Sept. 11, 1945. J. F. THOLL 2,384,784

CENTRIFUGAL SEPARATORS

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Fig. 1

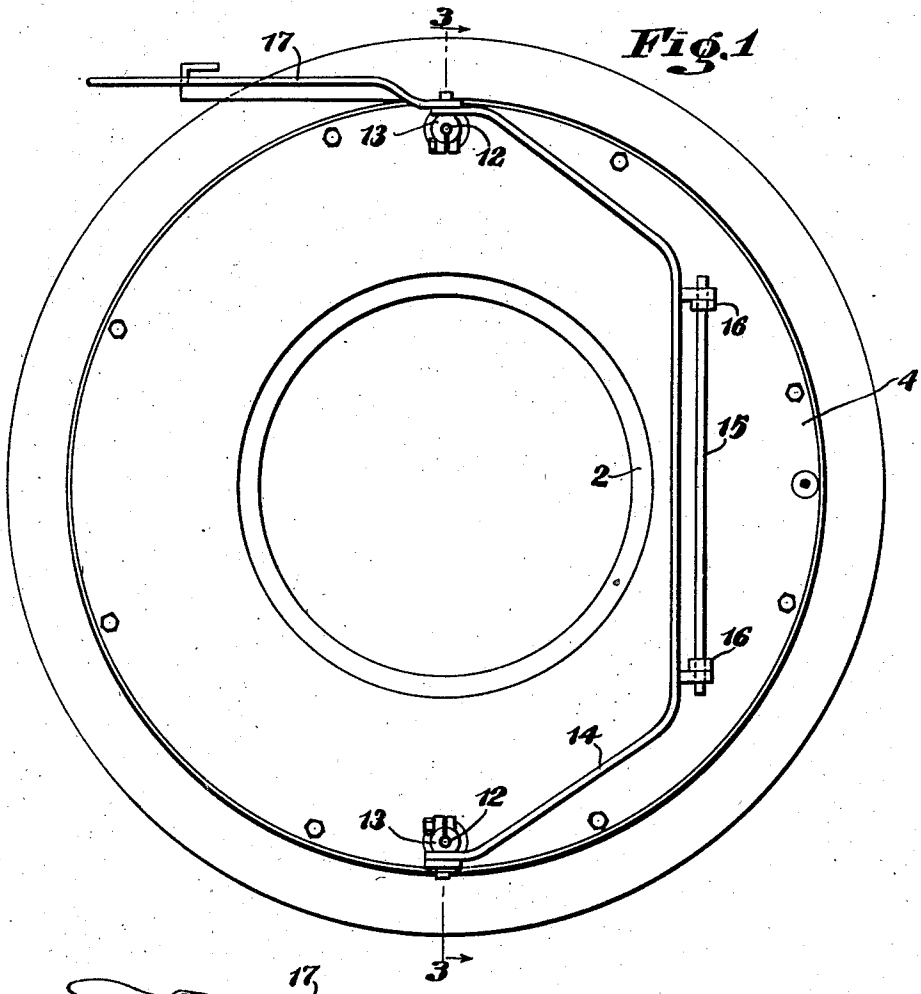
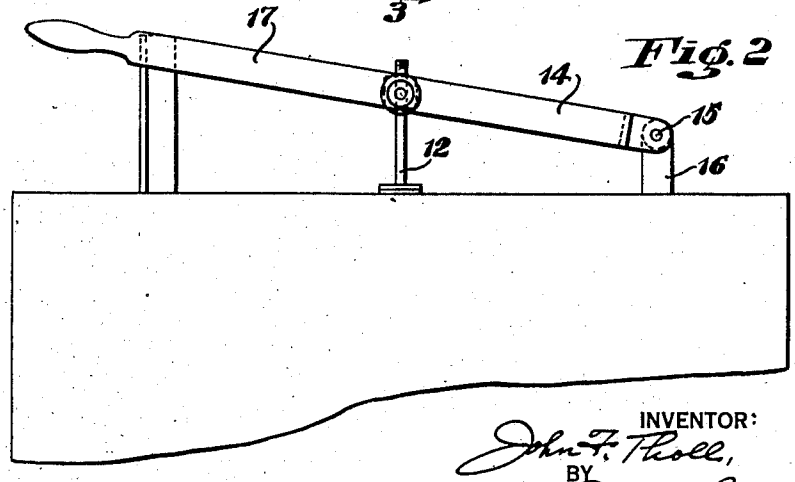


