

quite black; return this again into the bag, and continue doing so until it runs fine and clear.

If a little lime, about a spoonful, or any other alkali is added to the sugar with the water, &c., it will neutralize the acid which all raw sugars contain, and they will be found to stand much better after they have been manufactured, by not taking the damp so soon. This is not generally done by the trade, but it will be found beneficial if practised.

To clarify Loaf Sugar.—This is clarified by mixing the whites of eggs with water, without any other assistance, for having been previously refined, it does not require those auxiliaries again to separate the coarser parts, unless it is of an inferior quality, or an extra fine syrup, as for bon-bons and other fancy articles, is required. When it is necessary to have a very fine sparkling grain, in that case break your lump into small pieces and put it in a preserving-pan, with a sufficient quantity of water to dissolve it, in which has been mixed the white of an egg and powdered charcoal,* as for raw sugar, following those instructions already given. After the sugar has been drained from the bag, pass some water through to take off any which may be left in the charcoal, which you use for dissolving more sugar.

The scum should always be reserved, when charcoal or black is not used, to mix with the articles of an inferior quality.

The best refined loaf sugar should be white, dry, fine, of a brilliant sparkling appearance when broken, and as close in texture as possible. The best sort of brown has a bright, sparkling, and gravelly look. East India sugars appear finer, but do not contain so much saccharine matter, yet they are much used for manufacturing the best sort of common sweetmeats, when clarified, instead of loaf sugar.

Degrees of boiling Sugar.—This is the principal point to which the confectioner has to direct his attention; for if he is not expert in this particular, all his other labour and knowledge will be useless: it is

*Charcoal varies in its qualities, according to the wood from which it is prepared. That made from porous woods, such as the willow, alder, &c., is the best for clarifying liquids; animal charcoal, or bone black, is also equally good, on account of its light and porous nature; that made from hard woods is only fit for fuel, as it does not possess the clarifying and decolouring properties like that made from the more soft and porous woods. When newly prepared, or if it has been kept free from air, it has the property of absorbing all putrid gases; "it is also capable of destroying the smell and taste of a variety of animal and vegetable substances, especially of mucilages, oils, and of matter in which extractive abounds; and some articles are said to be even deprived of their characteristic odour, by remaining in contact with it, as valerian, galbanum, balsam of Peru, and musk. The use of charring the interior of water-casks, and of wrapping charcoal in cloths that have acquired a bad smell, depend upon this property. None of the fluid menstrua with which we are acquainted have any action whatever, as solvents, upon carbon."
Paris's Pharmacologia.

the foundation on which he must build to acquire success in his undertakings.

There are seven essential points or degrees in boiling sugar; some authors give thirteen, but many of these are useless, and serve only to show a critical precision in the art, without its being required in practice; however, for exactness, we will admit of nine, viz:—1. Small thread. 2. Large thread. 3. Little pearl. 4. Large pearl. 5. The blow. 6. The feather. 7. Ball. 8. Crack. 9. Caramel. This last degree derives its name from "a Count Albufage Caramel, of Nismes, who discovered this method of boiling sugar."—*Gunter's Confectioner.*

In describing the process, I shall proceed in a different manner to other writers on the subject, by classing it under different heads, according to the uses to which it is applied.

SYRUP.

Under this head are comprised the degrees from the small thread to the large pearl; for at these points the sugar is kept in a divided state, and remains a fluid of an oily consistency. A bottle which holds three ounces of water will contain four ounces of syrup. The method of ascertaining those degrees, according to the usages of the trade, is as follows:—

Small Thread.—Having placed the clarified syrup on the fire, let it boil a little, then dip the top of your finger in the boiling syrup, and on taking it out apply it to the top of your thumb, when, if it has attained the degree, on separating them a small ring will be drawn out a little distance, about as fine as a hair, which will break and resolve itself into a drop on the thumb and finger.

Large Thread.—Continue the boiling a little longer, repeat the same operation as before, and a larger string will be drawn.

Little Pearl.—To ascertain this degree, separate the finger from the thumb as before, and a large string may be drawn, which will extend to nearly the distance the fingers may be opened.

Large Pearl.—The finger may now be separated from the thumb to the greatest extent before the thread will break.

CRYSTALLIZATION.

This takes the degrees of the blow and feather. The particles of the sugar being now brought together within the sphere of their activity, the attraction of cohesion commences, whereby they attach themselves together and form quadrilateral pyramids with oblong and rectangular bases. This is generally, but improperly, termed candy, thereby confounding it with the degrees at which it grains, also termed candy. This certainly seems "confusion worse confounded;" but if things are called by their proper names, many of those seeming difficulties and technicalities may be avoided which tend only to confuse and embarrass the young practitioner, without gaining any

desired end or purpose. If it were generally classed into the degrees of crystallization, the true meaning and use would at once be explained and understood by the greatest novice.

