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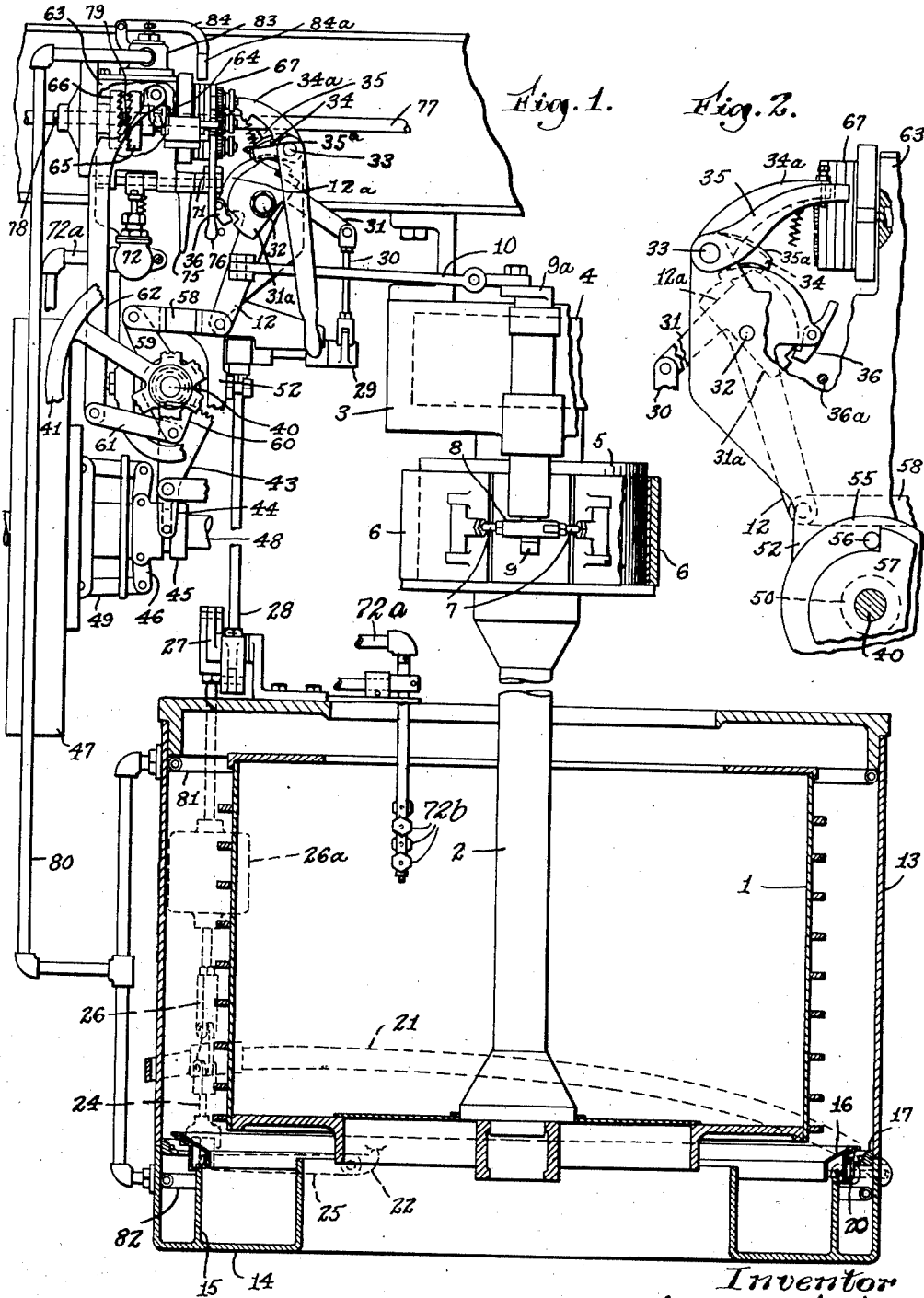
E. ROBERTS

