July 17, 1923. 1,461,909

C. B. JANDOS

CENTRIFUGAL SEPARATOR

Filed April 5, 1919 2 Sheets-Sheet 1

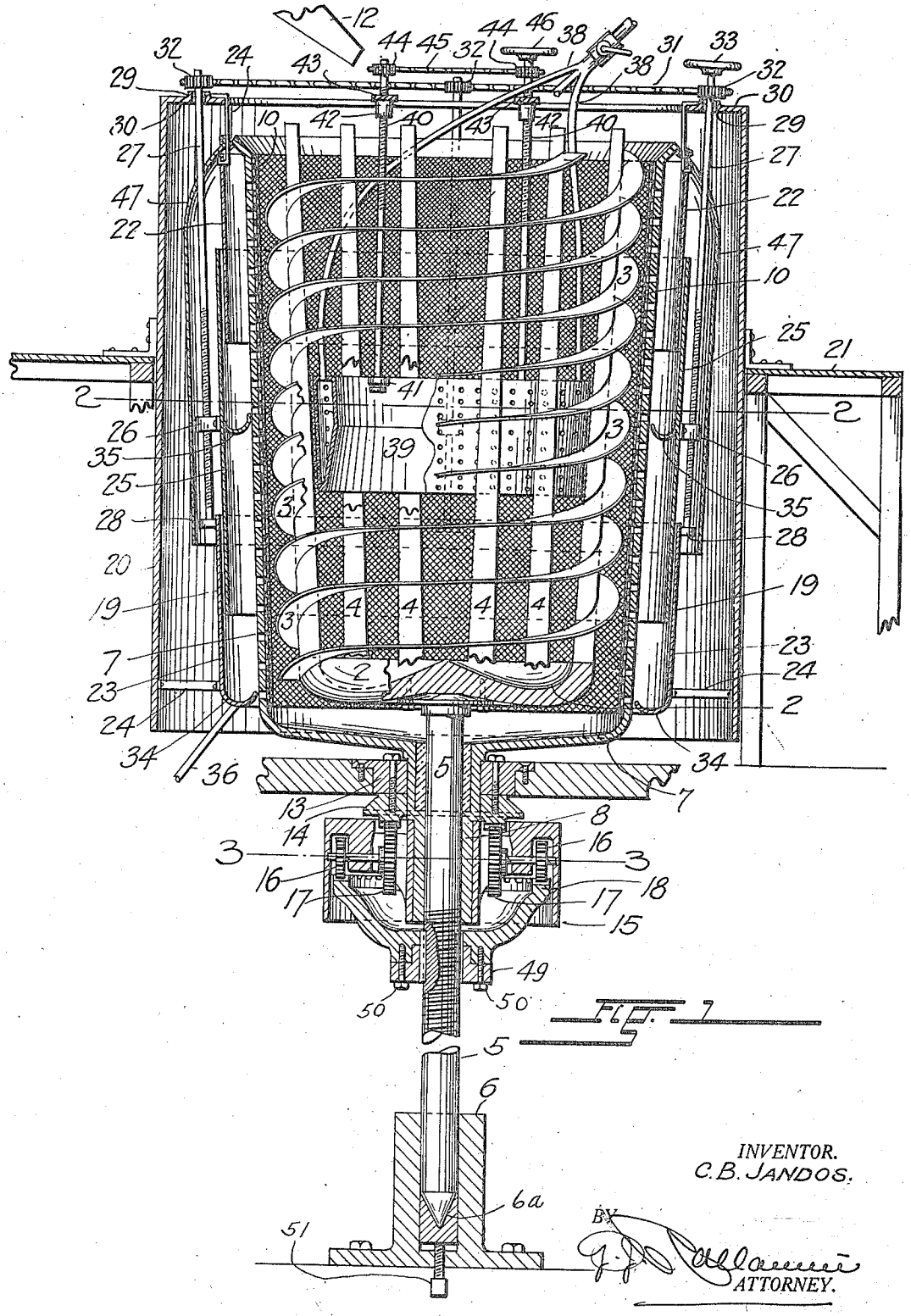


FIG. 1

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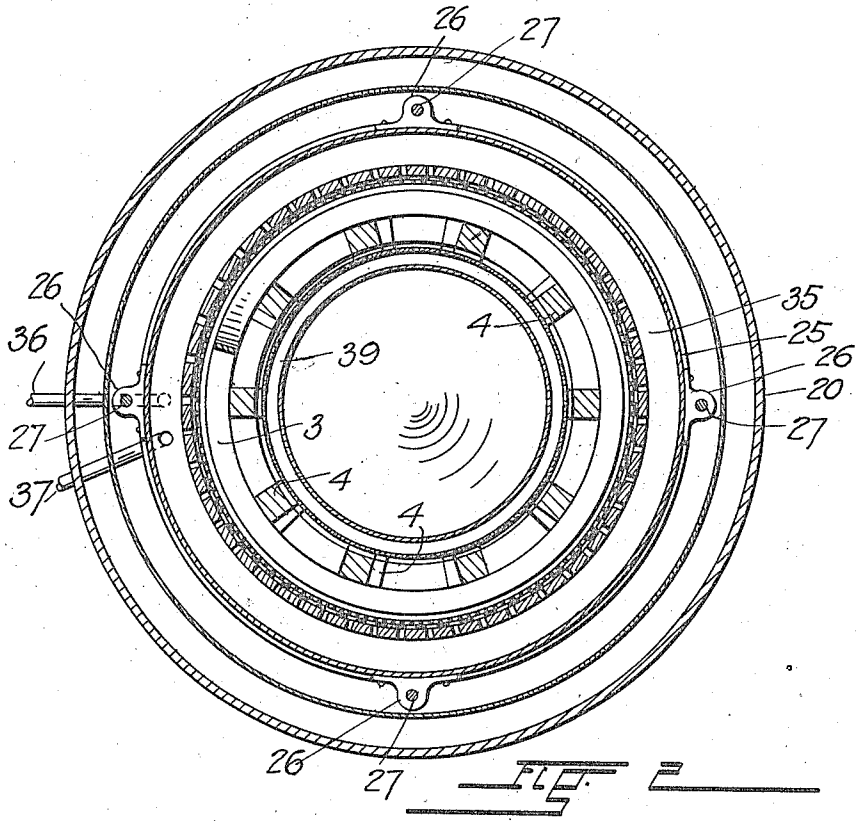


Fig. 2

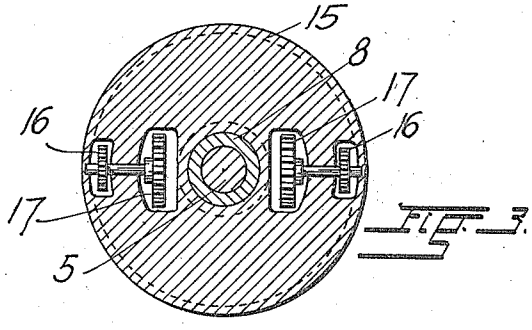


Fig. 3.

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Patented July 17, 1923. 1,461,909

UNITED STATES PATENT OFFICE.

CHARLES B. JANDOS, OF WINDSOR, COLORADO, ASSIGNOR OF TWO-FIFTHS TO EMILIO D. DE SOTO, OF DENVER, COLORADO.

CENTRIFUGAL SEPARATOR.

Application filed April 5, 1919. Serial No. 287,715.

To all whom it may concern:

Be it known that I, CHARLES B. JANDOS, a citizen of the United States, residing at Windsor, in the county of Weld and State of Colorado, have invented certain new and useful Improvements in Centrifugal Separators, of which the following is a specification.

This invention relates to centrifugal machines for the separation of solids and liquids, and its primary object is to provide a machine of simple construction which by a continuous operation effects under the influence of centrifugal force, a clean separation of syrups from sugar-crystals, raw sugar and fillmass, a product of the process of manufacturing sugar from either beets or sugar-cane.

By the use of my invention, the process of refining the raw sugar and fillmass (sugar containing syrups) heretofore performed by successive treatments in a series of machines is effectively accomplished by a single machine which completely extracts the syrups from the sugar crystals, washes the crystals to a state of commercial purity and delivers its liquid and solid products at different points.

The use of my invention eliminates the work and time required in separately treating material in the several units of the separating process, saves floor space and driving power, and greatly reduces the cost of installation, maintenance and operation.

With the above objects in view, my centrifugal separator comprises a shallow pan mounted upon a rotary upright shaft.

A basket within which the conveyor revolves has its circumferential wall composed of screening or other foraminous material and a non-rotary mantle spaced from the basket, is divided into two regions to receive the syrups at different points in the separating process and conduct the same to separate points of discharge.

A perforated head within the conveyor supplies the wash-water to the material carried thereby and a stationary casing spaced from the mantle provides a passage-way for the sugar-crystals discharged at the upper end of the conveyor by centrifugal force.

