating them along with the foulness, and thus brightening the liquor. The addition of a handful of hops, previously boiled for 5 minutes in a little of the beer, and then added to the barrel, and the whole allowed to stand for a few days, before proceeding to clarify it, will generally have the same effect.

CONCLUDING REMARKS.

The nature and variety of beer, &c.—The numerous varieties of beer met with in commerce, arise either from a difference in the materials, or the management of the brewing. Thus the *water*, but more generally the nature of the malt, or the temperature of the mashing or the fermentation, decides the character of the liquor. The difference between ale and porter arises from the color of the malt, and the distinctions between the same class of liquor, brewed from similar materials, may be referred to the mashing or the fermentation. Scotch ale and Bavarian beer differ in style from other ales, as before explained, from being fermented at lower temperatures; and porter differs from either of these because it has been made with higher-dried malt. This is the cause of the almost endless varieties of malt liquor met with in England. Every county—nay, every town and every brewer—is distinguished by the production of a different flavored beer. Besides the varieties arising from difference of quality or manipulation in the brewing of similar kinds of liquor, there are certain leading features which distinguish some of them, which has led them to be considered in the light of distinct members of

the same family. These are *ale*, *beer*, and *porter*. *Ale* is a pale liquor, brewed from lightly-dried malt, and is usually met with, abounding in undecomposed saccharine matter and mucilage. *Beer* is a fine, strong, well-fermented liquor, darker, less saccharine, and more alcoholic than ale. The finer class of Scotch, Bavarian, and East India ales, properly belong to this class. *Porter* is a dark brown colored liquor, originally prepared from high-dried malt, but now generally made from pale malt, and colored and flavored by patent or burnt malt. *Small or table beer* is a weak liquor, containing 3 or 4 times the quantity of water that is used for ordinary beer. *Stout*, *brown stout*, *&c.*, are varieties of porter, differing only in their strength.

Qualities.—The characteristics of good beer are transparency and a fine color, to whatever variety it may belong; and if it has been properly brewed, this will usually be the case. Hence, color and transparency become a proof of good beer. Good beer is pleasant, wholesome, and nutritious, at the same time that it is strengthening and exhilarating.

Season for brewing.—The best times of year for brewing are the spring and autumn, as at those periods the temperature of the air is such as to permit the cooling of the worts sufficiently low, without

having recourse to artificial refrigeration, or the use of machinery for that purpose.

TABLE

Exhibiting the Densities of different kinds of Beer.

Description.	Pounds per Barrel.	Specific Gravity.
Burton Ale, 1st Class	40 to 43	1.111 to 1.120
Do. 2d "	35 to 40	1.097 to 1.111
Do. 3d "	28 to 33	1.077 to 1.092
Ordinary Ale . . .	25 to 27	1.070 to 1.073
Common Ale . . .	21	1.058
Scotch Ale, 1st Class	40 to 44	1.111 to 1.122
Do. 2d "	33 to 40	1.092 to 1.111
Porter (ordinary) . .	18	1.050
Do. (good) . . .	18 to 21	1.050 to 1.058
Do. (double) . . .	20 to 22	1.055 to 1.060
Brown Stout . . .	23	1.064
Do. (best) . .	26	1.072
Table Beer	12 to 14	1.033 to 1.039
Table Beer (common)	6	1.014

ALE.

A PALE-COLORED liquor, brewed from lightly-dried malt. It is usually described as containing more saccharine matter and mucilage than beer or porter; but this is not a characteristic of the finer kinds of ale, as *Old Burton*, *Scotch*, *East India*, and other varieties,

that have undergone a thorough fermentation. *New* or *mild ale*, on the contrary, abounds in undecomposed sugar and gum, and is thus rendered more nutritious, though less alcoholic, than the above varieties.

Process of brewing ale.—The various operations of brewing are nearly the same for every species of malt liquor, the differences in the products arising from the materials employed, the heat of the water used for mashing, and the temperature at which the fermentation is conducted. (See Brewing.) For ale, pale or lightly-dried malt should be chosen, as well as pale hops, if it be desired to brew a liquor possessing but little color; and the fermentation should be carried on at a low temperature. Almost every country has its variety of ale, but the difference consists chiefly (the same quantity of malt and hops being used) in the preparation of the malt. The water may in some cases vary in quality, the boiling may be longer or shorter, or the liquor may be turned on at a different heat; but these circumstances being considered, one general process serves for the whole, as before observed. For immediate use, the malt may be all pale; but if brewed for keeping, or in warm weather, one-fourth should be amber malt. 6 lbs. of State hops should be used to the quarter, or 8 to 10 lbs. for keeping ale. The stronger ales con-

tain about 8$\frac{1}{2}$ of absolute alcohol; ordinary ales from 5 to 6$\frac{3}{4}$.

SCOTCH ALE.

This ale is brewed from the finest pale malt (made from the best English barley) and the best *East Kent Hops*, or for long keeping, *Farnham's* or *Country's*. The brewing is restricted to the colder portions of the year, as it never succeeds so well during the months of May, June, July, August, and September. Only *one mash* is made, and that at a temperature of about 180°, with one-third of the quantity of the water necessary for the brewing. The mash-tun is then covered up for half an hour, when the wort is drawn off, and a quantity of water, at the same temperature as before, sprinkled uniformly over its surface. This is performed by throwing the water into a vessel with a bottom full of holes, somewhat resembling a shower-bath, from whence it descends and gets equally distributed over every portion of the malt. After an interval of about twenty minutes, this wort is drawn off from several small cocks or holes, placed round the circumference of the bottom, by which means the hot water is made to percolate equally through every particle of the mass. This operation, called "sparg-