2,145,633

CENTRIFUGAL APPARATUS

Original Filed June 23, 1934

2 Sheets-Sheet 1



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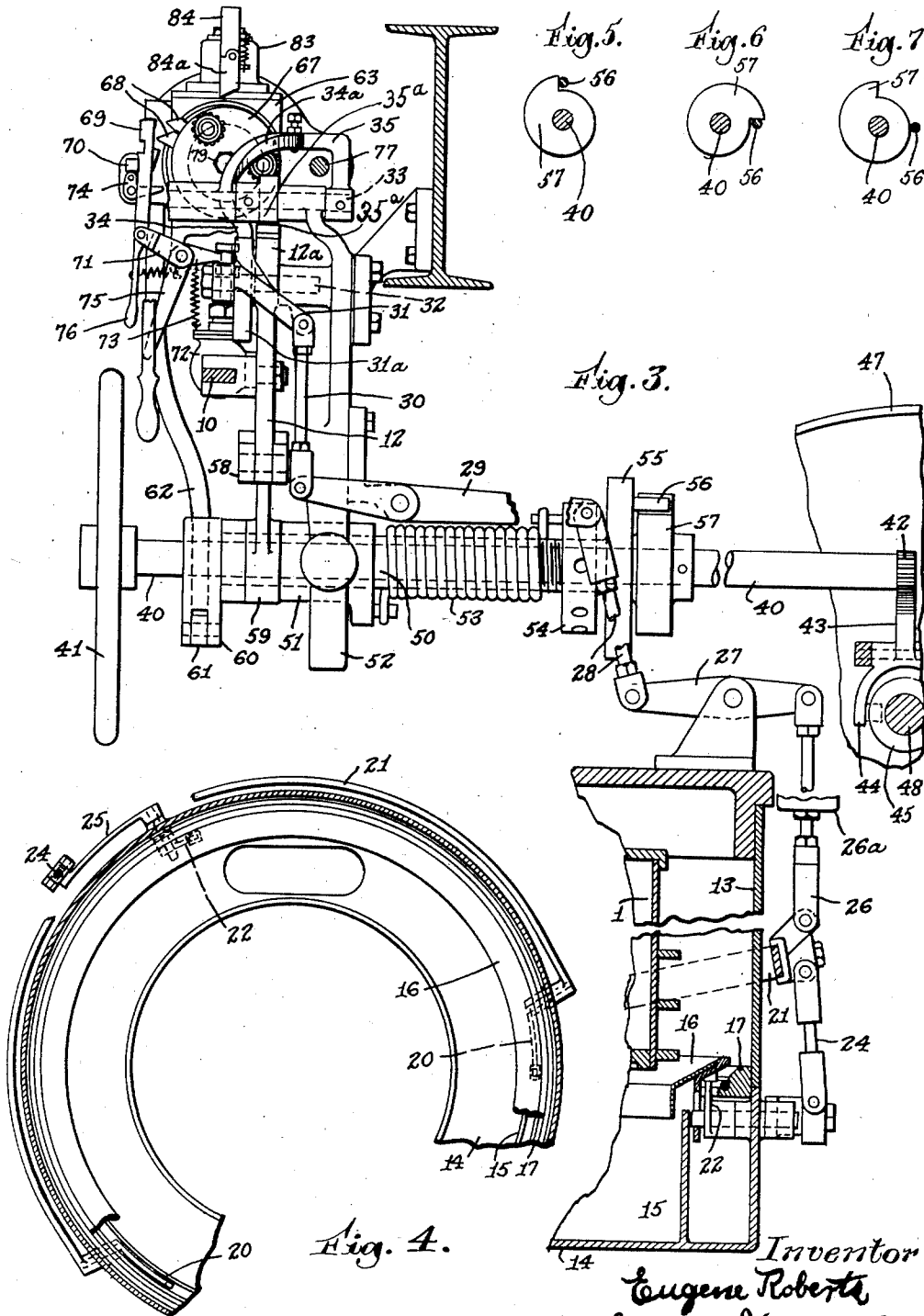
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Inventor
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UNITED STATES PATENT OFFICE