Fig. 2



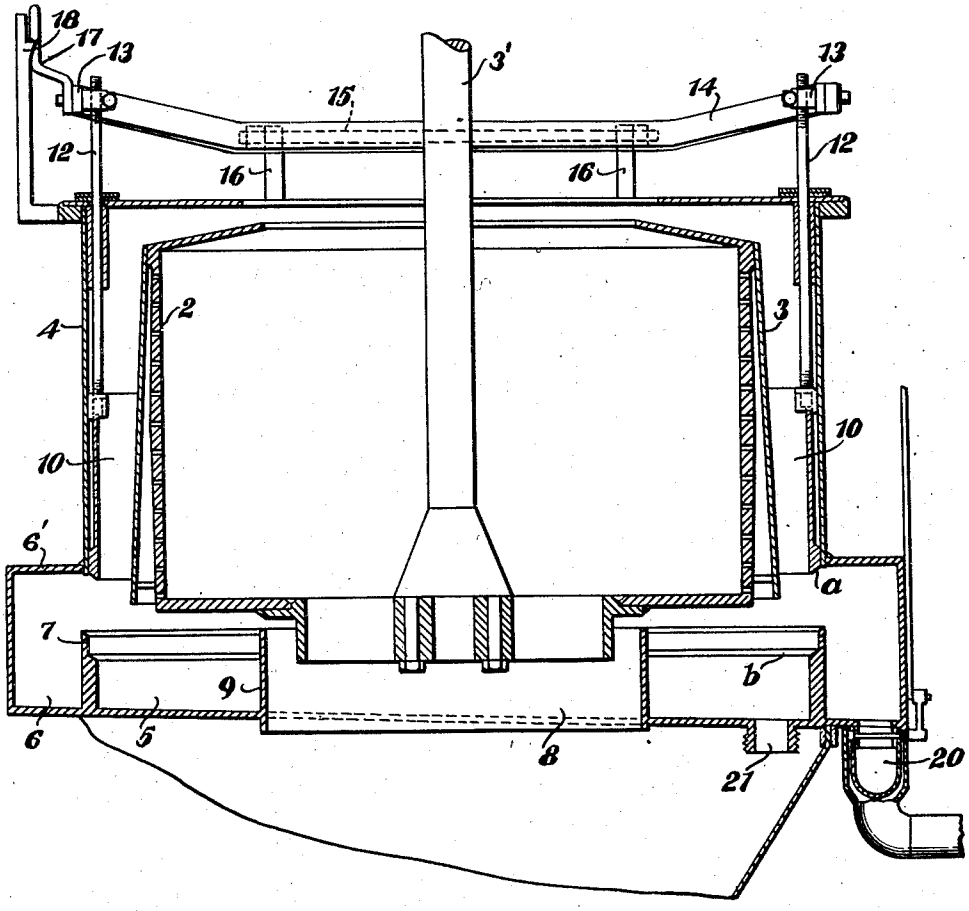
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Fig. 3



