

UNITED STATES PATENT OFFICE.

FELIX GARCIA, OF NEW ORLEANS, LOUISIANA; CARLOS GARCIA ADMINISTRATOR OF SAID FELIX GARCIA, DECEASED.

IMPROVEMENT IN DECALCIFYING LIQUIDS.

Specification forming part of Letters Patent No. **31,650**, dated March 5, 1861

To all whom it may concern:

Be it known that FELIX GARCIA, of New Orleans, in the parish of Orleans and State of Louisiana, did invent a new and Improved Method of Defecating Saccharine and other Liquids; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention consists in treating saccharine and other liquids first with an excess of lime and afterward with soap, so that by the action of the lime the impurities contained in the liquid are separated from the same, and by the subsequent action of the soap the lime, together with the impurities, are reduced to such a state that they can easily be separated from the liquid, leaving the latter in all its purity.

To enable those skilled in the art to fully understand and use this invention, I will proceed to describe it.

The saccharine liquid, whether produced from cane or grape-sugar dissolved in water, or from substances containing sugar, or expressed from saccharine plants—such as sugar-cane, beet-root, &c.—or obtained from starch, cellulose, &c., by chemical reaction, and whether the object of the operation be the production of the sugar they contain or the transformation of the sugar into alcohol and spirituous liquors, is first clarified by the addition of lime, and the lime is immediately neutralized by the application of some saponifiable agent combined with some alkali in the form of soap.

The saponifiable substance best calculated for this process is olive-oil, which may be combined with soda or any other of the alkalies. The soap thereby produced may be either neutral, in which state it contains about ten parts of the alkali in one hundred parts of soap, or the fatty matter may be made to predominate, which is effected by dissolving eighteen ounces of the neutral soap in two and a quarter pounds of boiling water, and after the solution has cooled down to about 104° Fahrenheit eighteen ounces of the fatty matter are added at the same temperature, and the mixture is carefully made up into a paste. This paste contains seven parts of the alkali in one hundred parts of the composition. In some

cases it may also be desirable to have the alkali predominate in the mixture, and in this case, after dissolving the neutral salt, as above described, soda or any other alkali or matter containing basic alkaline salts is added in the proportion which may be found to be best adapted for the occasion.

The neutral soap is used whenever, in working out the operations, there is no reason to fear an excess of alkali in the liquids—as, for instance, when saccharine liquid has to be changed into alcohol. If, on the other hand, there is reason to fear the effect of an alkaline reaction, which is the case when extracting sugar from saccharine liquids, the acidulous soap in which the fatty matter predominates is used. The basic or alkaline soap is applied when the liquids show those signs of acidity which require to be promptly acted upon. In cases where the saccharine liquid is not intended to present any alkaline quality ammonia may be employed, which entirely passes off during the ebullition. In order to use this method for saccharine liquid or juice to be clarified in the old-fashioned copper pans, which are exposed directly to the flame, the juice is first introduced into the clarifying-copper and a quantity of lime is added, which quantity varies so materially, on account of the varieties in the cane used and the state which the juice is in, that it is impossible to state the exact quantity to be employed. So much can be stated, however, that the quantity of lime used with this process is from ten to fifteen per cent. greater than the quantity of lime generally employed. The mixture is now well stirred, and when it reaches a temperature of about 165° Fahrenheit the acidulous soap (that one containing an excess of fatty matter) is introduced in quantities varying according to the quantity of lime used. The general proportion between the quantity of soap and the quantity of lime is as one to two—that is, one-half as much, by weight, of the soap is used than of the lime. After having well stirred, the mixture is now left to itself until reaction takes place and the scum accumulates. When the liquid reaches a temperature of about 195°, the scum begins to rise abundantly, and this scum has to be skimmed off as quickly as possible, in order to finish the

operation before the ebullition takes place. The contents of the clarifying-copper are now removed to the pan to be next used.

In certain cases circumstances render it necessary that the juice be brought up to 22° Baumé and the sirup put aside for future operations. In this case the operation of clarifying in the first copper is carried on as above explained, in so far as respects the use of the lime, but at the same time only one-third part of the soap is added. The remaining two-thirds of the soap are reserved for a fresh clarification. In a defecating-vessel heated by steam the required quantity of lime is added, and the whole is well stirred and exposed to the action of the steam until to the first appearance of boiling. In this state the liquid is left for a few minutes, and it is now drawn off by a faucet. The temperature of the liquid is lowered to about 100° or 120° in a refrigerator, if such a one can be had, and it is mixed with the acidulous soap in another defecator, and the mixture is well stirred and left until the reaction takes place. The scum accumulates on the surface in one solid mass, and it is removed in the ordinary manner. After the defecation is finished the juice runs out clear and bright, and there is now no more danger of its being spoiled.