2,145,633

CENTRIFUGAL APPARATUS

Eugene Roberts, Hastings, N. Y., assignor to The
Western States Machine Company, Salt Lake
City, Utah, a corporation of Utah

Application June 23, 1934, Serial No. 732,114
Renewed August 17, 1937

12 Claims. (Cl. 210-71)

This invention relates to the control of centrifugal apparatus, particularly of the type used in sugar mills and refineries, and is intended to provide a simple, effective apparatus by which the operation of such centrifugals may be rendered more efficient while operating on a shorter cycle and at the same time reducing or eliminating waste of valuable material.

In my Letters Patent of the United States No. 1,861,978 dated June 7, 1932, there was disclosed a suspended gyratory sugar centrifugal machine associated with a timing control and sugar washing apparatus, that was adapted particularly to be driven by a directly connected electric motor. The overhead timing mechanism was organized so that the throwing of the starting lever to full speed position, after it had been moved to low speed position to facilitate loading the centrifugal basket, acted to start the machine on its cycle of operations, including broadly, first, the purging, second, spraying or washing and, third, the drying and the stopping preparatory to unloading at low speed.

One of the principal objects of my present invention is to provide improved means permitting separate collection of different liquids expelled from a centrifugal during an operating cycle, and particularly, in the use of the apparatus in the manufacture of sugar, to enable a sharp separation between green liquors or other syrups of relatively low purity purged from a charge of sugar massecuite or magma and wash syrups produced by applying washing liquid to sugar remaining in the centrifugal after a part of the spinning cycle.

Another object of the invention is to provide means for hastening the flow into collecting troughs of syrup thrown from the basket of the centrifugal onto the inside wall of the surrounding casing, or curb, together with automatic control means for ensuring operation of the aforesaid means at the proper stage of a centrifuging cycle and thereby further facilitating separate collection of different liquids received on the curb as well as otherwise rendering centrifugal treatments more efficient.

A further improvement effected by this invention resides in the provision of means allowing driving controls for the centrifugal to be energized and de-energized, while the brake is in an off position, in order to permit rotation of the basket at a low speed suited for the discharging of the basket and also to allow the operator to wash the basket after each unloading operation, thereby preventing the smearing of the outlet

passages and maintaining the centrifugal at its full efficiency.

These and other features of the invention will be described in the following specification and will be defined in the claims hereto annexed.

In the accompanying drawings there is illustrated a control apparatus associated with centrifugal apparatus embodying a practical application of the principles of this invention, in which—

Fig. 1 is a front elevation showing one form of the improved control mechanism associated with a suspended centrifugal the basket and curb of which are shown in vertical section in order to expose the interior construction.

Fig. 2 is a detail view illustrating in rear elevation the relation of the brake and syrup diverting mechanism to the automatic timer.

Fig. 3 is a side elevation of the assemblage shown in Fig. 1, centrifugal suspension means being omitted.

Fig. 4 is a horizontal sectional plan of the surrounding curb or casing of the centrifugal showing the means for raising and dropping the syrup deflecting ring.

Figs. 5, 6 and 7 are diagrammatic views illustrating, respectively, the position of the shipper shaft cam and the brake actuating pin in the three successive positions in which the driving clutch is out and the brake is on; the driving clutch is in and the brake is off; and the driving clutch is out and the brake is off.

In the apparatus illustrating the disclosure of my Letters Patent above noted the driving control was so interlockingly connected with the brake control that when one was inactive the other was necessarily active. Moreover, the cycle of operations embracing the purging, washing and drying is now so short that there is not time for the centrifuged syrup impinging against the casing wall to flow down the sides and around the bottom trough to the outlet nozzle quickly enough to avoid allowing a considerable portion of it to escape into the wash syrup conduit. To hasten the escape of syrup into the syrup collecting conduit and to avoid undesirable intermingling of wash syrup and green liquor or other relatively impure syrup, I have located two collecting conduits directly inside the curb or casing, have simplified the operation and action of the syrup deflecting mechanism, and have hastened the flow by providing mechanism under the control of the timer for directing an annular series of fluid jets against the inside wall of the curb to give a scouring effect and quickly expel

adherent syrup into an appropriate syrup collecting trough, while at the same time making provision for cleansing the seat of the deflector element so as to avoid sticking which would follow from the accumulation of the sticky liquid around the seat. Provision is also made for momentarily washing the basket after discharging without interfering with the normal functioning of the automatically controlled spraying apparatus.

