

NICOLAS APPERT

THE ART OF
PRESERVING ALL KINDS
OF ANIMAL AND
VEGETABLE
SUBSTANCES FOR
SEVERAL YEARS, 2ND
ED.

Nicolas Appert
**The Art of Preserving All Kinds of
Animal and Vegetable Substances
for Several Years, 2nd ed.**

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*The Art of Preserving All Kinds of Animal and Vegetable Substances for
Several Years, 2nd ed. / A work published by the order of the French minister
of the interior, on the report of the Board of arts and manufactures:*

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M. Appert

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EXPLANATION OF THE PLATE

- *Fig. 1.* A reel with two iron bars, made use of to double the wire, and cut the doubled wire twice the length required for fixing the corks in the bottles.
- *Fig. 2.* A small machine for twisting the wire one-third of

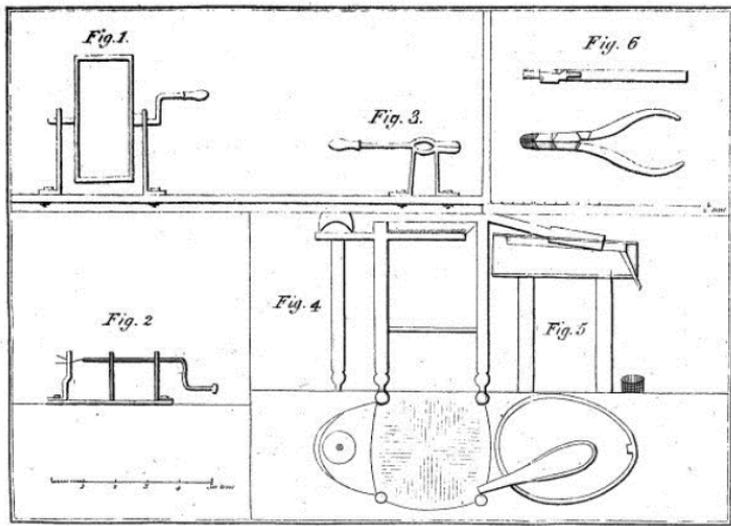
its length after having been doubled by fig. 1.

- *Fig. 3.* An instrument for compressing (and, as it were, biting) the corks three quarters of their length, beginning at the smallest end.

- *Fig. 4.* A stool stuffed with straw, furnished with a wooden stand on which the bottles may be placed to be tied. The same stool will serve to sit on during the corking.

- *Fig. 5.* A hollow block of wood, called a bottle-boot (Casse-Bouteille), within which the bottle is set when it is to be corked. This bottle-boot is furnished with a strong bat for beating in the corks.

- *Fig. 6.* A front and side view of pointed pincers, used for twisting the wire employed to keep on the corks, and for cutting off the superfluous ends of the wire. I make use of flat pincers and scissors for this operation.



Neele sc. Strand

London Published 25th. Feb^y. 1811 by Black & C^o.
Leadenhall Str.

ADVERTISEMENT

In an advertisement prefixed to the pamphlet, of which the following sheets are a translation, the author publishes his address: “*Quai Napoléon, au coin de la rue de la Colombe, No. 4, dans la Cité, à Paris;*” and offers for sale there, an assortment of provisions, preserved by the process, of which an account is here communicated to the public. As the book itself is a recommendation of the author’s own goods, it has been thought proper to add to his account of his process, a translation of the authorities and testimonies by which his own statements are authenticated; notwithstanding the repetitions which are in consequence admitted. The recommendation of the process by the French Minister immediately follows. The more elaborate Report of the Paris Society for the Encouragement of National Industry, will be found at the end of the work.

It is needless to anticipate the author’s display of the advantages which must flow from a simple and unexpensive process of keeping fresh articles of animal and vegetable food. If this can be effected for only *one year*, that is, from the season of produce through the seasons of scarcity; if no other articles, for instance, than eggs, cream, and vegetables, can be preserved in their full flavour and excellence during a long winter, there is not a mistress of a family in the kingdom, rich enough to lay by a stock of those articles, and not too rich to despise the economy

of a family, who will not find herself benefitted by the perusal of the small work here put within her reach; and there is no reason to suspect the correctness of this part of the author's statements. This, however, is but one of the more obvious benefits of his process; and if thus much be ascertained, then an interminable prospect of resources is opened, which the State, still more than the individual, will be called upon to employ.