For refining, the raw sugar and the inferior matter are dissolved, and the mixture is heated, as above stated. In this case ammonia or carbonate of ammonia may also be used with advantage. This process is also applicable to saccharine liquids obtained either by being dissolved, or by being expressed, or by any other method, after being changed into glucose-sugar from a chemical reaction on ligneous and cellular fibers, pectose, or pectosine starch, &c., as the case may be, and destined for transformation into alcohol. Such liquids, previous to putting them under fermentation, are subjected to a double defecation, in the manner above described, over the flame of the fire or by steam. In the first place the liquid is subjected to a course of lime and afterward to a course of soap, and it is now drawn off and put under vinous fermentation and distilled or otherwise treated, as occasion may require. This process, which can be generally applied as before explained, for taking out the lime dissolved in saccharine liquids is equally efficacious for the elimination or removal of all or any other agents which may be employed for defecation. It can be employed in those cases where a composition of barytes is used, or where any other metallic acid is used in the shape of salts, or, in fact, in every case, provided that the agent employed in defecating will, when combined with the soapy bodies, form an insoluble soap. It might happen that the density of the soap thus formed may prevent it from coming off with the scum and from being removed, except by continually separating it by precipitation. In this case the operation ought to be suitably modified in its de-

tails, as will be readily understood by every practical man. The same process may also be applied for the purpose of disinfecting bad alcohol, and in this case the alcohol is either first subjected to the treatment with lime and afterward to the treatment with the soap, or the soap may be applied immediately, and the fatty matter contained in the same, or the alkali combined with it, reacts on the essential oil dissolved in the alcohol, and by redistilling said alcohol the essential oil, and with it the bad smell usually found with the inferior sorts of alcohol, are retained in the retort, and the best and purest spirit is produced.

In case the soap alone is to be used, about seven pounds of the neutral soap are dissolved in as little water as possible, and the solution is mixed with thirty gallons of alcohol. After the mixture has been well roused up it is distilled in such a way as to preserve the composition which remains, so that the soapy substance contained in the same can be taken out and preserved.

In all cases where both lime and soap are used, and especially in its application to saccharine liquids, the effect of the soap is to allow of the use of a much greater quantity of lime than is usually employed in defecating such liquids, and by the employment of this excess of lime all the organic matter foreign to the sugar—such as parenchyma, mucilage, cellular and ligneous fibers floating in the solution—are completely removed. By adding the soap the lime, together with all the foreign matters, comes away with the scum, which floats on the top in a solid mass, leaving nothing but a clear solution charged only with the soluble salts arising either from the plant itself from which the juice is extracted, or from the alkali contained in the agent acted on by the lime by means of a double decomposition. Said alkalies—namely, potash and soda—have a great affinity for the carbonic acid of the air, and they pass into the state of carbonates, which have a very feeble reaction on the sugar in a state of dissolution. In the particular case when ammonia is employed it altogether passes off during the ebullition.

By thus subjecting the liquids to a double defecation, first by means of lime in excessive quantities, and, second, by means of the agent for eliminating the lime, there is no reason to fear that the sugar will become deteriorated during the concentration of the liquors, caused by the reacting agents used to defecate or clarify, whereas, on the other hand, all foreign and organic matter is entirely taken out of the saccharine liquid and thrown off in the scum, and thereby the primary cause of acetous or lactic fermentation is destroyed. The consequences of these facts, which are fully demonstrated by practice, are, first, that the quality of the article produced is improved, and, secondly, the quantity of the sugar produced is increased to the same extent that it is diminished by the ordinary process, in consequence of the

action of the lime on the sugar when used in excessive quantities, and the acetous and lactic fermentation which supervenes in saccharine liquids when lime is not used. Another advantage of this process is that by eliminating the lime which is first employed the coloration of the sugar or sirup is in a great measure avoided, from which results a saving of the decolorizing agents employed. Furthermore, by completely taking out all organic matters foreign to the sugar—such as parenchyma, mucilage, ligneous or cellular fiber—all the little vesicles which contain the essential oil appertaining to each plant are removed, and the cause of the bad taste and smell in certain sugars, alcohols, and secondary products is thus destroyed.

The cost of the saponifiable or fatty matter may be calculated as nothing, although in the first instance it causes some outlay of money,

since the whole of it comes away in a state of calcareous soap, and can be used again and again with scarcely any loss. Thus by one plain, simple, and cheap operation results are attained to obtain which it generally requires several laborious and tiresome operations.

Having thus fully described this invention, what I claim as new, and desire to secure by Letters Patent, is—

The within-described method of treating saccharine and other liquids first with an excess of lime and afterward with soap, substantially in the manner and for the purpose set forth.

FELIX GARCIA,

By CARLOS M. GARCIA,
Administrator.

Witnesses:

P. S. BREON,

T. WHARTON COLLENS.