The invention is illustrated as applied in practice to a belt-driven centrifugal in which the gyratory centrifugal basket 1, having the usual perforated wall and interior filter linings (not shown), is secured to the lower end of a rotary shaft 2 suspended according to well known practice in a fixed suspension hanger 3 to permit gyration against yielding centralizing resistance. Belt pulley 4 is secured to the upper end portion of the shaft to lie in the plane of the center of gyration, and below the belt pulley there is secured to the shaft a brake pulley 5 surrounded by opposing friction brake bands 6, whose free ends are interconnected by links 7 with a revoluble head 8 secured to a vertical rock spindle 9, whose upper end is provided with a crank shaft 9^a connected by pivotal links 10 with a brake actuating lever 12, whose hub portion, pivoted upon the stub shaft 32, is enlarged to form a cam-like disc 12^a carrying a pivotal latch 36.

The starting of the centrifugal is effected by the operator by means of a hand wheel 41, fast on the shipper shaft 40, to whose rear end is secured a pinion 42 meshing with a sector gear lever 43 fulcrumed intermediate of its ends and having a lower arm in the form of a fork or clevis 44 engaging an annular groove in a sleeve 44 slidably mounted on the horizontal line shaft 48. A clutch pulley 47 is revolubly mounted on shaft 48 and is frictionally engaged by centrifugal clutch shoes (not shown) which are retracted to inactive position by retracting levers 49, whose outer ends are forced to shoe-retracting position by toggle links 46 pivotally connected with the slidable muff or sleeve 45. Such a clutch is illustrated in my United States Letters Patent No. 1,884,873.

Rotation of the shipper shaft 40 clockwise acts to flex the toggles 45 and allow the clutch shoes, through centrifugal force, to form driving engagement with the pulley 47, which pulley has driving connection with pulley 4 of the centrifugal by the usual quarter-turn belt.

Control of the brake is provided by means of a rock sleeve 50, which is mounted for partial rotation in a fixed bearing box or member 51 carried by a hanger 52. A spring tensioning collar 54 is secured adjustably on the rear portion of the sleeve 50 and around the sleeve is placed a helical torsion spring 53, whose forward end is attached to an anchoring pin on the fixed bearing member 51 and whose rear end is held by a pin projecting from the adjustable tensioning nut 54. Beyond the rear of the sleeve 50 a cam-like member 57 is secured to the shipper shaft 40. The shoulder of said cam 57 is adapted to engage a pin 56 projecting from a disc or collar 55 secured to the sleeve 50, so that clockwise rotation of the shaft 40 tends, by the thrust of said shoulder, to wind said spring and increase the counter-clockwise torsional thrust of the spring.

The brake actuating arm 12 is connected by a pivotal link 58 with an arm 59 that is fast on the rock sleeve 50, so that clockwise rotation of

the sleeve imparted by like rotation of disc 57, pin 56 and collar 55 shifts the brake actuating arm 12 to the right or counter-clockwise and will allow dog or detent 35^a fast on rock shaft 33 to drop behind the shoulder of the brake arm head 12^a and hold the brake lever 12 against clockwise rotation that otherwise would be caused by torsion spring 53. An upwardly projecting arm 35 also fast on rock shaft 33 overhangs one of the timer cams 67 so that at the proper time in the timed cycle the dog 35^a is lifted and the brake lever returns to brake-on position by the brake setting torsion spring 53 and the intermediate connections.