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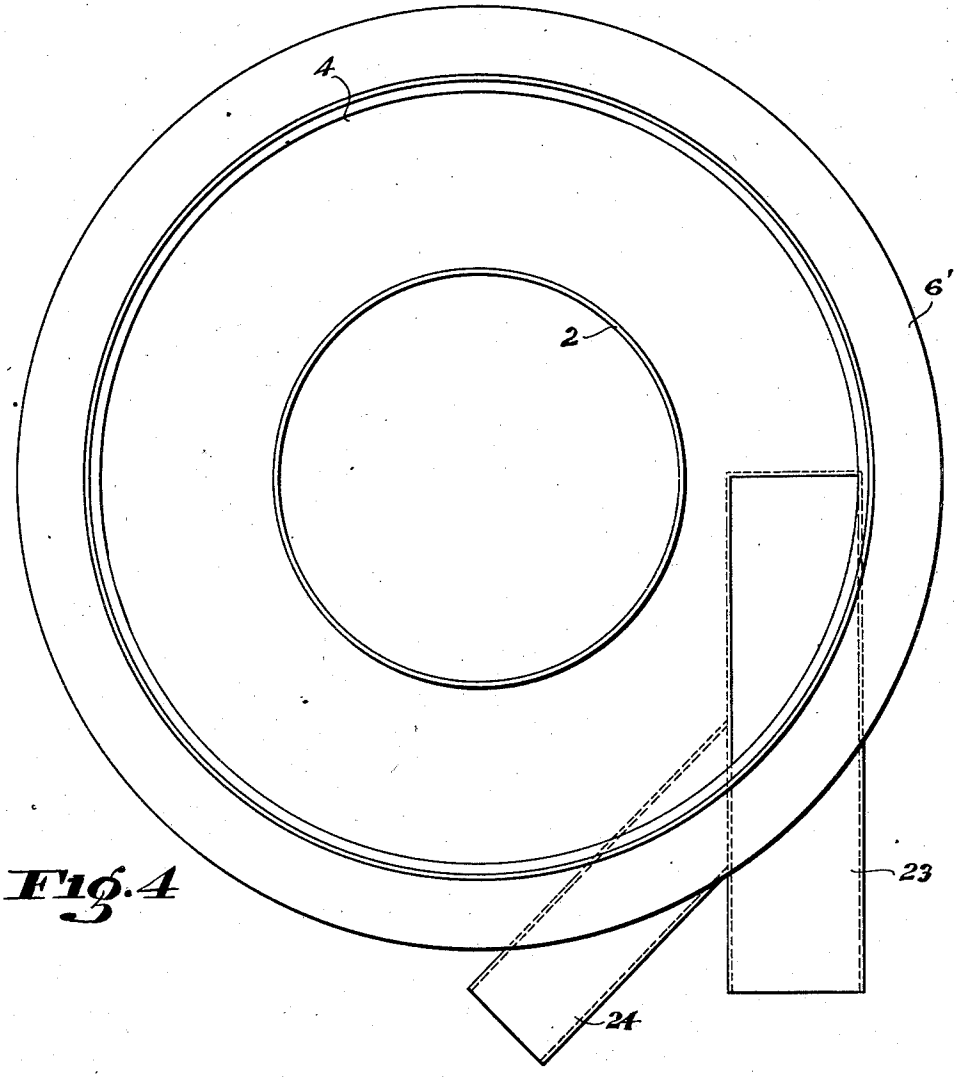


Fig. 4

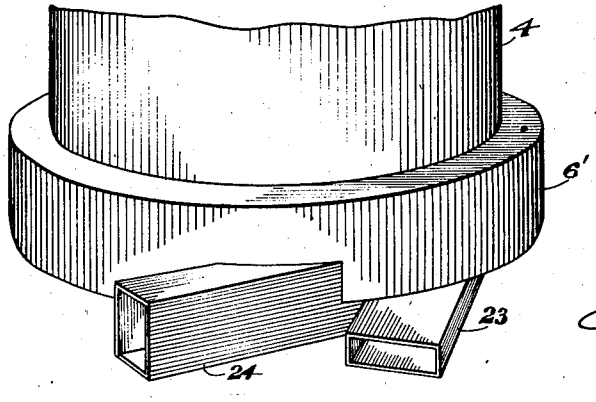


Fig. 5

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Patented Sept. 11, 1945 2,384,784

UNITED STATES PATENT OFFICE

2,384,784

CENTRIFUGAL SEPARATOR

John F. Tholl, Needham, Mass., assignor to American Tool & Machine Co., Hyde Park, Mass., a corporation of Massachusetts

Application December 3, 1940, Serial No. 368,357

3 Claims. (Cl. 210—75)

This invention relates to centrifugal separators and it will be herein disclosed as embodied in a machine designed especially for use in the sugar industry, although its utility is not limited to this particular field.