ing," is performed a second time, with a fresh portion of hot water, and after a like interval, is again drawn off. This process is repeated several times, until the density of the mixed worts becomes adapted to the quality of the ale required. Usually eight or ten "spargings" are employed, the latter at about 5° or 10° cooler than the first. The skilful brewer so divides his water that it may produce a wort of the proper gravity; but when a very strong one is required, the latter "sparges" are used for table beer, or as water for mashing a fresh quantity of malt. In this way, 1 quarter of malt will yield full 81 lbs. of extract. The wort is next boiled, with 4 lbs. of hops to every quarter of malt, and afterwards cooled down to 50° before adding the yeast. The latter must not exceed half a gallon for every 100 gallons of wort. The fermentation now commences and proceeds slowly, and in some brewings is accelerated by rousing up twice a day. Should more yeast be absolutely required in a few days, a *little* may be added. The fermentation generally continues for 15 to 20 days; and the ale is not cleansed before the degree of attenuation does not exceed $\frac{1}{2}$ lb. per diem, and not more than $\frac{1}{4}$ of the original gravity of the wort remains. This process is then performed by drawing off without skimming. As soon as the fermentation is finished, the ale is put

into carefully prepared casks, and stored in a cold cellar. Here it soon becomes fine, and seldom wants racking before sale. The usual gravity per barrel of the best Scotch ale is about 38 or 40 lbs., and is seldom lower than 32 lbs. or higher than 44 lbs.

TABLE ALE.

This is usually made by mashing the grains after the wort for the strong ale or beer has been drawn off; but if a separate brewing be made, the following are good proportions:—Pale malt, 1 quarter; mash with 4, 3, and 2¼ barrels of water; boil with 5 lbs. of hops, set with 1 gallon of yeast, and cleanse by beating the head in and letting it work out. *Prod.* 8¼ barrels, or full 4 gallons of ale for one of malt.

BREWING UTENSILS, TO CLEAN AND PRESERVE.

In cleaning them before being put away, avoid the use of soap, or any greasy material, and use only a brush and scalding water, being particularly careful not to leave any yeast or fur on the sides, then place them away in a clean, and moderately

dry situation. Should they become tainted or mouldy, take a strong lye of pearlash, which spread over the bottoms of the vessels scalding hot, and then with the broom scrub the sides and other parts.

Or, take common salt and spread it over the coolers, &c., and strew some on their wet sides, turn in scalding water and scrub them with a broom.

Or, throw some quicklime into water in the vessel, and scrub over the bottom and sides with it; in each case well washing afterwards with clean water.

Or, wash well first with oil of vitriol diluted with 8 times its weight of water, and afterwards with clean water.

Remarks.—Brewing utensils with care will last for many years. Mr. Cobbett says: "I am now in a farm-house, where the *same* utensils have been used for *forty years;* and the owner tells me that they may last for *forty years longer.*"

BEER, ALE, AND PORTER.

Quality, &c.—Pure malt liquor, which has undergone a perfect fermentation, is perhaps the most wholesome beverage that can be drunk, provided it be not taken in excess. Malt liquor bears different names

according to its strength and color. Ale is the most nutritious variety, but *good* porter frequently agrees better with bilious constitutions. The most wholesome and perhaps the least exceptionable beverages prepared from malt are those known as East India, Scotch, and Bavarian ales. A late writer has described good beer as *nutritious*, from the sugar and mucilage it contains; *exhilarating*, from its spirit; and *strengthening* and *narcotic*, from its hops. The stronger varieties of ale contain 7 to 8 per cent. of absolute alcohol; average strong ale 5 to 6 per cent.; brown stout 6 to 7 per cent.; London porter 3½ to 4 per cent.; and table beer 1 to 2 per cent.

AMBER BEER.

Prep.—Amber is now out of fashion, but formerly was drunk in great quantities, in London, mixed with bitters, and called purl. The proportions of malt were three quarters amber, and 1 quarter pale, with six pounds of hops to the quarter. The first liquor is usually turned on at 170°, and the second at 185°. The worts are boiled together for two hours. It is tunned at 64°, and after 24 hours roused every two hours, till the heat is increased to 74°. It is then skimmed every hour for 6 hours and cleansed, and

generally used as soon as it has done working in the barrels.

CHEAP BEER.

"No production of this country abounds so much with saccharine matter as the shells of green peas. A strong decoction of them so much resembles, in odor and taste, an infusion of malt (termed wort), as to deceive a brewer. This decoction, rendered slightly bitter with the wood sage, and afterwards fermented with yeast, affords a very excellent beverage. The method employed is as follows:

"Fill a boiler with the green shells of peas, pour on water till it rises half an inch above the shells, and simmer for three hours. Strain off the liquor, and add a strong decoction of the wood sage, or the hop, so as to render it pleasantly bitter; then ferment in the usual manner. The wood sage is the best substitute for hops, and being free from any anodyne property is entitled to a preference. By boiling a fresh quantity of shells in the decoction before it becomes cold, it may be so thoroughly impregnated with saccharine matter as to afford a liquor, when fermented, as strong as ale."

GINGER BEER.

Prep. I.—Lump sugar 1 lb.; bruised ginger (from which the dust has been sifted), ½ to 1 oz.; cream of tartar ½ oz.; 1 lemon, sliced; pour on them boiling water 1 gallon; cover up, and macerate until barely lukewarm, then strain, add yeast 2 oz.; work for 2 to 4 days, according to the weather; skim, strain through clean flannel, bottle, and wire down the corks. Excellent; will keep well.

II.—As last; but use *moist* instead of lump sugar.

PORTER.

A fermented liquor, brewed from pale malt, mixed with a sufficient portion of high-dried malt to impart the necessary color and flavor. In many cases, its color is imparted by parched malt or burnt sugar, subsequently to the boiling. (See BREWING.) Porter originated with a London brewer named Harwood, in 1722, and was first called "*entire*," or "*entire butt*," from being drawn from one cask. Previously to that date, *ale*, *beer*, and *two-penny* were the common beverages, either alone or mixed, under the

names of *half-and-half*, or *three threads*, for which the publican was compelled to have recourse to 2 or 3 casks. The term porter was given from its general consumption among porters and laborers. Ordinary porter contains 4 to 5% of alcohol.

