Dec. 13, 1927. 1,652,680

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Filed June 14, 1926

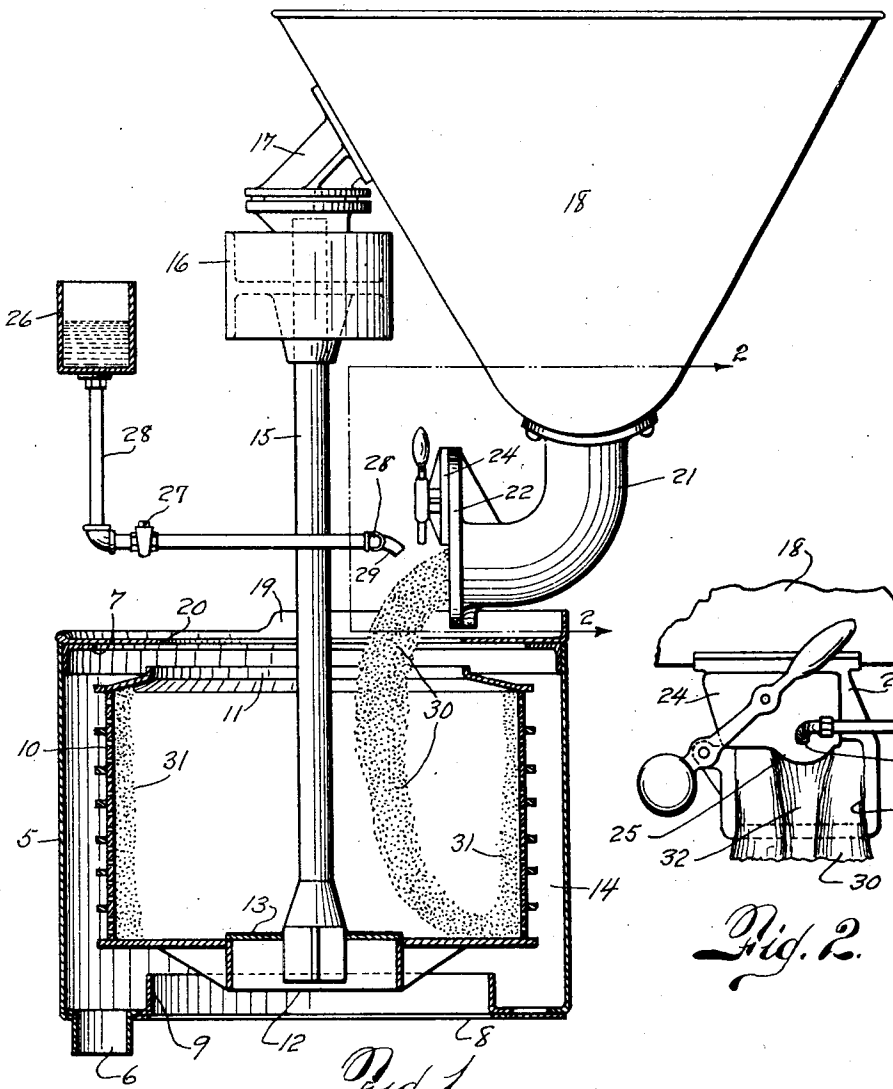


Fig. 1.

Fig. 2.

Witness.
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Patented Dec. 13, 1927. 1,652,680

UNITED STATES PATENT OFFICE.

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METHOD OF AND MEANS FOR TREATING SACCHARIFEROUS SOLUTIONS.

Application filed June 14, 1926. Serial No. 115,926.

This invention embodies improvements in methods of and means for treating saccharriferous solutions, and more particularly relates to what is known as sugar washing, in the art of sugar refining, or the purging with the aid of wash water of the mother liquor, molasses or sirup from the crystallized sugar, by the employment of a centrifugal machine, after the usual preparatory steps of boiling and subsequent concentrating treatment, in the vacuum pans, such saccharine solutions being of a substantially viscous character and generally designated as massecuite or fillmass.

As heretofore proposed, a suitable charge of the fillmass or viscous sugary mixture is introduced into the foraminate-walled basket, of the centrifugal machine, while said basket is being revolved at relatively slow speed, the charge gradually shaping itself as a hollow wall or annularly disposed cake-like formation around the inner peripheral surface of the screen-wall of the basket. When the full charge has been introduced into the basket, the latter is then rapidly revolved at full speed, say approximately at eleven hundred revolutions per minute, which by centrifugal force tends to throw off the sirup, through the perforated cylindrical wall of the basket, into an outer container or housing for the basket, leaving the sugar crystals substantially separated from or free of a maximum portion of the sirup. All of the sirup, however, will not by this operation become entirely separated from the crystallized sugar, and accordingly the balance of the sirup, still clinging to the sugar crystals, must actually be washed out therefrom, usually with warm water forced through the substantially purged cake-like formation, during continued rotation of the basket, by means of manually or automatically controlled spraying arrangements or nozzles directing their discharge against the inner surface of said cake-like wall of the substantially purged sugary residue.