The author, in his enumeration of the advantages to be derived from his process, places at the head, the saving it will occasion in the consumption of sugar. This process, added to recent improvement in the art of preparing grape syrup, holds forth, in his opinion, a prospect of relief to the suffering proprietors of French vineyards. This statement will have been listened to with great complacency by the French government, which so ostentatiously avows the determination to compel the whole Continent to subsist on its own produce, and dispense with the more luxurious of transatlantic commodities. Our country, however, from its soil and climate, can take little or no share in this branch of the application of the author's process.

On the other hand it offers us incalculable benefits in the equipment and victualling of our fleets, and in providing for the health and comfort of the floating defence of the country, as well as of that numerous and meritorious class of men, to which the nation owes so much of its prosperity. Whatever promises an improvement in the condition of every order of men who subsist on the Ocean, must be considered as an object of national

concern. The French government, at least on the part of some of its members in the subordinate branches of its administration, has taken the lead in recommending the author's process to the attention of public functionaries. From the superior activity, as well as more enlightened discernment of the people of this country, we may expect that our author's process will excite equally the notice of the government and country at large; and we trust that government-contractors and commissioners, as well as the pursers of men of war, and the stewards of merchantmen, will not be the last to examine for themselves the promising statements of our author.

From the public papers we learn that a patent has been taken out for preserving provisions according to the process described in this book. We do not pretend to determine how far this patent may interfere with the adoption by other persons of this same process as a manufactory and trade; but, it is certain, that on the small scale on which provisions would be preserved for single families, every person will be at liberty to avail himself of the instructions he may meet with in this volume.

It was thought less objectionable to insert unnecessary matter, than to omit what to some readers might be useful or interesting. Every thing, therefore, has been translated, and we have even copied the author's plate of the machinery used in corking bottles, though from our improved state of mechanics, the greater part of our readers will stand in no need of its assistance, similar machines being in common use by the wine-coopers, &c.

THE MINISTER OF THE INTERIOR, COUNT OF THE EMPIRE, TO M. APPERT, &c

Paris, 30th January 1810.

Second Division

BOARD OF ARTS AND MANUFACTURES

My Board of Arts and Manufactures¹ has reported to me, Sir, the examination it has made of your process for the preservation of fruits, vegetables, meat, soup, milk, &c. and from that report no doubt can be entertained of the success of such process. As the preservation of animal and vegetable substances may be of the utmost utility in Sea-voyages, in hospitals and domestic economy, I deem your discovery worthy an especial mark of the good will of the government. I have in consequence acceded to the recommendation made me by my council to grant you

¹ *Mon Bureau consultatif des Arts et Manufactures.*

a recompence of 12,000 francs.² In so doing I had in view the assigning you the reward due to the inventors of useful processes, and also the indemnifying you for the expences you have been obliged to incur, either in the forming your establishment or in the experiments necessary to establish the success of your process. You shall be immediately informed when you may repair to the public treasury and receive the 12,000 francs.

It appears to me of importance, Sir, that you should spread the knowledge of your preserving process. I desire, therefore, that agreeably to your own proposal, you will digest a detailed and exact description of your process. This description, which you will remit to my Board of Arts and Manufactures, shall be printed at your expence, after it shall have been examined. You will then transmit me 200 copies. The transmission of these copies being the only condition I impose on you for the payment of the 12,000 francs, I doubt not you will hasten to fulfil it. I desire, Sir, you will acknowledge the receipt of my letter.

Accept assurances, &c

(Signed) Montalivet.

² About £500 sterling.

BOARD OF ARTS AND MANUFACTURES

The undersigned Members of the Board of Arts and Manufactures attached to the Minister of the Interior, being required by his Excellency to examine the description of the process of Mr. Appert for the preservation of alimentary substance, certify that the details it contains, as well on the mode of carrying on the process as on the results, are exactly conformable to the various experiments which Mr. Appert has made before them, by order of his Excellency.

*(Signed) Bordel,
Gay-Lussac,
Scipion-Perrier,
Molard.*

Paris, 19th April 1810.

Copy of a Letter written to General Caffarelli, Maritime Prefect at Brest, by the Council of Health, dated Brumaire, year 12.