The nature and principle of this operation are these. First, as in the case of syrup (the first four degrees), when the water has absorbed as much sugar as it is capable of containing in a cold state, by continuing the boiling, a further portion of the solvent (water) is evaporated, and sugar remains in excess, which, when exposed to a less degree of heat, separates itself, and forms crystals on the surface and sides of the vessel in which it is contained, and also on anything placed or suspended in it. But if it is exposed too suddenly to the cold, or disturbed in its action by being shaken, or if the boiling has been continued too long, the crystals will form irregularly by the particles being brought in too close contact, and run too hastily together, forming a mass or lump.

To obtain this part in perfection, the boiling should be gradual, and continued no longer than till a few drops let fall on a cold surface show a crystalline appearance, or after being removed from the fire a thin skin will form on the surface. It should then be taken from the fire and placed in a less hot but not cold place, and covered or put into a stove or hot closet to prevent the access of cold air. A few drops of spirits of wine, added when the sugar has attained the proper degree, will conduce to a more perfect crystalline form, scarcely attainable by any other means, as it has a great affinity with the water, thereby causing the sugar to separate itself more freely. It must be used with caution, as too much will cause it to grain.

To ascertain the Degree of the Blow.—Continue the boiling of the sugar, dip a skimmer in it and shake it over the pan, then blow through the holes, and if small bubbles or air-bladders are seen on the other side, it has acquired this degree.

The Feather.—Dip the skimmer again into the sugar, and blow through the holes as before, and the bubbles will appear larger and stronger. Or if you give the skimmer a sudden jerk, so as to throw the sugar from you, when it has acquired the degree, it will appear hanging from the skimmer in fine long strings.

CANDY.

Sugar, after it has passed the degree of the feather, is of itself naturally inclined to grain, that is to candy, and will form a powder if agitated or stirred: for as the boiling is continued, so is the water evaporated until there is nothing left to hold it in solution: therefore that body being destroyed by heat, which first changed its original form to those we have already enumerated, as this no longer exists with it, it naturally returns to the same state as it was before the solvent was added, which is that of minute crystals or grains, being held together by the attraction of cohesion, unless, as before stated, they are separated by stirring, &c.

The sugar being evaporated by boiling from the last degree, leaves a thin crust of crystals round the sides of the pan, which shows it has attained the candy height; and this crust must be carefully removed, as it forms, with a damp cloth or sponge, or the whole mass will candy if suffered to remain. To prevent this is the chief desideratum, all further proceedings for which specific rules will be given in their proper places.

The remaining degrees can be ascertained after the following manner:—

The Ball.—Provide a jug of clean cold water, and a piece of round stick. First dip in the water, then in the sugar, and again in the water;* take off the sugar which has adhered to it, and endeavour to roll it into a ball between the finger and thumb in the water: when this can be done, it has attained the desired degree. If it forms a large hard ball which will bite hard and adhere to the teeth when eaten, it is then termed the large ball, *et contra*.

The Crack.—Follow the directions given for the ball. Slip the sugar off from the stick, still holding it in the water, then press it between the finger and thumb; if it breaks short and crisp, with a slight noise, it is at the crack.

Caramel.—To obtain this degree it requires care and attention, and also to be frequently tried, as it passes speedily from the crack to the caramel. Try it as before directed, and let the water be quite cold, or you will be deceived. If on taking it off the stick it snaps like glass, with a loud noise, it has attained the proper degree; it will also, when it arrives at this point, assume a beautiful yellow colour; after this it will speedily burn, taking all the hues from a brown to a black; therefore, to prevent this, dip the bottom of the pan into a pail of cold water as soon as it comes to caramel, as the heat which is contained in the pan and sugar is sufficient to advance it one degree; also be careful that the flame of the fire does not ascend round the sides of the pan, which will burn it.

In boiling sugar, keep the top of the pan partially covered from the time it commences boiling until it has attained the ball or crack: the steam which rises, being again thrown on the sides, prevents the formation of the crust or crystals.