Prep. I. (*Draught.*) *a.* Pale malt 3½ quarters; amber malt 3 quarters; brown malt 1½ quarters; mash at twice with 28 and 24 barrels of water; boil with good hops 56 lbs.; set with yeast 40 lbs. *Prod.* 28 arbrels, or 3½ times the malt, besides 20 barrels of table-beer from a third mashing.

II. (*Bottling Porter. Brown Stout.*) Pale malt 2 quarters; amber and brown malt, of each 1½ do.; mash at 3 times with 12, 7, and 6 barrels of water; boil with hops 50 lbs.; set with yeast 26 lbs. *Prod.* 17 barrels, or 1½ times the malt.

III. For either of the above use pale, malt mixed with one-seventy-ninth part of patent malt for porter, and one-seventieth part for brown stout.

IV. (*Brown Stout.*) To a butt of good porter add 4 gallons of molasses, 1 gallon of coloring, and 1 quart of finings; rummage up well, and in a week rack it into another cask.

MANAGEMENT OF MALT LIQUORS.

The qualities of ale, beer, and porter as beverages,

and the methods of preparing them, have been already described. (*See Ale, Beer, Brewing, Porter, &c.*) The present article will, therefore, be confined to a short notice of the *cellar management*, and the *diseases of malt liquors generally*.

Bottling.—Clean, sweet, and dry bottles, and sound and good corks, should be had in readiness. The liquor to be bottled should be perfectly clear; and if it be not so, it must be submitted to the operation of "fining." When quite fine, and in good condition, the bung of the cask should be left out all night; and next day the liquor should be put into bottles, which, after remaining 24 hours merely covered with sheets of paper to keep out the flies and dust, must be securely corked down. Porter is generally wired over. If the liquor is intended for exportation to a hot climate, the bottles should remain filled for three days, or more, before corking them.

The stock of bottled liquor should be stored in a cool situation, and a *small quantity* to meet present *demands* should also be set on their sides in a warmer place to ripen. *October beer* should not be bottled before midsummer, nor *March beer* till Christmas.

Ripening.—The addition of a small lump of white sugar to each bottle of ale or beer, and a tea-spoonful

of moist sugar to each bottle of porter at the time of corking, will render it fit for drinking in a few days in ordinary weather. A raisin or lump of sugar candy is often added to each bottle with a like intention. The Parisians bottle their beer one day, and sell it the next. For this purpose, in addition to the sugar as above, they add 2 or 3 drops of yeast. Such bottled liquor must, however, be drunk within a week, or else stored in a very cold place, as it will otherwise burst the bottles, or blow out the corks.

Age.—The addition of a *very little* diluted sulphuric acid to new beer will give it the appearance of being one or two years old. Copperas, alum, sliced lemons, Seville oranges, and cucumbers, are also frequently employed by brewers for the same purpose. These additions, however, we do not advise under any circumstances.

Heading.—This is added to thin and vapid beer to make it bear a frothy head.

Preservation.—See the end of the article BREWING.

Improving.—Cut half a six cent loaf into slices, toast them brown, place them in a coarse linen bag, along with 2 oz. of hops, and 1 oz. each of bruised ginger, cloves, and mustard seed, suspend the bag by means of a string a few inches below the surface of the beer, and bung close.—For a hogshead.

Cloudiness.—Add a handful of hops, boiled in 1 gallon of the beer, and in a fortnight fine it down.

Sourness.—Add a little powdered chalk or carbonate of soda to the beer, until the acidity is nearly removed, then rummage in 4 or 5 lbs. of moist sugar or treacle to every hogshead. Such beer should be soon put on draught, as it is apt to get flat by keeping. Oyster and egg shells are also frequently used by brewers for the same purpose.

Vamping.—Half fill the casks with old liquor, fill them up with some newly brewed, and bung close for 3 weeks or a month.

Mustiness.—To each hogshead add 1 lb. of new hops boiled in a gallon of the liquor, along with 7 lbs. of newly-burnt charcoal coarsely bruised, and a 1 lb. loaf of bread cut into slices and toasted rather black; rouse well every day for one week, then rummage in moist sugar 3 or 4 lbs., and bung down for a fortnight.

Flatness.—Rummage a few pounds of moist sugar or treacle (foots) into each hogshead; fermentation will ensue in a few days, and the liquor become brisk. On the small scale the addition of a few grains of carbonate of soda or prepared chalk to each glass will make the liquor brisk and carry a head; but it must be drunk within a few minutes,

else it becomes again flat. This is an excellent method when home-brewed beer becomes sour and vapid.

DISTILLATION.

The evaporation and subsequent condensation of fluid, by means of a still and refrigerator, or other similar apparatus. In COMMERCIAL LANGUAGE, the term is applied to the manufacture of spirituous liquors.

The discovery of the art of distillation is usually ascribed to the alchemists, but there appears to be good reason to suppose that it was known in more remote ages to the Arabians and other Eastern nations, to whom it probably descended from the ancient Babylonians. Certain it is, however, that a rediscovery of the process was made by some of the northern nations of Europe, and that the first notice of it appears in the writings of Arnoldus de Villa Nova, and his pupil Raymond Lully, by whom spirit, or *aqua vitæ*, as it was called, was declared to be "an emanation of the Deity; an element newly revealed to man, and destined to restore the energies

of modern decrepitude," and that the discovery of this fluid indicated the consummation of all things, and the end of the world.