The provisions prepared according to the process of Citizen Appert and sent to this port by the Minister of Marine, have, after lying in the roads three months, been found in the following condition.

The broth or soup (*bouillon*) in bottles was good; the *bouillon* with a *bouilli* in a vessel apart was also good, but weak; the *bouilli*

itself was very eatable.

The beans and green peas, prepared both with meat and vegetable soup, had all the freshness and flavour of recently gathered vegetables.

(Signed) Dubreuil,

Billard,

Duret,

Pichon,

Thaumer.

True Copy.

J. Miriel, *Secretary*

§ I

All the expedients hitherto made use of for preserving alimentary and medicinal substances, may be reduced to two principal methods; that of dessication; and that of mingling, in greater or less quantities, a foreign substance for the purpose of impeding fermentation or putrefaction.

It is by the former of these methods that we are furnished with smoaked and hung meat, dried fish, fruits, and vegetables. By the latter, we obtain fruits and other vegetable substances preserved in sugar, the juices and decoctions of plants reduced to syrups and essences, all kinds of pickles, salted meat and vegetables. But each of these modes has its peculiar inconveniences. Dessication takes away the odour, changes the taste of the juices, and hardens the fibrous or pulpy matter (the *porenchyma*).

Sugar, from the strength of its own flavour, conceals and destroys in part other flavours, even that, the enjoyment of which we wish to preserve, such as the pleasant acidity of many fruits. A second inconvenience is this, that a large quantity of sugar is required in order to preserve a small quantity of some other vegetable matter; and hence the use of it is not only very costly, but even in many cases pernicious. Thus the juices of certain plants cannot be reduced to a syrup or essence, but by means of nearly double the quantity of sugar. It results from this, that those syrups or essences contain much more sugar than any medicinal

substance, and that most frequently the sugar counteracts the operation of the medicine, and is hurtful to the patient.

Salt communicates an unpleasant acerbity to substances, hardens the animal fibre, and renders it difficult of digestion. It contracts the animal parenchyma.³ On the other hand, as it is indispensable to remove, by means of water, the greater part of the salt employed; almost all the principles which are soluble in cold water, are lost when the salt is taken away: there remains nothing but the fibrous matter, or parenchyma; and even that, as has been said, undergoes a change.

Vinegar can seldom be made use of, but in the preparation of certain articles for seasoning.

I shall not enter into any details concerning what has been said and published on the art of preserving alimentary substances. I shall only observe, that as far as my knowledge extends, no author, either ancient or modern, has ever pointed out, or even led to the suspicion, of the principle which is the basis of the method I propose.

³ “The salt meat with which the crews of vessels are fed, appears to be one of the principal causes of the scurvy. It seems that the same causes which operate to prevent the fermentation of meat, renders it also difficult of digestion. Though a small quantity of salt may be an obstacle in the way of putrefaction, the too abundant and frequent use which is made of it, must cause great obstructions in the smaller vessels of the body, and these obstructions cannot fail to overload the stomach of men who have to digest dry vegetables and biscuits, which sailors advanced in years are not always able to chew completely. Bad digestion and obstruction in the smaller vessels may occasionally give rise to ulcers in the mouth, and spots, which denote the scurvy.” —*Santé des Marins*, by Duhamel.

It is known, how much, within a certain period, the public attention, both at Paris and in the departments, has been directed towards the means of diminishing the consumption of sugar, by supplying its place by the use of various extracts, or essences, of indigenous substances. The government, whose philanthropic views are turned towards all useful objects, does not cease to invite all those who pursue the arts and sciences, to investigate the means of drawing the utmost advantage from the productions of our soil, in order to develop, to the utmost, our agriculture and manufactures, and so diminish the consumption of foreign commodities.

In order to attain the same end, the Society for the Promotion of National Industry⁴ stimulates, by the offer of flattering rewards, all those whose talents and labours are directed towards discoveries, from which the nation and humanity may draw substantial benefits. Animated by this laudable zeal, the Agricultural Society, by its resolution of the 21st of June 1809, and its official notification of it, the 15th of the July following, made an appeal to the whole nation, in order to collect all the information and documents which might contribute to the composition of a work on the art of preserving, by the best possible means, every kind of alimentary substance.