In washing sugar by this old method, or substantially in the manner just set forth, there obviously would normally result a considerable loss of sugar, owing to the warm water passing through the caked mass and dissolving some of the sugar crystals thereof, and because of this water, syrup and dissolved sugar crystals, thrown off from the mass, commonly known as wash sirup because of its sugar contents, must be boiled and further treated again to recover what would otherwise be a lost sugar content. Manifestly, this reboiling of the sirup from raw sugar centrifugal machines causes a substantially increased coal consumption and increased costs generally per pound of manufactured sugar, and it is well understood in the sugar industry that every unnecessary item of expense must be eliminated in the economic production of sugar along commercially successful lines.

A primary object of the present invention has been to overcome this necessity of retreating the wash sirup, or in other words to obtain a maximum recovery of the sugar contents, of a charge of the saccharriferous solution, in a single cycle of operations; and it may be emphasized at the outset that this end is attained, as will hereinafter more fully appear, by the application of the wash water to the saccharine solution prior to any purging of the sirup from its contained sugar crystals, by the action of centrifugal force, as contradistinguished from the washing or spraying of the sugary mass after the same has been substantially purged of its liquor, or even during the actual purging operation.

The foregoing and other objects and advantages, however, will be more clearly apparent it is believed as incidental to the following disclosure, and with these general outlining remarks, therefore, reference will now be had to the accompanying drawings illustrating a practical embodiment of means for carrying out the method involved, which means from a broader aspect are so incidental to the method as to practically embody one and the same invention, and in which drawings

Figure 1 is a view, partially in cross-section and end elevation, illustrating any suitable type of a centrifugal sugar washing machine, but embodying the washing means as associated therewith in a novelly disposed relation for carrying out my improved method; and Figure 2 is a fragmentary cross-sectional view, taken along the line 2—2 of Figure 1.

Any suitable type of a sugar washing centrifugal machine may be employed, and I will therefore simply describe briefly and in general terms the one actually illustrated.

The numeral 5 indicates an outer shell

casing or housing for the rotary sugar container or centrifugal basket, the said housing being provided with an outlet 6, for the discharge of the sirup and wash water, an enlarged top opening 7 and a central bottom opening 8, which latter is formed with an upstanding annular rim 9. The numeral 10 designates the freely perforate or foraminous cylindrical wall of the centrifugal basket, having an enlarged top inlet opening 11 and a central bottom depending annular flange, extending into the upstanding rim 9 and providing an outlet opening 12, for the discharge of the sugar crystals, the upper portion of the sugar discharge outlet being normally closed by any suitable valve plate or operative closure, simply illustrated by a centrally apertured disk 13 slidingly encompassing the lower end of a shaft support for the basket. The basket is so mounted within the housing 5 as to form an annular space between its foraminate wall 10 and the cylindrical wall of the housing, as well as a trough-like annular space between the bottom walls, such space being indicated by the numeral 14. The centrifugal basket is preferably hung, within its housing, by the vertically disposed driving shaft 15, having a drive pulley 16 thereon, and supported by means of a bracket 17 attached to a side wall of the hopper or fillmass mixer tank 18, associated with the centrifugal machine proper. The numeral 19 simply designates an upstanding semi-annular rim of an annular top member for the housing, which member has an enlarged opening 20 of about the diameter of the opening 11 of the centrifugal basket, the top opening 7 of the housing itself being of a sufficiently large diameter to permit of the insertion of the basket therethrough, and the upstanding semi-annular rim 19 providing for a guard to prevent any slopping over of the fillmass as it is being fed into the centrifugal basket.

The fillmass hopper or tank 18 is provided with a discharge spout or elbow pipe outlet 21, having a face plate 22 that is formed with a discharge opening 23, shown as rectangular, and associated therewith is a counterbalanced lever controlled gate valve 24, which latter is preferably provided at its lower edge face with a downwardly continuing teat-like projection or narrow lip 25, for functioning in a manner hereinafter referred to, and which although a minor feature may still be considered an important feature, with reference to the washing of the discharging fillmass by the wash water.

A predetermined charge of wash water is contained within a water tank 26, although the charge of wash water need not necessarily be a predetermined charge, as the water tank 26 could be a larger wash water storage container under regulable charge control, and leading therefrom is a conduit pipe 28, which may be under valve control as at 27, the outer end of said conduit pipe being so bent or disposed as to terminate proximately forward of said discharge spout opening 23, and being formed as or provided with a nozzle 29 associated with the stream of fillmass as the latter flows from said spout outlet 23 into the centrifugal basket, it being also observed that the lower end of said elbow spout 21 is substantially encompassed by said semi-annular rim 19.