The process of distillation, as carried on in the distilleries of the United States, may be divided into *four* general operations, viz: *The mashing* or formation of a saccharine infusion, from certain vegetable matters, as malt, barley, oats, rye, &c.;—*the cooling* of this wort or liquor; *the fermentation*, or process by which the sugar of the cooled wort is converted into alcohol; and *the separation of the spirit* so formed by means of a still and refrigerator. By the *first* operation, the materials for the formation of the alcohol are obtained; by the *second*, they are brought to a temperature most favorable to the transformation that takes place in the *third*, after which it only remains to free the product of the last operation from the foreign matter with which it is associated: this is done in the *fourth*, and, correctly speaking, constitutes the only part of the process which can be called *distillation.*

The general principles of the first three of the preceding operations, are noticed in the articles BREWING, DIASTASE, and FERMENTATION. It will there be seen, that the amylaceous or starchy matter of the grain is first saccharified and afterwards converted into alcohol, and that certain precautions are necessary

to render the process successful and economical. In many of the distilleries of the United States, molasses and analogous saccharine substances are employed, in which case the vegetable principle (sugar) essential to the formation of alcohol is already present, and merely requires simple solution in water of a proper temperature, to be ready to be subjected to immediate fermentation. In general, however, the sources of spirit in this country are the various kinds of grain; barley, wheat, and rye, are those commonly employed. These are ground and mixed with bruised malt in various proportions, and are mashed in a similar manner to malted grain. The fermentation is carried on until the density of the liquor ceases to lessen, or *attenuate*, which is determined by an instrument called a saccharometer. When this point is arrived at, it is submitted to distillation, to prevent the access of the acetous fermentation, which would lessen its alcoholic value.

During the process of distilling off the spirit of the fermented "wash" or wort, a hydrometer is employed to ascertain its strength, and as soon as the liquor that passes over acquires a certain degree of weakness, the operation is stopped and the spent wash removed. The spirits obtained by the first distillation are generally called "*low wines*," and have a specific gravity of about .975. By rectifica-

tion or "*doubling*," a crude milky spirit, abounding in oil, at first comes over, followed by clear spirit, which is received in a separate vessel. The process is continued until the alcoholic content of the distilled liquor diminishes to a certain degree, when the remaining weak spirit that comes over, called "*faints*," is caught separately and mixed with the *low wines*, preparatory to another distillation. The strongest spirit passes over first, and the condensed liquor gradually becomes weaker, until it ceases to contain alcohol. It will thus be seen, that by receiving in separate vessels any given portion of the product, spirit of any required strength within certain limits may be obtained. It is found from experience, and is readily accounted for by theory, that the lower the temperature at which the distillation is conducted, the stronger will be the product, and the less quantity of oil or other volatile matter will come over along with it. To promote this, it has been proposed to carry on the process in vacuo, but on the large scale this has never been adopted. The distillation of the "*wash*" is usually carried on in a separate set of stills to those employed for the rectification of the *low wines*. For very strong and tasteless spirit, a third, and even a fourth rectification takes place, conjointly with other methods to abstract the oil, and to remove any foreign matter that vi-

tiates its odor or flavor. A portion of soap is put into the still with the wash to prevent excessive frothing.

The quantity of spirits obtained from various substances, and even from pure sugar, depends upon the skill with which the several operations are conducted. By theory, pure sugar should yield 51⅘ of alcohol; but in practice, 1 gallon of proof spirit is the utmost obtained from 10 lbs. of sugar. According to Hannstaedt, 100 lbs. starch yield 35 lbs. of alcohol, or 3 gallon of pure spirits; and 100 lbs. of the following grains produce the accompanying quantities by weight of spirit of sp. gr. .9427, or containing 45⅘ of pure alcohol: wheat, 40 to 45⅘; rye, 36 to 42⅘; barley, 40⅘; oats, 36⅘; buckwheat, 40⅘; corn, 40⅘; being an average of 3.47 gallons of proof spirits. It is found that a bushel of good malt yields 2 gallons of proof spirits, and that the maximum quantity of proof spirits obtained from new grain, mashed with ⅕ or ⅙ of malt, does not exceed 22 gallons per quarter.

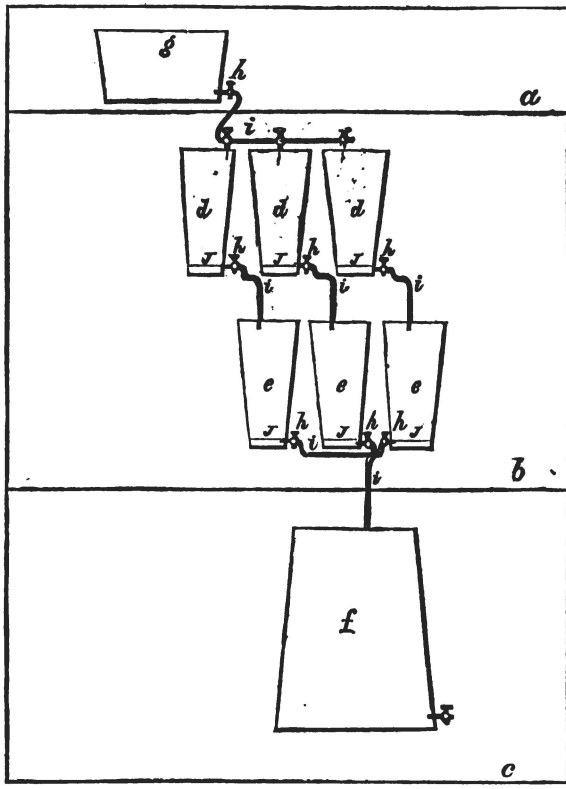
IMPROVED SYSTEM OF RECTIFICATION.

Rectification of WHISKEY and PURE SPIRITS consists in the partial or total separation from the alcohol

and water (which make up the body of the raw whiskey) of the ESSENTIAL OILS and verdigris on which the spirit depends for the very strong and disagreeable odor peculiar to it. The more perfect this separation, the less of that odor remains until we produce *pure spirits*, which is simply alcohol and water, or diluted alcohol odorless and tasteless if perfectly rectified. Filtration through charcoal is the usual course to produce the desired flavor and odor in common rectified *whiskey*, together with other substances which may be used to give an appearance of age and strength. The great secret of perfect rectification consists in having all of the tubs placed in the right position, so as to run the liquor even; in properly mixing the raw whiskey and water, and in running the liquor slowly and cautiously through the coal; to do this we use a mixer, in which we mix the highwines and water. This is placed over the upper tier of rectifiers, to which it is connected by lead pipes; after being thoroughly stirred or mixed, we run the liquor on slowly so as not to force it through the rectifiers. The plan in use, of mixing in the rectifiers is very objectionable on many accounts. In the first place, the highwines contains such an amount of oil as to render it much lighter than the water, and thorough agitation with the latter must be had to mix them properly. This can only be