To prevent its graining, add a little of any sort of acid when it is at the crack—a table-spoonful of common vinegar, four or five drops of lemon-juice, or two or three drops of pyroligneous acid: any of these will have the desired effect; this is termed greasing it: but remember that too much acid will also grain it, neither can it be boiled to caramel if there is too much. A little butter added when it first commences boiling will keep it from rising over the pan, and also prevent its graining. About as much cream of tartar as may be laid on a sixpence, and added to seven pounds of sugar with the water, or equal quantities of cream of tartar and alum in powder, added when

* This should be performed as speedily as possible.

it boils, will also keep it from candying. If sugar is poured on a slab that is too hot it is very apt to grain; this is frequently the case after several casts have been worked off in rotation; therefore, when you find it inclined to turn, remove it to a cooler spot, if possible, and not handle it any more than is necessary.

Sugar that has been often boiled or warmed is soon acted upon by the atmosphere, whereby it becomes clammy and soon runs, as it is weakened by the action of the fire. Acid causes the same effect.

If it has passed the degree you intended to boil it at, add a little water, and give it another boil.

SECTION II.—SYRUPS.

THESE are either the juices of fruits, or a decoction or infusion of the leaves, flowers, or roots of vegetables, impregnated with a sufficient quantity of sugar for their preservation and retaining them in a liquid state.

A great portion of this class comes more under the notice of the apothecary than the confectioner; but it may now be considered, with lozenges, as a branch of pharmacy in the hands of the latter, the most agreeable of which are now manufactured by him to supply the place of fresh fruits, &c., when out of season, for the making of cooling drinks, ices, &c., for balls and routs.

General Rules and Observations.—Two things are essentially necessary to be observed, which are:—the proper methods of making decoctions and infusions. These require some knowledge of the nature and properties of vegetable matter.

The virtues of most plants are extracted by infusion, and this is generally the case with aromatic plants, and those whose properties depend on an essential oil; for, in boiling, the whole of the aroma of the plant is dispersed, and the syrup loses that delicate flavour for which it is prized.

Aromatic herbs, and the leaves of plants in general, yield their virtues most perfectly when moderately dried. Cold water extracts from these in a few hours, the lighter, more fragrant and agreeable parts, and then begins to take up the more ungrateful and grosser. By pouring the same liquor on fresh parcels of the herb, it becomes stronger, richer, thicker, and balsamic.

Those only should be decocted whose principles consist of mucilage, gum, or resin, and require boiling to extract them.

The compact resinous woods, roots and barks, yield their virtues most freely while fresh. Dry, they yield little to cold or moderately warm water, and require it to be boiling. By this process the grosser, more fixed saline and mucilaginous parts are dissolved, the resinous melted out, and the volatile dissipated.

Infusions.—“These are watery solutions of vegetable matter, obtained by maceration, either in hot or cold water, with the assist-

ance of ebullition. In selecting and conducting the operation, the following general rules should be observed:—

“1st. Infusion should always be preferred before decoction, where the virtues of the vegetable substance reside in volatile oil, or in principles which are easily soluble; whereas, if they depend upon resinous-mucilaginous particles, decoction is an indispensable operation.

“2nd. The temperature employed must be varied according to the circumstances of each case, and infusion made with cold is in general more grateful but less active than one made with heat.

“3rd. The duration of the process must likewise be regulated by the nature of the substances; for the infusion will differ according to the time in which the water has been digested on the materials; thus the aroma of the plant is first taken up, then in succession the colouring, astringent, and gummy parts.

Decoctions.—“These are solutions of the active principles of vegetables, obtained by boiling them in water.

“1st. Those principles only should be decocted whose virtues reside in principles which are soluble in water.

“2nd. If the active principle be volatile, decoction must be an injurious process; and if it consists of extractive matter, long boiling, by favouring its oxidizement, will render it insipid, insoluble, and inert.

“3rd. The substances to be decocted should be previously bruised or sliced, so as to expose an extended surface to the action of the water.

“4th. The substances should be completely covered with water, and the vessel slightly closed, in order to prevent as much as possible the access of air; the boiling should be continued without interruption, and gently.

“5th. In compound decoctions, it is sometimes convenient not to put in all the ingredients from the beginning, but in succession, according to their hardness, and the difficulty with which their virtues are extracted; and if any aromatic or other substances containing volatile principles, or oxidizable matter, enter into the composition, the boiling decoction should be simply poured upon them, and covered up until cold.

“6th. The relative proportions of different vegetable substances to the water must be regulated by their nature. The following general rule may be admitted. Of roots, barks, or dried woods, from two drachms to six to every pint of water: of herbs, or flowers, half that quantity will suffice.

“7th. The decoction ought to be filtered through linen while hot, as important portions of the dissolved matter are frequently deposited on cooling; care must also be taken that the filter is not too fine, for it frequently happens that the virtues of a decoction depend upon the presence of particles in a minutely divided state.”—*Paris's Pharmacologia.*

“All acid syrups ought to have their full quantity of sugar, so as to