The numeral 30 designates a stream of the fillmass forming a portion of the charge as it flows from the hopper spout into the centrifugal basket, the valve 24 being shown in opened position on the drawings, and the numeral 31 indicates the position the fillmass assumes as the basket is revolved, while the numeral 32 designates a longitudinally disposed groove or pocket formed at the upper inner surface of the stream of the fillmass by the downwardly protruding lip 25 of the gate valve 24, as will be obvious from Figure 2, and into which pocket-like groove the wash water is directed by the nozzle end 29.

Now, by my improved method of applying the wash water to the stream of fillmass, as the latter flows into the centrifugal basket and from a position outside of the basket, in sharp distinction from a spray being directed against the revolving wall of the sugary mass in the basket, the result is that the wash water is absorbed by the sirup, in mixture with the sugar crystals, before any centrifugal force is applied for separation purposes, and it accordingly follows that the viscosity of the sirup is so substantially reduced that the sugar crystals are much more facilely and effectively purged of the sirup, through the screen wall 10, when the basket is brought up to the speed of approximately eleven hundred revolutions per minute.

It will therefore be noted that the wash water is not applied as heretofore to sugar crystals that have already been substantially purged of their sirup, so that with my invention no sugar is in fact dissolved, because the water acts solely on the sirup which is in intimate mixture with the sugar crystals, with the result that the sirup absorbs the water and is so diluted thereby as to substantially reduce the viscosity of the sirup

The discharge of the wash water is preferably in an individual stream, of relatively small cross-sectional area, as distinguished from a plurality of jets in spraying form, and there is no pressure exerted on the flow of water excepting the normal head pressure thereon, or just sufficient to drain the water pot or container quickly, or as regulated by its valve control.

The directing of the small flowing stream of water into the depression 32 of the fillmass, as the latter is being discharged from

the spout outlet, not only prevents any loss of water but also insures even distribution throughout the flowing mass, it having been determined by extended experimentation that the affinity of the sirup for the water is such that the water is fully and almost instantly absorbed thereby, prior to centrifugal action thereon, and without affecting the sugar crystals in point of any dissolving action on the same.

Finally, it may be emphasized that with my new method the maximum sugar content of a charge is obtained in a single cycle of operations, by avoiding the sugar loss heretofore experienced with prior methods, economy of operations resulting from the avoidance of the necessity of reboiling the wash sirup as heretofore practiced to obtain a substantially full recovery of the sugar, and in final analysis resulting in a superior conditioned sugar. As a matter of fact, it has been found that with my method the sugar or fillmass may be purged or finished and ready for discharging, from the centrifugal basket. in approximately one-half of the time that it ordinarily requires with the prior methods of sugar washing.

Having thus fully disclosed my improved method, and a practical embodiment of means for carrying forward the steps thereof, it will nevertheless be understood that I do not wish to unnecessarily confine myself to all of the details exactly as disclosed, excepting as they may come within the terms or tenor of the ensuing claims, or equivalent steps or combinations of elements, or as fairly interpreted in the light of the specification if necessary.

What I do claim, as new and patentable, is:—

1. In the treatment of sacchariferous mixtures with a sugar purging centrifugal, a method of washing said mixture which embodies the steps of flowing a charge thereof, into said centrifugal, in the form of a stream having a depressed surface, and discharging wash water into the depression of said surface for diluting the sirup of said flowing charge.

2. In the treatment of sacchariferous mixtures with a sugar purging centrifugal, the method of washing said mixture which embodies the steps of flowing a charge thereof, into said centrifugal, in the form of a stream having a depressed surface, while said centrifugal is being revolved at relatively low speed, directing wash water into the depression of said surface, for diluting the sirup of said charge, at a position exteriorly of said centrifugal, and thereafter revolving said centrifugal at its desired maximum speed.

3. In combination with sugar purging apparatus, embodying a centrifugal and a receptacle, for the sacchariferous mixture, having an outlet discharging over into said centrifugal, valvular means controlling said outlet, means for causing a depression to be formed in a flowing stream of said mixture as it is discharged from said outlet, and means for directing a continuous supply of wash water into said depression during the flow of said stream from said outlet.

4. In combination with sugar purging apparatus, embodying a centrifugal and a receptacle, for the sacchariferous mixture, having an outlet discharging over into said centrifugal, a gate valve controlling said outlet and provided with a depending lip for causing a depression to be formed in a flowing stream of said mixture as it is discharged from said outlet, and a wash water tank having a valve controlled outlet conduit terminating in proximate association with said mixture outlet, the said water conduit being provided with a discharge orifice for directing the wash water into the said depression of the mixture stream.

In testimony whereof, I affix my signature.

OLIVER SOPHUS OLSEN.