done by putting the two into a tub and beating them up together with a stick. Without this, the water comes through first, and the highwines afterwards, which in a short time renders the coal unfit for use, and requires new coal. From three to four months' use, is sufficient to spoil any rectifiers in which the mixing is done. Instead of this, by our method, the coal may be made to last 12 to 15 months. Another cause by which the coal may be spoiled is, by the accumulation of verdigris and filth on the top of it. This we must also guard against. Again: the large amount of liquor, generally at first, on the top of the coal forces itself through with such rapidity as to the spoil the coal and receive but little benefit to itself. To avoid this objection, we run it slowly from the mixer by means of faucets and pipes, and keep it running at pleasure. By paying attention to the rules laid down in this system, the coal in use may be kept good twelve to eighteen months—which is a saving of seventy-five per cent. in coal alone.

The Rectifiers and Mixers should be made of well seasoned WHITE OAK, of the dimensions, and placed in the position indicated by the annexed cut. Covers should be made to fit them closely.



a. Upper floor. *b.* Middle do. *c.* Lower do.
d. Upper Rectifiers, 3 feet high, 20 inches wide on bottom, 24 inches wide on top.
e. Lower Rectifiers, 3 feet high, 20 inches wide on bottom, 24 inches wide on top. *f.* Receiver: size optional.
g. Mixer—2 feet high, 2 feet 8 inches wide on bottom, 3 feet wide on top.
h. Faucets. *i.* Connexion pipes.
j. False bottom, placed 4 inches from bottom.

TO PACK THE LOWER RECTIFIERS.

First on the false bottom (which is perforated with half inch holes), place a woollen blanket or cloth, on that put six inches of coal, then ½ peck barley malt; fill up to within two feet of the top with coal —put on another blanket or cloth; on that place another ½ peck of malt, and fill up to within 8 inches of the top with coal.

TO PACK THE UPPER RECTIFIERS.

These may be filled entirely with coal, to within eight or ten inches of the top, unless you choose to put sand into the bottom, which is not material.

TO KEEP THE RECTIFIERS GOOD.

Remove from the top of the upper rectifiers, once in three months; and from the tops of the lower ones, once in six months, six inches of the coal; and replace the same with fresh coal, which will renew the rectfiers, and keep them good for a long time.

Be particular at all times to keep *all of the tubs* closely covered, so as to prevent evaporation.—Ne-

ver let the liquor run off and leave the coal dry, until you are done with it, or it will become musty and useless.

The coal for rectifying should be of a good quality, and properly burned; all of the *poisonous gases* must be expelled from it, by either burning it in the OPEN AIR, or if burned in a "pit," it should be reburned in a large kettle, or otherwise, so as to effect the desired object.

TO PACK LOWER SPIRIT RECTIFIERS.

First on the bottom after the blanket, put six inches of clean sand; on that, six inches of coal, ½ bushel lime, and fill up to within eight inches of the top with coal.

UPPER SPIRIT RECTIFIERS

May be packed like UPPER WHISKEY rectifiers. Spirit Rectifiers, to produce perfectly pure and odorless spirits, must be run slowly—the slower, the better the spirits will be.

APPENDIX.

AMERICAN LIQUORS.

We append the following formulas for common and low-priced liquors; and, though not entirely founded on the same principles as are the formulas for imitations of foreign liquor, still they are unobjectionable, being *free* from *poisons* or poisonous *drugs*, with one or two exceptions, and even then they are as free as the genuine importations themselves. Although these are not intended as perfect imitations, many of the formulas will produce a very passable imitation, particularly in brandies, rum, wines, &c.

The basis used is pure spirits, at from proof to 15 u. p. In the absence of the proper spirit, a very good substitute may be produced from rectified whiskey by depriving it of its taste and odor, by a process which renders the liquor suitable for use.

(See Formula No. 1.) The whiskey to be prepared should be of the proper strength, and should be partially rectified. The materials used destroy the fusil oil, and the verdigris is precipitated with the lime to the bottom. After standing the prescribed time, the liquor should be carefully drawn off and put into another cask, so as to avoid the sediment. Then the materials to produce the desired liquor should be added. *All* oils used must be cut in 90% alcohol, in the proportion of 1 quart of alcohol to 2 oz. oil; should stand at least 24 hours before using, and the different liquors should stand the full time mentioned in each formula. Whiskey prepared in this way is called "*neutral spirits.*"

Formula No. 1.

To Neutralize Whiskey to make various liquors.

To 40 galls. whiskey, add:

1½ lbs. unslacked lime,
¾ lb. alum, and
½ pt. spirits of nitre.

Stand 24 hours and draw it off.

Formula No. 2.—*Brandy.*

To 40 galls. pure or neutral spirits, add:

1 lb. crude tartar (dissolved in 1 gall. of hot water),
½ pint acetic ether,
6 lbs. bruised raisins,
2 oz. tincture of kino,
3 lbs. sugar.

Color with sugar coloring. Let it stand 14 days, and draw it off.

Formula No. 3.—*Brandy.*

To 40 galls. neutral or pure spirits, add:
2 oz. acetic acid,
2 galls. good brandy,
4 lbs. loaf sugar,
2 oz. orris root, powdered,
4 oz. catechu, do.

Color as above. Stand 10 days, and draw it off.

Formula No. 4.—*Brandy.*

To 40 galls. neutral or pure spirits, add:
10 oz. crude tartar (dissolved in hot water),
2 galls. Jamaica rum,
4 lbs. bruised raisins,
3 oz. tincture of kino.

Color as above. Stand 10 days, and draw it off.

Formula No. 5.—*Brandy.*

To 40 galls. spirits, add:

2 do. Jamaica rum,
5 oz. powdered catechu,
1 qt. white wine vinegar,
½ oz. orris root,
1 do. cassia buds (ground),
2 oz. cream of tartar,
3 lbs. loaf sugar.