In the sugar making process it is a common practice to separate the molasses from the crystallized sugar by centrifuging. During this operation the molasses is forced centrifugally through the basket lining and the perforations in the basket wall against the inner surface of the surrounding casing or "curb." At the conclusion of this separating step a spray of water is directed against the sugar cake adhering to the inner wall of the basket for the purpose of washing the molasses out of the sugar. It is desirable to keep this wash water separate from the molasses in order not to dilute the latter, and at the same time it is desirable, also, to recover the sugar content of the wash water as economically as possible. In prior arrangements these objects have been difficult to accomplish because of the fact that both the wash water and the molasses are discharged from the basket against the stationary inner surface of the curb, the wash water flows over surfaces heavily loaded with molasses, and consequently, the desired separation of the two could not be maintained.

The present invention deals with these conditions and it aims to devise an arrangement in which the desired control of the centrifuging and washing operations and the liquids discharged from them will be facilitated.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a plan view of a centrifugal separator casing or curb embodying features of this invention;

Fig. 2 is a side elevation of the parts shown in Fig. 1;

Fig. 3 is a vertical, sectional view approximately on the line 3—3, Fig. 1;

Fig. 4 is a plan view showing a different arrangement for discharging the molasses and the wash water from the machine; and

Fig. 5 is a perspective view of the lower portion of the machine illustrating the discharging means shown in Fig. 4.

The construction shown in the drawings comprises a basket 2, Fig. 3, which may be of any construction suited to the requirements of the particular work to be performed. As here shown it is supported on the lower end of a basket shaft or spindle 3'. Encircling the basket and secured to it for rotation therewith is an imperforate metal shield 3, tapered, with its larger end directed downwardly. It encloses the greater part of the peripheral surface of the basket.

This basket assembly is mounted in a casing or curb 4 in the usual manner. Inner and outer gutters 5 and 6, respectively, are provided at the lower end of the curb. They have a common inclined bottom sheet, are separated by an annular flange 7, integral with or welded to said sheet and the inner gutter 5 also is separated from the discharge opening 8 by a second annular flange 9 similarly joined to the bottom sheet.

Fitting slidably in the curb 4 is a sleeve 10 which encircles approximately the lower half of the basket, this sleeve being mounted for vertical adjustment downwardly into contact with the upper marginal portion of the flange 7. That is, the lower part *a*, Fig. 3, of the sleeve is thickened and shaped to slide inside the upper reduced margin of the flange, into overlapped relation thereto, and the lower edge of this sleeve is tapered to fit against a circumferential seat *b* provided on the flange. This arrangement provides a more substantial and reliable construction and makes a better joint between the parts. In order to facilitate the adjusting operation two vertical rods 12—12 are secured at their lower ends to the upper edge of the sleeve, while the upper ends of these rods are mounted in clamps 13—13 which are pivoted to the opposite ends of a bail or loop 14 which, in turn, is supported on a rock shaft 15 mounted in bearing brackets 16—16 secured to the curb sheet. A handle or lever 17 is secured to one end of the bail so that by lowering or raising the lever the sleeve 10 can be lowered into contact with the flange 7 or raised into its upper position, as shown in Fig. 3. A rest or latch 18, Fig. 3, supports the lever in the latter position.

In using this machine to separate molasses from sugar, the charge is introduced into the basket in the usual manner, the sleeve 10 at this time being in its upper or inoperative position, as shown in Fig. 3. As the extraction of the molasses proceeds, due to the rapid rotation of the basket, this liquid strikes the inner surface of the imperforate shield 3 and it flows downwardly along the tapered wall of the shield due to the strong centrifugal force to which it is subjected. It is finally discharged at the lower edge of the shield into the outer gutter 6, and flows down the

inclined floor of this gutter to the outlet 20. When this operation has been substantially completed, the shield 10 is lowered into its seated relationship to the flange 7, and a spray of wash water is directed against the inside surface of load in basket, the latter being revolved rapidly at this time. This wash water is forced centrifugally through the basket load cake or crystals, through the perforations in basket and against the inner surface of shield 3, where it is discharged at the lower edge of the shield against the inner surface of the sleeve 10. It is here directed into the inner gutter 5, and it flows down the inclined bottom of the gutter to the discharge outlet 21, from which it is led to a sump or any other desired point. When the washing operation has been completed, or has been carried to the desired degree, the wash water is shut off, the sleeve 10 is raised into its normal position, the load is discharged through the opening 8, and the machine is then ready to receive another load. The foregoing operations may be repeated indefinitely.

