

UNITED STATES PATENT OFFICE.

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ASSIGNORS TO FEDERAL SUGAR REFINING COMPANY, OF JERSEY
CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF CLEANSING SUGAR-CRYSTALS AND IN THE RECOVERY OF CLEANSING COMPOSITIONS
EMPLOYED.

SPECIFICATION forming part of Letters Patent No. 747,256, dated December 15, 1903.

Application filed June 28, 1902. Serial No. 113,675. (No specimens.)

To all whom it may concern:

Be it known that we, CLAUS A. SPRECKELS and CHARLES A. KERN, citizens of the United States, residing in the borough of Manhattan, city, county, and State of New York, (and having a post-office address at 138 Front street, in the borough of Manhattan,) have invented certain new and useful Improvements in Processes of Cleansing Sugar - Crystals and in the Recovery of Cleansing Compositions Employed, of which the following is a full and true description.

The object of this invention is to remove from the sugar-crystals the traces of the cleansing composition employed for the removal of sugar impurities, as hereinafter described, and by such removal to obtain a product from which substantially all the soluble impurities have been removed.

Another object is to treat the cleansing composition with a view to recovering it for reuse after the same has been separated from the crystalline mass.

Our present process is practiced by first mixing the sugar crystals and impurities with a defecating or cleansing agent, preferably employing the agent described in patent to us, No. 698,150, dated April 22, 1902. Next we separate from the crystalline mass the said cleanser containing the impurities which it has absorbed, and then we wash the crystalline mass which is left with a liquid which is non-solvent thereof for the purpose of removing the remaining traces of the defecating or cleansing body used as aforesaid. We mix the sulfonated or sulfoleaginous cleansing liquid described in said patent to us, No. 698,150—viz., a cleansing agent prepared by subjecting one or more bodies, of which resins, fats, fatty oils, and essential oils are examples—to the action of sulfuric acid or a mixture of acids containing sulfuric acid, or we may mix other defecating or cleansing liquid with the sugar crystals and impurities, as therein described, and then subject the mixture to separation, preferably by the employment of a centrifugal machine, whereby the cleanser, with the absorbed sugar im-

purities, will be removed from the mass containing the sugar-crystals, as described in Letters Patent granted to us, No. 700,099, dated May 13, 1902. The crystalline mass remaining in the centrifugal machine will sometimes be found still to bear traces of the cleansing composition employed, and there will also remain in the mass certain solid impurities consisting of the substances—such as sticks, stones, straws, fibers, &c.—of the original mass. It is with the removal of the traces of the cleansing composition, which may be recovered for reuse, that our present invention principally deals. In order to remove any traces of the cleansing body or composition and also the solid impurities referred to from the mass of sugar-crystals, we can dissolve the mass and then filter out the pure sugar liquor and crystallize the sugar as described in our Letters Patent No. 700,099, dated May 13, 1902; but in certain classes of sugar the removal of a small proportion of certain solid substances, if of very small size and not injurious to sugar, is not necessary, provided the actual sugar impurities are eliminated. These substances become mechanically mixed with the sugar, either while in the original juice form, or are incident to the processes which it undergoes. On the other hand, such impurities as invert sugar, caramel, salts, &c., and which we term herein “soluble impurities,” belong to a distinct and different class. Candy manufacturers, canneries, syrup manufacturers, preserve manufacturers, tobacco manufacturers, and many other trades use sugar of a purity of say ninety-nine per cent., one per cent. being such solid substances, with results as satisfactory as though the sugar was one hundred per cent. fine. The slight mixture of solid substances in the grades of sugar referred to gives a slightly-darker color. While this color may be objectionable in sugar for table use, yet it is not deleterious in itself, and hence is not objectionable in the trades referred to. There is an enormous demand for sugar which may contain a small amount of such coloring-matter, but which for that reason sells for less than

the pure white sugar. It is the fact that a sugar which is free from all so-called "soluble sugar impurities," such as invert sugar and salts, yet may contain an insignificant amount of solid substances which produce color, will meet with the ready sale, provided all traces of defecating or cleansing composition employed for the separation of such adherent impurities are removed from the crystalline mass. Such a crystalline mass, which may be called relatively "pure" or "free" from the soluble impurities referred to, since it contains no sugar impurities, may be employed by the candy manufacturers and the other trades above mentioned with satisfactory results.

* In our Patent No. 700,099, dated May 13, 1902, the process of treatment of sugar-crystals is described as consisting in first mixing the mass with a sulfonated defecating or cleansing liquid, then subjecting the mixture to centrifugal action to separate therefrom the liquid, together with the impurities absorbed thereby, then dissolving the crystalline mass, mixing therewith fullers' earth or equivalent and sometimes metallic salt, and subjecting the sugar solution to filtration in order to separate the pure sugar liquor from the traces of the defecating or cleansing liquid and from the solid impurities. In order to crystallize the pure sugar liquor, it is finally subjected to a vacuum-pan process.

The present invention is distinguished from the treatment just referred to in that after the crystalline mass has been mixed with the defecating or cleansing liquid and subjected to centrifugal action to remove the said liquid and the sugar impurities absorbed thereby we are enabled by a further step to remove any remaining traces of the cleansing or defecating liquid without dissolving the sugar-crystals and without any filtration, and hence without any recrystallization of the sugar after filtration.