Between the sleeve 50 and shipper wheel 41 there is secured to the shipper shaft 40 an arm 60, which is connected by a pivotal link 61 with a clutch actuating lever 62 fulcrumed on the timer case or box 63 and secured to a clevis or clutch fork 64, which by clockwise rotation slides the intermittently driven clutch disc 65 into active engagement with the continuously rotating driving clutch member 66 fast on shaft 78 that has uninterrupted connection with the slow moving line shaft 77. Details of such an intermittently driven timer are disclosed in my earlier United States Patent No. 1,719,132 and need not be repeated herein.

As disclosed in my aforesaid Letters Patent, the throwing of the shipper to normal driving position effects the unsetting or throwing off of the brake and also acts to energize the rotary timer which controls the timing of the different operations of the centrifugal cycle. As disclosed in my aforesaid Letters Patent, the revolving cams of the timer act, through various projections or swells such as shown at 68, to actuate the controlling connections. The sprayer cut-off valve at 72 has an upwardly projecting valve stem engaged with a rocker arm normally drawn downward by contractile spring 73 to keep the valve seated or closed. This rocker arm is lifted to open the valve by the downward movement of the connected oppositely projecting arm 71, which is pivotally connected with a notched latch 69 which is forced downward by one of the timer cam projections 68 until the notch interlocks with a stationary bar or lug 70, so that the valve remains open until another timer cam projection in the path of the releasing dog or angle latch 74 swings the latch 74 clockwise to throw the latch 69 out of interlocked engagement with the stop 70, thereby permitting the contractile spring 73 to instantly close the cut-off valve. For reasons presently to be described, the detent latch 69 is provided at its lower end with a handle 76 adapted to be grasped by the operator. Also the arm 71 is connected with a manual lever or handle 75 to permit opening the valve by hand.

It will be understood that the sprayer cut-off valve 72 is located across a fluid supply conduit 72^a leading to a sprayer for directing wash fluid into the contents of the basket 1. The sprayer, which may be of any known type, is designated at 72^b in Figure 1. When valve 72 is opened by movement of the timer mechanism, wash fluid is immediately sprayed into the basket 1, and the spray is cut off when the valve is closed. The apparatus of this invention is constructed so that actuation of the sprayer may be regulated to take effect automatically in any desired timed relation to the starting and stopping of the centrifugal and to the actuation of the syrup separator and washdown jets, to be described more specifically hereinafter.

It is desirable, when processing certain types of sugar-syrup mixtures, that the green syrup extracted from the wet sugar during the purging step of the cycle be as completely as possible separated from the wash syrup which results from the spraying of a washing liquid against the interior of the walled up sugar and is expelled centrifugally against the surrounding curb or casing 13. In the processing of some grades of sugar-syrup mixtures, for example in the so-called "affination" stage of cane sugar refining, it is extremely important to be able to collect an accurately regulated amount of the wash syrup with the green syrup and to collect the remainder of the wash syrup separately so that the different types of syrups or mixtures of syrups may be used subsequently in the manner best adapted to their particular qualities.

To permit the attainment of these objectives I have provided an arrangement for directly diverting a selected type of syrup, such as green liquor, from the entire circumference of the curb into an annular syrup collecting trough inside the curb, while making provision for shifting a syrup deflector to idle or inactive position where it allows further liquid received on the curb wall, such as wash syrup, to flow directly into another, separate, circumferential collecting trough.

To hasten the flow of syrup from the curb wall into these collecting troughs, I have also made provision for an annular series of scouring jets, such as steam jets, which are directed downward against the inside wall of the curb to more rapidly expel the sticky syrup and to accelerate its movement by the action of heat. I have also provided means for directing cleansing steam jets against the deflecting ring so as to keep it clean and prevent the sticking of the deflecting ring to its seat.