Instead of depending on gravity to carry away the wash water and the molasses from the gutters, the centrifugal force with which these liquids are delivered to the gutters may be utilized in promoting the discharging action. An arrangement designed for this purpose is shown in Figs. 4 and 5. Here a tangential discharge spout or chute 23 leads from the inner gutter 5 to a point external to the machine at which it may conveniently be connected with any other suitable conduit or piping system, the chute 23 serving to discharge the wash water from the machine. A similar chute 24 is connected into the lower circumferential enlargement 6' of the curb where it opens tangentially into the molasses gutter 6. This arrangement is of advantage in facilitating the discharge of these liquids from the centrifugal.

The construction here provided is of advantage in keeping the wash water out of the molasses, reducing the waste which customarily occurs when the wash water is handled in the usual manner, and making a more efficient use of the wash water employed to purge the load in the basket. It should be noted that no substantial volume of molasses can remain on the inner surface of the shield 3 because of the strong centrifugal force to which it is subjected. Consequently, the wash water is not loaded up with molasses collected from stationary surfaces on which it accumulates during the main centrifuging operation. Neither does it dilute the molasses previously discharged. Moreover, this mechanism lends itself readily to use in the automatic systems in which a master control apparatus is provided to govern the loading, separating and washing operations in a definite cycle, the time occupied by the individual steps being definitely predetermined.

While I have herein shown and described a preferred embodiment of my invention, it will be understood that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a centrifugal separator, the combination of an upright rotary basket, a curb in which said basket is mounted, inner and outer gutters at the lower end of said curb, said gutters having a common inclined bottom sheet, an upright, annular flange rigid with said bottom sheet separating said gutters, the upper edge of said flange being approximately in vertical alignment with the lower edge of said curb, said basket being provided with means for confining the discharge of liquid therefrom to approximately the lower end thereof, a sleeve surrounding said basket and fitted slidably against the inner wall of said curb for vertical adjustment into and out of engagement with said flange, the upper edge of said flange lying slightly below the level of the discharge of liquid from said basket whereby such discharge normally goes into the outer gutter, and means for lowering and raising said sleeve vertically into and out of engagement with said flange so that it will direct the liquid discharged from said basket into said inner gutter when in its lowered position.

2. A centrifugal separator according to preceding claim 1, in which said sleeve has a thickened lower edge and said flange is provided with a seat to engage said edge and also with an annular margin into which the lower marginal portion of said sleeve slides in overlapping relationship thereto as said edge approaches said seat.

3. In a centrifugal separator, the combination of an upright rotary basket, a curb in which said basket is mounted, inner and outer gutters at the lower end of said curb, said gutters having a common inclined bottom sheet, an upright annular flange rigid with said bottom sheet separating said gutters, the upper edge of said flange being approximately in vertical alignment with the lower edge of said curb, said basket being provided with means for confining the discharge of liquid therefrom to approximately the lower end thereof, a sleeve surrounding said basket and fitted slidably against the inner wall of said curb for vertical adjustment into and out of engagement with said flange, the upper edge of said flange lying slightly below the level of the discharge of liquid from said basket whereby such discharge normally goes into the outer gutter, and means for lowering and raising said sleeve vertically into and out of engagement with said flange so that it will direct the liquid discharged from said basket into said inner gutter when in its lowered position, said means including guide rods connected with said sleeve and projecting upwardly to points above the casing for the basket, a lever mechanism cooperating with said rods for raising or lowering them simultaneously, and a latch for releasably holding said sleeve in its upper position.

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