It was after invitations of so great weight, that I resolved to make known a method of effecting this object, of great facility in the execution, and at the same time very cheap, and which,

⁴ *La Société d'Encouragement pour l'Industrie nationale.*

by the extension it admits of, may afford numerous advantages to society.

This method is not a vain theory. It is the fruit of reflection, investigation, long attention, and numerous experiments, the results of which, for more than ten years, have been so surprising, that notwithstanding the proof acquired by repeated practice, that provisions may be preserved two, three, and six years, there are many persons who still refuse to credit the fact.

Brought up to the business of preserving alimentary substance by the received methods; having spent my days in the pantries, the breweries, store-houses, and cellars of Champagne, as well as in the shops, manufactories, and warehouses of confectioners, distillers, and grocers; accustomed to superintend establishments of this kind for forty-five years, I have been able to avail myself, in my process, of a number of advantages, which the greater number of those persons have not possessed, who have devoted themselves to the art of preserving provisions.

I owe to my extensive practice, and more especially to my long perseverance, the conviction:

- 1st. That fire has the peculiar property, not only of changing the combination of the constituent parts of vegetable and animal productions, but also of retarding, for many years at least, if not of destroying, the natural tendency of those same productions to decomposition.

- 2d. That the application of fire in a manner variously adapted to various substances, after having with the utmost care and as

completely as possible, deprived them of all contact with the air, effects a perfect preservation of those same productions, with all their natural qualities.

Before I state the details of my process, I ought to observe that it consists principally,

1st. In inclosing in bottles the substances to be preserved.

2d. In corking the bottles with the utmost care; for it is chiefly on the corking that the success of the process depends.

3d. In submitting these inclosed substances to the action of boiling water in a water-bath (*BALNEUM MARIÆ*), for a greater or less length of time, according to their nature, and in the manner pointed out with respect to each several kind of substance.

4th. In withdrawing the bottles from the water-bath at the period described.

§ II.

Description of my Rooms set apart for carrying on the Process on a large Scale. ⁵

My laboratory consists of four apartments. The first of these is furnished with all kinds of kitchen utensils, stoves, and other apparatus, necessary for dressing the animal substances to be preserved, as well as with a kettle for broth, gravy, &c. containing 180 French pints, raised on brick work. This kettle is provided with a pot to be put within it, pierced with holes like a skimmer, with divisions for holding various kinds of meat and poultry. This pot can be put into and taken out of the kettle with ease. The kettle is provided with a wide cock, to which is fitted, within, a little rose, like that of a watering-pot, covered with a piece of boulding-cloth. In this way I can procure broth or gravy quite clear, and ready to be put into bottles.

The second apartment is appropriated to the preparing of milk, cream, and whey.

The third is used for corking and tying the bottles and vessels, and putting them into bags.

The fourth is furnished with three large copper boilers, placed

⁵ It is obvious, that for the use of private families, and for carrying on the process on a small scale, nothing further will be requisite, than such vessels and other conveniences as are found in every house in the country, where provisions are cured for the consumption of the family during winter.

upon stones raised on brick work. These boilers are all furnished with a stout lid, fitted, to rest upon the vessels within. Each boiler is furnished with a wide cock below, in order to let out the water at a proper time. These large boilers are destined to receive, generally, all the objects intended to be preserved, in order to apply the action of heat to them in a suitable manner; and thus they constitute so many water-baths.⁶

The utensils which furnish the third apartment for the preparatory process consist of

1. Rows of bottle-racks round the room.
2. A reel for the iron wire, to be used for binding the necks of the bottles and other vessels. (*Fig. 1.*)
3. Shears and pincers for tying on the corks. (*Fig. 6.*)

⁶ The reason why it is necessary that large boilers should be furnished with wide cocks is, that it would take up too much time to let so large a body of water, always placed over a heated stove, remain till it became cool; and that, on the other hand, it would do great injury to those substances to let them remain too long exposed to the heat. Without inconvenience, therefore, in private families, any cauldron or earthen vessel may be taken for a water-bath, provided the water rises to the rim of the bottle. In case there should be no vessel sufficiently high, the bottles may be laid down in the water-bath, care being taken to pack them well together, lest they should be broken. Many operations have succeeded well with me this way. The corks are somewhat more liable to burst outwards; but if the bottles are well corked, there is nothing to be feared. For instance, it would not be advisable to lay on their sides, bottles, or other vessels stopped up with stoppers consisting of different pieces of any substance, because the action of the fire upon this kind of stopper is stronger; and however well the vessel might be corked, it would not be advisable to incur the risque. Small water-baths are the more convenient, because they may be placed any where, and removed at will. They soon become cold. The bottles are taken out when the water is sufficiently cool to allow of the finger being put in, and thus the operation is terminated.