In the operation of the machine, the pan with its superposed conveyor and the surrounding basket are rotated at a fixed ratio to each other, through the instrumentality of a differential gearing so as to effect a separation of the solid and liquid constituents of the fillmass and raw sugars fed onto the pan under the influence of centrifugal force, the liquids passing through the circumferential wall of the basket into the space defined by the surrounding mantle and the solids being carried upwardly by the conveyor through the desyruping regions to be discharged at the upper end thereof into the passage-way between the mantle and the casing.

Both the water-supplying head and mantle surrounding the sifting basket have adjustments which permit of varying the desyruping and washing periods in accordance with the character of the material under treatment.

An embodiment of my invention has been illustrated in the accompanying drawings in which similar characters of reference indicate corresponding parts throughout the several views, and in which—

Figure 1 represents a vertical section through the centrifugal separator, partially in elevation;

Figure 2, a horizontal section on the line 2—2, Figure 1, and

Figure 3, a section partially in elevation taken on the line 3—3, Figure 1.

Referring to the drawings, the reference character 2 designates the shallow pan upon which the material under treatment is fed and which has a conical upper surface to facilitate the movement of the charge to its peripheral edge.

The spiral conveyor surmounting the pan consists of one or more helical blades 3 fastened around a plurality of circularly arranged, slightly diverging bars 4 which spring upwardly from the circumferential edge of the pan in preferably integral connection therewith.

The pan is fastened upon the upper extremity of an upright shaft 5 which is supported in an adjustable step-bearing which comprises a housing 6 having a vertical bore, a bearing block 6^a movably fitted in the bore of the housing, and a screw 51 which extends through a threaded opening in the bottom of the housing for the support of the bearing block. The basket which surrounds the conveyor, consists of a cup-

shaped vessel 7 at the upper end of a hollow stem 8 which fits rotatably around the upper portion of the shaft.

The circumferential wall of the basket is perforated and lined with two or more layers of screening 10 of different meshes, and its upper edge flares outwardly to facilitate the discharge of the cleansed sugar crystals of the material which is continuously supplied near the center of the machine through an inclined chute 12 or other suitable contrivance.

A bearing 13 through which the stem of the basket extends, carries an annular gear 14 which is a fixed element of the differential gearing by which the shaft and the basket are synchronously rotated at different velocities.

A pulley 15 rigidly mounted on the stem of the basket at the lower end thereof, carries two pairs of gear-wheels 16 and 17 of different diameters whose axes of rotation are radial with respect to the common axis of rotation of the shaft and the basket.

The largest one of the gears of each pair, meshes with the before-mentioned fixed gear-wheel 14 and the smaller members of the pairs mesh with an annular gear 18 which is mounted on the shaft.

A nut 49 screwed upon a threaded portion of the shaft 5 and normally fastened to the gear wheel 18 by bolts 50, cooperates with the adjusting screw 51 on the step bearing 6 to vary the distance between the spiral blade of the conveyor and the surrounding basket.

In the operation of the machine, the pulley drive by connection with a conveniently located motor, imparts a rotary movement to the basket and through the intermediary of the differential gearing, causes the shaft to rotate simultaneously at a much reduced velocity.

The casing 20 of the separator is supported on a suitable structure indicated in Figure 1 by the reference numeral 21.

The mantle 19 which defines the syrup regions consists of upper and lower sections 22 and 23 which are fixed inside the casing by suitable braces 24, and an intermediate lapping section 25 which is vertically adjustable with relation to the other sections, and which to this end is provided with four nuts 26 fixed exteriorly thereof at quadrant points.

Screw-shafts 27 working in the nuts, are supported in step-bearings 28 on the lower section and in bearings 29 on an inwardly projecting flange 30 at the upper edge of the casing and they are connected for conjunctive rotation by a chain 31 trained around sprocket wheels 32 on their ends projecting above the casing.

A hand-wheel 33 on one of the screw-shafts is provided for their rotation.

An upwardly extending trough 34 at the lower edge of the bottom section of the mantle receives the syrup discharged through the circumferential wall of the basket during the first part of the separating process and a similar trough 35 extending inwardly from the adjustable middle section of the mantle receives the wash water and the syrup discharged through the wall of the basket during the second and final part of the process. Conduits 36 and 37 connected with the troughs conduct their contents to different receptacles.