Color as directed in No. 2. Stand 10 days, and draw it off.

Formula No. 6.—*Holland Gin.*

To 40 galls. p. or n. spirits, add:

3 oz. spirits of nitre,
4 lbs. loaf sugar,
1 oz. oil juniper,
½ do. oil caraway, } cut in 1 qt. alcohol,

Stand 24 hours.

Formula No. 7.—*Holland Gin.*

To 40 galls p. or n. spirits, add:

2 lbs. loaf sugar,
The juice of 2 qts. of juniper berries.

Put these berries into a half-gallon of alcohol, and let it stand 5 days, then press out the juice and add the same to the liquor. Mix by thorough agitation, and stand 4 days.

Formula No. 8.—*Holland Gin.*

To 40 galls. p. or n. spirits, add:

¾ oz. oil juniper,
1 oz. sweet fennel seed,
1 pt. lemon juice,
3 lbs. loaf sugar,
1 oz. acetic acid,
2 galls. good gin.

Stand 3 days, and draw it off.

Formula No. 9.—*Jamaica Rum.*

To 40 galls. p. or n. spirits, add:

2 do. Jamaica rum,
2 oz. tincture of kino,
3 lbs. loaf sugar,
2 oz. butyric acid.

Color with sugar coloring. Stand 5 days.

FORMULA No. 10.—*St. Croix Rum.*

To 40 galls. p. or n. spirits, add:
2 do. St. Croix rum,
2 oz. acetic acid,
1½ do. butyric acid,
3 lbs. loaf sugar.

FORMULA No. 11.—*Irish or Scotch Whiskey.*

To 40 galls. p. or n. spirits, add:
60 drops of creasote, dissolved in 1 qt. alcohol.
2 oz. acetic acid,
1 lb. loaf sugar.
Stand 48 hours.

FORMULA No. 12.—*Monongahela Whiskey.*

To 40 galls. p. or n. spirits, add:
2 oz. spirits of nitre,
4 lbs. dried peaches,
4 lbs. N. O. sugar,
1 qt. rye (burnt and ground like coffee),
¼ lb. allspice,
½ do. cinnamon,
⅛ lb. cloves.

Put in the ingredients, and after standing 5 days, draw it off, and strain the same, if necessary.

FORMULA No. 13.—*Old Bourbon Whiskey.*

To 40 galls. spirits, add:

5 do. good Bourbon whiskey,

2 oz. spirits of nitre,

2 oz. fusil oil (from corn), cut in 1 qt. alcohol.

Stand 4 days.

FORMULA No. 14.—*Cherry Brandy.*

To 40 galls. p. or n. spirits, add:

40 qts. wild black cherries.

These cherries should be mashed before being added to the spirits; stand 3 days. Strain the same, and add:

6 lbs. loaf sugar,

5 galls. of water.

FORMULA No. 15.—*Cherry Brandy.*

To 40 galls. spirits, add:

2 oz. essential oil of bitter almonds, cut in ½ gall. 90% of alcohol.

10 lbs. sugar. Color with sugar coloring, dark, very dark.

Formula No. 16.—*Cherry Brandy.*

To 40 galls. p. or n. spirits, add:
5 do. water,
10 lbs. sugar,
1 lb. bruised bitter almonds,
1 oz. cloves,
1 do. cassia. Color with sugar coloring, mix well. Let it stand 30 days, and then draw it off.

Formula No. 17.—*Raspberry Brandy.*

To 40 galls. p. or n. spirits, add:
4 do. water,
40 qts. raspberries,
6 lbs. loaf sugar,
1 oz. cloves,
1 do. cassia. Color if necessary.
Let it stand 15 days, draw it off. Strain and fine it as in fining wines.

Formula No. 18.—*Blackberry Brandy.*

To 40 galls. p. or n. spirits, add:
5 do. water,
40 qts. blackberries,

6 lbs. sugar,
1 oz. cloves,
1 do. cassia.

Manage same as in No. 17.

FORMULA No. 19.—*Peach Brandy.*

To 40 galls. p. or n. spirits, add:
10 do. good peach brandy,
3 lbs. loaf sugar,
1 oz. essential oil of bitter almonds, cut in 1 qt. 90% alcohol.

Stand 3 days.

FORMULA No. 20.—*Peach Brandy.*

To 40 galls. p. or n. spirits, add:
3 do. peach brandy,
1 lb. bitter almonds, steeped in 1 gall. of spirits,
4 lbs. loaf sugar.

Stand 5 days, and draw it off.

FORMULA No. 21.—*Lemon Brandy.*

To 40 galls. spirits, add:
40 lemons (sliced),

10 lbs. loaf sugar,
1 lb. lemon peel.
Stand 1 week, and draw it off.

Formula No. 22.—*Orange Brandy.*

To 40 galls. spirits, add.
40 oranges (sliced),
6 lbs. sugar.
Stand 1 week, and draw it off.

Formula No. 23.—*Pineapple Rum.*

To 40 galls. rum as made by Formula No. 10, add:
20 pineapples (sliced),
5 lbs. loaf sugar.
Stand 10 days, and draw it off.

WINES.

Formula No. 24.—*Madeira Wine.*

To 40 galls. prepared cider, add:
¼ lb. tartaric acid,
4 galls. spirits,
3 lbs. loaf sugar

Fine and color as directed in the formula for imitation madeira.

Formula No. 25.—*Malaga Wine.*

To 40 galls. prepared cider, add:
- 5 do. water,
- 16 lbs. N. O. sugar,
- 4 galls. spirits.

Let it stand 4 days, draw it off, and add 5 gallons good sweet Malaga wine. Color with sugar coloring.

Formula No. 26.—*Malaga Wine.*

To 40 galls. prepared cider, add:
- 4 do. water.
- 2 lbs. bruised raisins,
- 12 do. N. O. sugar,
- ¼ lb. crude tartar,
- 2 oz. tinct. of kino.

Same directions as No. 25.