4. Machine for twisting the iron-wire after it has been divided and cut to a proper length. (*Fig. 2.*)

5. Two instruments forming a lever, and used for compressing, and as it were biting the corks. (*Fig. 3.*)

6. A bottle-boot or block, standing on three legs, and provided with a strong bat for corking. (*Fig. 5.*)

7. A stool standing on five legs, for tying on the corks. (*Fig. 4.*)

8. A sufficient quantity of linen bags, for covering the bottles and other vessels.

9. Two stools covered with leather and stuffed with hay, in order to shake the bottles upon them, and in that way force a greater number of peas and other small substances into the bottles.

10. A press for the juice of plants, fruits, and herbs; with pans, vessels, sieves, and every thing else that belongs to it.

Besides my laboratory, consisting of these articles, I have fitted up three apartments.

The first, for preparing vegetables: it is furnished with dressers all round.

The second, for storing up and preparing all kinds of fruit.

The third is a cellar, furnished with bottle racks, for rinsing and setting by the bottles and other vessels, as in a store-house.

I have the precaution to keep the bottles and other vessels I may want, ready rinsed at hand. I am also supplied with an assortment of corks, compressed and bit in the instrument already described. When every preparation is thus made, the

process is half done.

The principle by which all alimentary substances are preserved and kept fresh, is invariable in its effects. The result in particular experiments, depends upon the fitness of each individual application of the principle to the substance which is to be preserved, according to its peculiar qualities; but in every case, the exclusion of air is a precaution of the utmost importance to the success of the operation: and in order to deprive alimentary substances of contact with the air, a perfect knowledge of bottles and the vessels to be used, of corks and corking, is requisite.

§ III.

Of Bottles and Vessels

I chose glass, as being the matter most impenetrable by air, and have not ventured to make any experiment with a vessel made of any other substance. The ordinary bottles have generally necks too small and ill made; they are also too weak to resist the blows from the bat and the action of the fire: I, therefore, caused bottles to be made for my especial use, with wider necks, and those necks made with a projecting rim, or ring, on the interior surface, placed below, and resembling, in form, the rim which is at the top of the exterior surface of the necks of bottles. My object was, that when the cork had been forced into the neck of the bottle, three-fourths of its length, in the manner already described, it should be compressed in the middle. In this manner the bottle is perfectly corked on the outside as well as within. It thus opposes an obstacle to the swelling, or expansion, which arises from the operation of heat upon the substance enclosed within the bottle. This mode of forming the neck of the bottle is so much the more indispensable, as I have repeatedly known the swelling to be so strong, as to push out corks of three or four lines in length, though confined by two iron wires crossed. The bottles and vessels should be made of a tough substance [*de matière liante*], the former having the weight of twenty-five

or twenty-six ounces for each *litre*⁷ that the bottle contains. The glass ought to be of equal thickness in every part, or it is liable to break in the water-bath. The form of the Champagne bottle is most convenient; it is the handsomest as well as the strongest, and is of the best shape for packing up.

⁷ The French *litre*, consists of nearly two wine pints and a half, English measure.

§ IV. Of Corks

Economy in corks is generally very unwise, as in order to save a very trifle in the price of cork, a risk is incurred of losing the valuable commodity it is intended to preserve. As corking is made use of in order to preserve and meliorate certain articles, by depriving them of all contact with the air, too much attention cannot be given to the good quality of the cork, which should be of eighteen or twenty lines in length and of the finest quality. Experience has so fully satisfied me on this point, that I never make use of any but superfine corks: these are, in the end, the cheapest. I further take the precaution of compressing, and, as it were, biting the cork, three-fourths of its length, by means of the instrument already described (*fig. 3*), beginning at the small end. The cork is rendered more supple; the pores of the cork are brought closer; it is somewhat lengthened, and its thickness is so much diminished at the extremity which is put into the mouth of the bottle, that a large cork may be made to enter a very moderate opening. The action of the heat within the vessel is such, that the cork swells within, and the corking is thus rendered perfect.