The wash-water is supplied through a plurality of hose connections 38 to an annular head 39 which is suspended inside the spiral conveyor by means of screw shafts 40 which extend loosely through inwardly projecting lugs 41 of the head and work in nuts 42 fixed on cross bars 43 at the top of the casing.

Heads at the lower ends of the shafts support the lugs, and sprocket-wheels 44 at the upper ends of the same are connected by a chain 45 for their simultaneous rotation. A hand-wheel 46 on one of the shafts is used to impart a rotary motion thereto for the purpose of raising or lowering the head.

The water entering the head through the hose-connections, is forcibly ejected through perforations in the circumferential wall thereof for the purpose of cleaning and finally desyruping the material impelled between the portions of the spiral blade around the head.

An apron 47 fixed on the casing 20 extends downwardly from the upper edge of the basket and in spaced relation to the interior surface of the casing to prevent the sugar-crystals discharged at the upper end of the conveyor from entering the space between the basket and its surrounding mantle, or from interfering with the operation of the adjusting screws 27.

In the operation of the machine, the raw sugar or fillmass fed onto the pan at the foot of the conveyor is thrown outwardly by centrifugal force against the inner circumferential surface of the basket which separates the greater part of the liquid in the material from the solids, which fall upon the spiral blades and are moved upwardly by the revolving motion thereof.

The syrup passing through the meshes of the screens and the perforations in the outer wall of the basket, enters the space between the basket and the mantle below the adjustable trough 35 and collects in the lower trough from which it is discharged through the conduit 36.

When the upwardly moving solids reach an elevation corresponding with that of the head 39, it is forcibly engaged by the jets of wash water which remove the remainder

of the syrupy constitutents of the material and also removes adherent impurities.

The wash-water with the matter it removes, passes through the wall of the basket into the upper syrup region above the trough 35, from whence it is discharged through the conduit 37, and the cleansed sugar crystals continue their upward movement to be discharged by centrifugal force at the upper end of the conveyor into the space between the downwardly extending apron and the casing.

The proportionate heights of the two syrup-regions are varied by adjustment of the middle section of the mantle to adapt the machine for treatment of raw sugar and fill-mass of different qualities, and the water-supplying head is raised or lowered accordingly.

The material impelled by the conveyor may be washed only after it has reached the upper syrup region, or the wash-water may be directed thereonto before it leaves the lower region.

The elevation at which the washing takes place and the proportionate heights of the two syrup regions, determine to a considerable extent the sugar strength of the syrup separated from the sugar, it being understood that if the wash-water is of low temperature its early application in the upward motion of the material will result in producing syrups of low test, while if the water is of a comparatively high temperature, higher test syrups are obtained.

Having thus described my invention what I claim and desire to secure by Letters-Patent is:

1. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral conveyor inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, composed of upper and lower stationary sections and an adjustable middle section carrying a trough which divides the space between the mantle and the basket into upper and lower syrup-regions.

2. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral blade inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, and means for spraying a wash-water onto material carried on the blade.

3. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral blade inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, and a head adapted to spray a liquid onto material carried on the blade, mounted inside the basket in connection with a source of water-supply.

4. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral conveyor inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, and a head adapted to spray a liquid into material carried on the blade and having an up and down adjustment inside the basket in connection with a source of water-supply.

5. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral conveyor inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, a trough dividing the space between the mantle and the basket into upper and lower syrup regions, and a spraying head inside the conveyor.

6. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral conveyor inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, a trough dividing the space between the mantle and the basket into upper and lower syrup regions, and a spraying head having an up and down adjustment inside the conveyor.

7. A centrifugal separator comprising a rotary, circumferentially perforated basket, a rotary spiral conveyor inside the basket, a receiving surface at the lower end thereof, a mantle around the basket, an up- and downwardly adjustable trough dividing the space between the mantle and the basket into upper and lower syrup regions, and and up and downwardly adjustable spraying head inside the conveyor.

8. A centrifugal separator comprising a rotary basket having a flaring and perforated circumferential wall, a mantle around the basket, and within the same a vertically adjustable rotary spiral conveyor of corresponding contour, and a receiving surface at the lower end thereof.

9. A centrifugal separator comprising a basket having a flaring and perforated circumferential wall upon a downwardly extending hollow stem, a conveyor of corresponding contour within the basket, a receiving surface at the lower end thereof, a shaft extending through the stem, an adjustable step-bearing for the shaft, a gearing for the rotation of the shaft and the stem, and means acting upon the shaft for the vertical adjustment of the conveyor.

In testimony whereof I have affixed my signature.

CHARLES B. JANDOS.