Formula No. 27—*Sherry Wine.*

To 40 galls. prepared cider, add:
- ½ oz. essential oil of bitter almonds,

4 lbs. loaf sugar,
8 galls. cheap cape wine,
2 oz. tincture of kino.
Stand one week.

Formula No. 28.—*Sherry Wine.*

To 40 galls. prepared cider, add:
5 do. spirits,
2 lbs. wild honey,
½ lb. bitter almonds (beat up),
¼ oz. orris root (sliced),
2 lbs. raisins (bruised).
Stand 10 days, and draw it off.

Formula No. 29.—*Port Wine.*

To 40 galls. prepared cider, add:
5 do. spirits,
10 qts. wild grapes (clusters),
1 lb. bruised rhatany root,
3 lbs. loaf sugar,
4 oz. tincture of kino.
Stand 10 days, draw it off, and color with tincture of rhatany.

Formula No. 30.—*Port Wine.*

To 40 galls. prepared cider, add:

5 do. p. or n. spirits,
2 do. red cape wine,
3 lbs. raisins (bruised),
4 do. N. O. sugar,
3 oz. tincture of kino.

Same directions as No. 29.

FORMULA No. 31.—*Port Wine.*

To 35 galls. prepared cider, add:
5 do. red cape wine,
5 do. port,
3 do. spirits,
3 lbs. sugar,
2 oz. tincture of kino,
1 do. tartaric acid.

Bung it close for 7 days, draw it off, and color with sugar coloring.

FORMULA No. 32.—*Claret Wine.*

To 40 galls. prepared cider, add:
5 do. water,
The juice of 40 lemons,
2 lbs. sugar,
4 oz. cream of tartar,
3 galls. pure spirits.

Stand 10 days, and color with the juice of red beets—and fine it.

Formula No. 33.—*Claret Wine.*

To 35 galls. prepared cider, add:
- 5 do. port wine,
- 1 lb. cream of tartar,
- 3 galls. p. or n. spirits,
- 2 lbs. loaf sugar,
- 10 lemons (sliced).

Stand 10 days, draw it off; fine and color with beet root or red saunders.

Formula No. 34.—*Teneriffe Wine.*

To 40 galls. prepared cider, add:
- 3 do. spirits,
- ½ pt. lemon juice,
- ½ pt. honey,
- ⅓ oz. oil of bitter almonds (cut),
- 2 lbs. bruised raisins.

Stand 10 days, and draw it off.

Formula No. 35.—*Sauterne Wine.*

To 35 galls. new cider, add:
- 30 qts. white grapes. Let fermentation take place, and then add:
- 2 galls. pure spirits.

Fine and decant till it is pure. Discolor with milk.

Formula No. 36.—*Blackberry Wine.*

To 30 galls. p. or n. spirits, add:
- 8 do. soft water,
- 6 lbs. loaf sugar,
- 1 pine apple (sliced),
- 40 qts. blackberries,
- 3 oz. tincture of kino,
- 1 do. tartaric acid,
- 1 pt. yeast.

Stand in a warm place until fermentation takes place, then draw it off and fine it.

Formula No. 37.—*Raspberry Wine.*

To 30 galls. p. or n. spirits, add:
- 5 do. water,
- 4 lbs. sugar,
- 1 pineapple (sliced),
- 40 qts. raspberries,
- 2 oz. tincture of kino,
- ½ pt. of yeast,
- 2 oz. tartaric acid.

Same directions as in No. 36.

Formula No. 38.—*Currant Wine.*

To 30 galls. spirits, add:
5 do. water,
6 lbs. loaf sugar,
3 oz. tincture of kino,
30 qts. currants (the juice),
2 galls. good port wine.
Stand 1 week, and draw it off.

General rules for family wines, from ripe saccharine fruit.

Formula No. 39.

4 lbs. ripe fruit,
1 gall. soft water,
3 lbs. loaf sugar,
1½ oz. cream of tartar (dissolved in hot water),
1 qt. brandy.
Stand one week, and draw it off.

Formula No. 40.

Same as last, but using one lb. more of each, fruit and sugar—*A superior wine.* Same directions as No. 39.

Formula No. 41.

Same as No. 39, but using two pounds more, each (sugar and fruit). Is good without brandy, but better with it: 1½ lbs. raisins may be substituted for each pound of sugar.

Same directions as No. 39.

Formula No. 42.

To 16 lbs. ripe fruit (either kind mentioned below), add:

8 galls. soft water,
12 lbs. loaf sugar,
6 oz. cream of tartar,
2 galls. good brandy.

Flavor, color, fine and decant when necessary.

By the foregoing receipts, wines of an excellent quality, may be made from the following fruits:—

Gooseberry, currant, cherry, elder, strawberry, raspberry, mulberry, blackberry, apple, grape, apricot, damson, and whortleberry.

IMITATION CIDER.

To 8 galls. soft water,
8 lbs. N. O. sugar,
7 oz. tartaric acid,
1 qt. yeast.

Put the ingredients into a cask and stir it up, after standing 24 hours with the bung out. Bung it up close, add 1 gall. spirits, and let it stand 48 hours, after which time it is ready for use.

BITTERS.

Bitters are considered as tonic and stomachic, and to improve the appetite when taken in moderation. The best time is early in the morning, or an hour before meals. An excessive use of bitters tends to weaken the stomach. They should not be taken for a longer period than a fortnight *at one time*, allowing a similar period to elapse before again having recourse to them.

BRANDY BITTERS.

Spirit Bitters.

I. Dried orange and lemon peel, of each 2 oz.; fresh ditto, of each 3 oz.; good brandy 1 gallon;

lump sugar 1 lb. Digest the peel in the brandy for ten days, frequently shaking; then press out the liquor and filter through blotting paper; lastly, dissolve the sugar therein.

Remarks.—A very agreeable bitter, either taken as a dram, or mixed with other liquor.

II. Gentian root, bruised, 4 oz.; fresh orange peel 5 oz.; cassia bark 2 oz.; cardamom seeds, bruised, 1 oz.; cochineal, bruised, ¼ oz.; proof spirit 1 gallon. Digest for a week, then decant the clear, press the bottoms, and pour thereon 5 pts. of water; again digest for 3 days, then press out the liquor, mix the two tinctures, filter and add sugar 2 lbs.