I will now describe the mechanism of the deflector ring and its timed actuating control as illustrated in the accompanying drawings, it being understood of course that the practical embodiment of the invention is not restricted to the described details of construction. The annular trough-like bottom 14 of the curb 13 is provided with a vertical annular partition 15 and above this is mounted a vertically movable inclined deflector ring 16, which overhangs the dividing partition 15 and also overhangs an annular ledge 17 located on the inside wall of the curb at a level somewhat above the top of the dividing flange 15. Preferably the deflecting ring 16 is provided with downward annularly spaced projections to straddle the partition 15 for a short distance. Obviously when the deflector ring is dropped upon the annular seat member 17 all liquid flowing down the inner face of the wall of the curb will be deflected into the inner liquid collecting trough, while on the other hand when the deflector ring 16 is separated from the seat member only a very short distance, as by raising it, the liquid flowing down inside the curb wall will run into the outer collecting trough.

At three points around the circumference of the curb there are pivotally mounted three lifting paws or fingers 20, 20 and 22. The paws 20 are connected by a semi-annular bail or lever 21, which is pivotally connected with a vertical link 26 carrying an actuating weight 26^a. The bail is also connected by pivotal link 24 with an arm 25 that is secured to the pivotal paw 22 on the opposite side of the pivotal axis, so that when the weight 26^a depresses the link 26 the lever bail 21 and lever 25 are depressed, thereby causing the lifting of the fingers or paws 20, 22 and ele-

vating the ring 16 from its seat to open the outer trough to the inflow of the wash liquor. During the purging operation of the machine the link 26 is kept in raised position with the deflector ring 16 resting closely upon the annular ledge or seat 17 in order to deflect the centrifuged syrup or green liquor into the inner trough. The link 26 is connected with the rocker lever 27 fulcrumed on the top of the curb, which lever in turn is connected by link 27 with another rock lever 29, whose farther end is connected by link 30 with a lever 31 which, during the purging operation, is in raised or horizontal position. The lever 31 is pivotally mounted on a stub shaft 32, which also forms a fulcral support for the brake lever 12, and the hub portion of said lever 31 is enlarged to form a cam-like disc 31^a having an upper shoulder and a lower shoulder located directly in front of the brake lever cam head 12^a which carries the latch 36.

When the lever 31 is in raised position, that is, horizontal according to the drawings, its upper shoulder will be engaged by a dog or detent 34 loosely mounted on the shaft 33 and normally weighted or under spring tension to press against the periphery of the cam head 31^a so as to drop behind the upper shoulder when lever 31 is in raised position. This dog 34 has an upward extension or arm 34^a preferably provided at its outer end with an adjustable contact screw for engaging one of the cams 67, which is set to lift the dog 34 at the proper time to free the head 31^a of the lever 31 and allow the lever to drop under the gravity action of the weight 26^a. The actuating cam element for lifting arm 34^a in a counter-clockwise direction may be set or timed so that when the wash water valve 72 is opened, or at any appropriate stage of the operating cycle thereafter, the dog is released and the deflector ring actuating mechanism is allowed to operate to raise the ring to inactive position.

To drive liquid expelled from the basket and adhering against the curb wall into its appropriate collecting trough, I have arranged a source of fluid supply, steam for example, comprising a pipe 80, whose upper branch leads to a pipe ring 81 having underneath perforations at frequent intervals to direct jets of fluid downward and against the inside face of the curb 13 so that the scouring and washing action of the fluid, and both the heat and the scouring action when steam is used, tend to cause the adhering material to quickly pass down into an open trough. Another branch of the pipe 80 passes to an annular jet pipe 82 arranged below the ledge 17 to direct jets against the deflector ring 16 and thereby cleans the deflector of adherent sticky syrup and prevent its sticking to the seat.

The pipe 80 leads from a valve chamber 83, which is connected with the source of fluid supply. Chamber 83 is here shown as mounted on the cover of the timer casing. An upwardly projecting valve stem is engaged with a pivoted arm 84, whose lower end 84^a is positioned to lie in the path of movement of a swell or projection on one of the cams 67, which is properly set to lift the arm 84 and open the valve in order to permit the flow of fluid through the jet pipes 81 and 82 at the proper point in the cycle, for example, before the wash water begins to spray against the inside of the walled up sugar in the basket 1. The scouring fluid may be applied after soon as the wash syrup is centrifugally expelled against the inside of the curb, since it will act also to

accelerate the flow of the wash syrup, thereby preventing the mingling of valuable wash syrup with green liquor of possibly low value from the next cycle, and to free the deflector ring and its seat from accumulations of sticky material. For almost continuous application of the fluid to the curb wall the swell or raised portion of the cam may be continued for such angular part of the cam circumference as may be found convenient.