§ V. Of Corking

After what has been just said, the absolute necessity will be apparent of having good bottles, with a projecting rim of equal thickness all round within the neck. Excellent superfine corks are also indispensable, which have been compressed in the instrument three quarters of their length.

Before I cork, I take care that the bottles containing liquor are filled only up to within three inches of the outer rim, lest they should burst from the bubbling and swelling occasioned by the application of heat to the water. When the bottles contain vegetables, fruit, &c. they may be filled up to within two inches of the rim.

I place the full bottle upon the bottle-boot already mentioned, before which I seat myself. This apparatus is to be supplied with a strong wooden bat, a small pot full of water, and a sharp knife, greased with a little suet or soap, for cutting off the tops of the corks, which ought never to be raised much above the head of the bottles. These arrangements being made, I place the bottle-boot between my legs, and taking a cork of fit size, I dip one half of it into the little pot of water, in order to facilitate its entrance; and having wiped the end, I then put it to the mouth of the bottle, at the same time turning it round. I hold it in this position with my left hand, which I keep steady, that the bottle may stand upright.

I take the bat in my right hand, in order to drive in the cork by force of blows.

When I find, at the first or second blow of the bat, that the cork has somewhat entered, I take my hand from the cork in order to hold with it the neck of the bottle, which I fix firmly and upright upon the bottle-boot; and by dint of repeated blows, I continue to drive in my cork three-fourths of its length. The quarter of the cork which remains above the bottle, after having refused to yield any further to the redoubled blows of the bat, assures me, in the first place, that the bottle is completely corked, and this same residue serves also to hold the double crossed iron wire which is necessary to bind fast the cork, that it may be able to resist the action of heat on the water-bath. I must repeat again, that too much attention cannot be given to the corking: no circumstance however minute ought to be neglected, in order to effect the rigorous exclusion of the air from the substance to be preserved; air being a most destructive agent, and the one which is most sedulously to be counteracted in the course of the process.⁸

⁸ Many persons believe they have corked well, when they have forced the cork even with the mouth of the bottle; but this is a great mistake. On the contrary, whenever the whole of the cork, instead of withstanding the blows of the bat, is forced into the bottle, it is adviseable to draw it out and substitute another in its place. Thus the believing that a bottle corked very low is well corked, because no liquor escapes when the bottle is turned with its neck downwards, is an error, which, joined to the use of bad corks, causes a number of losses. He who corks with care and judgment is satisfied that the operation has been performed well by the resistance of the cork to the blows of the bat, and never thinks of turning the neck of the bottle downwards. It is besides sufficient to reflect on the punctures met with in cork, and on all the hidden defects

The bottles being well stopped up, I then fasten the cork down with a couple of iron wires crossed: this is an easy operation, and any one can do it, who has once seen it done.

I then put each bottle in a bag of canvass or coarse linen cloth, made for the purpose, sufficiently large to wrap up the whole of the bottle up to the very cork. These bags are made in the shape of a muff, open alike at both ends: one of these ends is drawn with a string running in a gutter, leaving an opening of about the width of a crown piece; the other end is provided with a couple of small strings, in order to tye the bag round the neck of the bottle.

By means of these bags, I can dispense with the use of hay or straw in packing up the bottles in the water-bath; and, whenever any one of them breaks, the fragments are preserved in the bag. I am spared a great deal of trouble and a number of inconveniences which I had formerly to sustain, in picking up the pieces of the bottle out of the straw or hay I then made use of.

After having spoken of bottles, their form and quality; of stoppers, and the length of the fine cork of which they ought to

which may subsist in the interior even of the finest cork, by means of which, the air may be introduced; in order to be convinced of the propriety of making use of none but the very best corks, and that, after having well compressed them in the machine for that purpose; and also of corking them so closely that they become very much compressed in the middle. It is in this way only, that losses can be prevented from frequently taking place, which have often no other cause than bad corking; for, if a bottle does not instantly run when carelessly corked, it proceeds from this circumstance, that the air has not had time to penetrate through the apertures which may be in the interior of the cork: and, in fact, how different is the quality of wine, drawn from the same cask! and how many bottles do we meet with, which have lost more or less of their contents!

be composed; of the corking and tying; of bags, their form and utility; I proceed to give an idea of vessels with large necks, that is, glass jars, which I make use of for preserving solid and bulky substances, such as poultry, game, meat, fish, &c.