III. Bruised gentian 2 oz.; fresh orange peel 3 oz.; cassia bark ¼ oz.; cloves 1 drachm; proof spirit 1 gallon; cape or raisin wine ½ gallon. Digest for a week as before, then add sugar 1 lb., and a little coloring, if required.

IV. Bruised gentian ¼ lb.; cochineal ½ oz.; sugar ¾ lb.; spirit (24 u. p.) 1 gallon.

CALOMBA BITTERS.

Calomba root, fresh orange and lemon peel, of each 1 oz.; proof spirit 1 quart; digest for a week, then express the tincture, add lump sugar 4 oz., and a little coloring.

WINE BITTERS.

I. Bruised gentian root, fresh orange and lemon peel, of each 1¼ oz.; white wine 1 quart; digest for a week, and strain.

II. Cinchona bark, bruised, 8 oz.; white canella 1½ oz.; juniper berries, lemon peel, and winter's bark, of each 1¼ oz.; carbonate of soda ½ oz.; Madeira wine 1¾ gallons; digest for a week.

III. Fresh lemon peel 1 lb.; dried orange peel ½ lb.; bruised gentian root, ¼ lb.; cape wine 1 gallon; as before.

NECTAR.

I. Chopped raisins 2 lbs.; loaf sugar 4 lbs.; boiling water 2 gallons; mix; when cold, add 2 lemons sliced; proof spirit (brandy or rum) 3 pints; macerate in a covered vessel for 4 or 5 days, occasionally shaking, strain, let it stand in a cold place for a week to clear, and then bottle. In ten days, or less, if kept in a very cold place, it will be excellent.

II. Red ratifia 3 gallons; oils of cassia and caraway, of each 25 drops; previously dissolved in brandy ½ pint; orange wine 1 gallon; sliced oranges 6 in number; lump sugar 2 lbs.; macerate for a week,

decant and bottle. Both are used as pleasant cordials.

NEGUS.

I. (*Red.*) Port wine 1 bottle (1½ pints); ½ nutmeg, grated; the juice of 2 lemons, and the yellow peel of one; lump sugar ½ lb.; put the whole into a bottle, add boiling water 3 pints, cork down close, and macerate with agitation. *** Very excellent.

The addition of a single drop of essence of ambergris, and 6 or 7 drops of essence of vanilla, improves it.

II. (*White.*) From white wine, as the last. *** A single glass of the above may be made by observing the same proportions.

PUNCH.

I. Juice of 3 or 4 lemons; yellow peel of 1 or 2 lemons; lump sugar ¾ lb.; boiling water 3½ pints; infuse ½ an hour, strain, add porter ½ pint; rum and brandy, of each ¾ to 1 pint, (or either alone 1½ to 2 pints) and add more warm water and sugar, if desired weaker or sweeter.

II. (*Cold Punch.*)—Arrack, port wine, and water, of each 1 pint; juice of 4 lemons; white sugar 1 lb.; mix.

III. (*Gin Punch.*) Yellow peel and juice of 1 lemon; gin ¾ pint; water 1¾ pints; sherry 1 glass; mix.—(*Iced Punch.*) Champagne or Rhenish wine 1 quart; arrack 1 pint; juice and yellow peels of 6 lemons; white sugar 1 lb.; soda water 1 or 2 bottles; ice as cream.

IV. (*Milk Punch.*) Yellow rinds of 2 dozen lemons; steep for two days in rum or brandy 2 quarts; then add spirit 3 quarts more; hot water 3 quarts; lemon juice 1 quart; loaf sugar 4 lbs.; 2 nutmegs, grated; boiling milk 2 quarts; mix, and in 2 hours strain through a jelly bag.

V. (*Brandy Punch*). French brandy 20 quarts; yellow peels of 30 oranges and 30 lemons; infuse for 12 hours; add 30 quarts of cold water, 15 lbs. of lump sugar, and the juice of the oranges and lemons; mix well, strain through a hair-sieve, add new milk 2 quarts, and in six weeks bottle.—Keeps well.

VI. (*Orange Punch*). As No. 1. using oranges, and adding a little orange wine. A little curaçoa, noyeau, or merischino, improves it.

VII. (*Raspberry Punch.*) As last, but using raspberry juice or vinegar for oranges or lemons.

VIII. (*Regent's Punch*). Strong hot green tea, lemon juice, and capillaire, of each 1½ pints; rum, brandy, arrack, and curaçoa, of each 1 pint;

champagne 1 bottle; mix, and slice a pine-apple into it.

IX. (*Tea Punch*). Hot tea 1 quart; arrack ½ bottle; white sugar 6 oz.; juice of 8 lemons; yellow rinds of 4 lemons; mix.

X. (*Wine Punch*). Sugar 1 lb.; yellow peel of 3 lemons; juice of 9 lemons; arrack 1 pint; port or port or sherry wine (hot) 1 gallon; cinnamon ¼ oz.; nutmeg 1 dr.; mix.

*** All the above are pleasant intoxicating beverages.

COLORING FOR LIQUORS.

Take two lbs. crushed or lump sugar, put it into a kettle that will hold four to six quarts, with one half-tumbler of water. Boil it until it is *black*, then take it off and cool with water, stirring it as you put in the water.

BEAD FOR LIQUORS.

One oz. sulphuric acid and one half oz. sweet oil, mixed together in a glass bottle. One drop is enough for a quart, and in proportion for a larger quantity.

TINCTURES AND EXTRACTS.

Formula.

Tincture of Kino.—1 oz. gum kino, and 1 pt. alcohol.

Do. *Saffron.*—4 oz. saffron to 1 pt. alcohol.

Do. *Red Sanders.*—3 oz. red sanders to 1 pt. alcohol.

Extract of Beet Root.—By boiling.

Do. Rhatany.—1 lb. root rhatany to 1 qt. alcohol.

THE END.