In carrying out our present process we first mix the sugar crystals and impurities with a defecating or cleansing liquid and then subject this mixture to centrifugal action to remove the defecating or cleansing liquid, together with the absorbed impurities, such as invert sugar and salts. We then take the crystalline sugar mass retained by the centrifugal machine and containing traces, as before explained, of the defecating or cleansing liquid employed and also the solid impurities and we mix therewith a liquid non-resolvent of sugar, preferably a fully-saturated solution of sugar and preferably cold. The result is that any remaining traces of the cleansing or defecating composition are washed from the sugar-crystals. We then subject the crystalline mass to mechanical action, preferably in a centrifugal, as before, to remove the saturated solution of sugar carrying the traces of cleansing or defecating liquid referred to from the sugar-crystals.

In carrying out the steps which result in

the removal of the traces of cleanser from the sugar-crystals we prepare an ordinary fully-saturated solution of sugar. We then take the crystalline mass as it comes from the centrifugal machine, as above described, and containing the traces of our cleansing body and composition, as well as solid impurities, if any, and dump this mass into a kettle or other receptacle and mix with the mass enough of the cold saturated solution of sugar to make a magma. The effect of this is to wash off from the sugar-crystals any traces of the defecating or cleansing composition, but without dissolving the sugar-crystals themselves. In order to separate from the mass the saturated solution and the cleansing composition removed thereby, we put the mass again into a centrifugal machine, and thus expel the saturated solution and cleansing composition which has been washed off thereby. This method does not remove the solid impurities, if any, in the mass; but this is not required for certain grades of sugar, as hereinbefore explained.

Our invention, as hereinbefore stated, also, comprises the recovery for reuse of our defecating or cleansing composition, preferably employed as before stated, the aim being to cheapen the refining of sugar by employing the same defecating or cleansing liquid over and over again.

The sulfonated or sulfoleaginous defecating or cleansing liquid hereinbefore described when expelled from the raw sugar by the first-named centrifugal machine carries off with it the absorbed sugar impurities of the original sugar mass. Ordinarily such defecating or cleansing liquid may be employed for cleansing several batches of raw sugar without the necessity of manipulating the cleanser to remove the sugar impurities therefrom. Eventually, however, the presence of the accumulated sugar impurities mixed with the cleansing liquid renders the latter ineffective or unsatisfactory. We have discovered, however, that the sulfonated or sulfoleaginous defecating or cleansing liquid may be relieved of the sugar impurities and when so relieved may be reused for cleansing sugar and in the same manner as before employed. The sugar impurities—such as salts, invert sugar, and caramel—have greater specific gravity than the sulfonated or sulfoleaginous defecating or cleansing liquids prepared as hereinbefore described and in accordance with our patents above referred to. Taking advantage of this fact, we subject the defecating or cleansing liquid containing the impurities absorbed from the raw sugar to mechanical action in an apparatus suitable for the purpose. Preferably we employ an ordinary centrifugal cream-separator provided with discharge-pipes, which respectively lead the removed impurities and the freed defecating or cleansing liquid into separate receptacles. The removed impurities may contain traces of the

sulfonated or sulfoöleaginous defecating liquid, and to recover these traces we mix water with the impure mass, permit the mixture to settle, and draw off the floating layer of defecating or cleansing composition. To facilitate the settling, salt or a saline solution may be added to the mixture.

Our process also includes the recovery for reuse of the traces of the sulfonated or sulfoöleaginous defecating or cleansing liquid washed off from the sugar-crystals by the saturated solution of sugar, as hereinbefore described, and this is effected in the same way as above described.

In the cleansing of raw sugar we have found that the traces of the defecating or cleansing composition remaining on the sugar-crystals after the use of the centrifugal constitute about one per cent. of the amount of composition employed. As described, the traces of defecating or cleansing composition are removed by the washing with the saturated solution of sugar, for example, and in order to recover the defecating or cleansing composition from the saturated solution we subject the latter to centrifugal action in a suitable machine, wherein the composition, being of less specific gravity, is quickly and completely separated from the sugar solution.

What we claim is—

1. The method or process of cleansing a mass containing sugar-crystals, consisting in

mixing therewith a sulfonated defecating or cleansing agent, then separating from the mass the said cleanser, together with the absorbed impurities, then mixing the cleansed crystalline mass with a non-solvent of sugar for the purpose of removing remaining traces of the cleanser, and removing said non-solvent of sugar, substantially as described.

2. The method or process of cleansing a mass containing sugar-crystals, consisting in mixing therewith a sulfonated defecating or cleansing agent, then separating from the mass the said cleanser, together with the absorbed impurities, then mixing the cleansed crystalline mass with a fully-saturated solution of sugar, and removing said solution, substantially as described.

3. The method or process of cleansing a mass containing sugar-crystals, consisting in mixing therewith a defecating or cleansing liquid non-solvent of sugar, then separating from the mass the said cleanser, together with the absorbed impurities, then mixing the cleansed crystalline mass with a fully-saturated solution of sugar, and removing said solution, substantially as described.

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Witnesses:

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