These jars have necks of two, three, or four inches diameter, and are of a larger or small size; like bottles, they are furnished with a projecting rim, not only in order to strengthen the neck, but also for receiving the iron wire destined to bind the corks. I have not yet been able to procure from the glass-houses a similar projecting rim in the interior of the neck of these jars, as I have in that of the bottles. The completely corking up these vessels, is, from this circumstance, rendered more difficult, and demands especial care.

I met with another obstacle in the cork itself, from its thinness (more especially when the cork was very fine), and also from its ascending pores being against the grain. I was therefore obliged to form stoppers of three or four pieces of cork, from twenty to twenty-four lines in length, placed together the way of the grain, the pores of the cork being placed horizontally, by means of isinglass prepared in the following manner.

I melted over the fire four drams of well beaten isinglass, in eight ounces of water: when melted, I caused it to run through fine linen; and then put it again over the fire in order to reduce it to one third of its volume. After which I added an ounce of good full-proof brandy. I then left the whole on the fire till it became reduced to about three ounces. I then put the glue thus

prepared in a little pot over live coals, and took care to warm my pieces of cork. I then slightly smeared over the pieces of cork with a brush, in order to glue them together. When the pieces composing the stopper were well fixed and glued together, I then fixed a tight thread to the two extremities of the stopper, in order to keep the pieces together, and let them dry, either in the sun or in a gentle heat for about a fortnight. At the end of this time I took a cork-maker's knife and cut my stoppers of a proper shape; and having always fitted them to the mouth of the jar, they have never proved defective.

Having corked my jars, and driven in the stopper by means of the bat, the bottles being always placed upright in the bottle-boot, I made use of a compound luting. This luting (communicated to me by Mr. Bardel) is made of quick lime, which is slaked in the air by being sprinkled with water, till it becomes reduced to a powder. The powder to be kept in this state in corked bottles ready for use. This lime mixed with a cheese made of skimmed milk (*fromage à la pie*), and formed to the thickness of paste, produces a luting which hardens rapidly, and which withstands the heat of boiling water.

I besmear the whole of the outside of the stopper with this luting, and I cover the edge of the jar with hemp and strips of linen placed above and close to the stopper, and hanging down to the rim.

Farther, that the iron wire may have force enough to keep down the stopper, I put a piece of cork seven or eight lines high,

and sixteen or eighteen lines in diameter, in the middle of the large stopper which is itself too big to allow the wire to have any effect upon it. By means of this second cork, placed in the middle of the large stopper, I am able to make the wire take a proper hold of the cork and give due strength and solidity to the stopper.

When every thing has thus been foreseen and prepared, and, above all things, well corked, tied, and wrapped up in bags, there remains nothing to be done, but to apply the preserving principle, that is, *heat*, to the substances duly arranged, and this is the most easy part of the operation.

I place all the vessels, bottles or jars, upright in a boiler, which I then fill with cold water up to the necks of the vessels; I then cover the boiler with its lid, which is made to rest upon the vessels. I cover the upper part of the lid with a piece of wet linen, in order that the sides of the lid may exactly fit, and all evaporation from the water-bath be impeded as much as possible.

When the boiler has been thus filled and adjusted, I light the fire beneath. When the water-bath begins to boil, I take care to maintain the same degree of heat for the greater or less quantity of time required by the substances exposed to its influence. When this time has elapsed, I then instantly put out the fire by means of a coal extinguisher (*étouffoir*).

After the fire has been put out a quarter of an hour, I let out the water of the bath by means of the cock; after the water has been withdrawn half an hour, I uncover the boiler, and I do not take out the bottles till one or two hours after the uncovering;

and this terminates the operation.

The next day, or a fortnight afterwards, for that is immaterial, I place my bottles on shelves, as I do wine, in a cool and shady place. If I purpose sending them a great distance, I think it worth while to pitch them before I place them on the shelves; otherwise this last operation is not absolutely necessary. I have now by me, bottles which have been three years lying under a stair-case, the substances contained in which retain as much flavour as if they were just prepared, and yet they were never pitched.

Конец ознакомительного фрагмента.

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