Another new feature of improvement herein disclosed is that which permits the momentary washing of the basket itself after each unloading of the centrifugal. With sticky materials the filter linings and the basket openings are likely in time to become more or less clogged against the rapid escape of syrup or wash syrup. To obviate this trouble, which leads to inefficiency in maintaining rapid circulation of the liquids through the sugar, I provide manually controlled means associated with the automatic timer mechanism so that after the unloading of the basket the sprayer or wash water valve 72 may be momentarily opened to douche the interior of the basket lining and keep the passages through the filter lining and the basket wall free from any obstruction. With this end in view I have provided a handle 75 within reach of the operator by which he can momentarily open the valve by lifting the rocker arm through the rearward movement of the handle and may then immediately release the latch 69 by pulling forward the handle 76, forming an extension of the latch 69, to release the latch against the tension of its retracting spring and allow the valve to instantly close. This momentary application of the spray by the operator does not in any way interfere with the proper action of the timing mechanism and does contribute very materially to keeping the filter linings and the basket free from obstruction.

After the brake dog 35 has been released from the brake arm head 12^a, the counter-clockwise thrust of the torsion spring 53 operates to set the brake and stop the machine, while at the same time the pin 56 carried ultimately by the brake sleeve 50 acts in a counter-clockwise direction to disconnect the driven clutch member 65 from the driving member 66, thus releasing the timer and allowing it to return to initial position under the influence of a return spring, as disclosed in my earlier patent. That is to say, Fig. 6 illustrates the position of the cam 57 on the shipper shaft 40 and the position of the thrust pin 56 on the disc 55, that is fast to the brake sleeve 50, when the hand wheel 41 has been turned in a clockwise direction to move these parts from the position shown in Fig. 5. In the Fig. 6 position the brake is off and both the driving clutch and the timer clutch are in, while Fig. 5 shows the relation of parts 56 and 57 when the brake is in and the clutches are out, which is the appropriate position to slow down the revolving centrifugal and stop it within a predetermined time interval that will depend on the tension to which torsion spring 53 is set. As the centrifugal slows down the discharger plow is operated by the attendant in the well known manner to unload the basket, but under some conditions the basket may stop before the unloading is completed. To meet this situation, provision is made to allow the operator to give further momentary rotation of the basket sufficient to complete the unloading and also, if desired, to effect the momentary washing of the basket and its filter linings above referred to. Accordingly, at this stage he can turn the hand wheel clockwise, thus

unsettling the brake and allowing it to be locked in off position, as in Fig. 6, and after a brief interval sufficient to give a new rotative impulse to the basket by its driving clutch, the operator may shift the clutch to off position corresponding to Fig. 7, while leaving the brake locked in off position. This action was not possible with the complete interlocking arrangement of the brake and clutch disclosed in my earlier apparatus.

The resetting of the lever 31 to raised or horizontal position is effected by the brake lever head 12^a acting through the medium of its attached pivotal latch 36, which acts when the brake lever moves to brake-off position, that is, counter-clockwise, to engage the lower shoulder of the disc 31^a and rotate that disc counter-clockwise until the upper shoulder of the disc is engaged by the dog 34. The latch 36 is overbalanced so that it is lower and tends to swing in toward the cam 31^a, but the latch is released near the end of its downward travel by the engagement of its upper end with a fixed stop pin 36^a so that the latch does not interfere with the dropping of the arm 31 when it is released for the purpose of permitting the actuating weight to cause the lifting of the deflector ring 16 from its seat.

It will therefore be seen that any desired separation of mother liquor or other relatively impure syrup from wash syrup may be efficiently controlled and performed without undesirable waste or mingling of the syrups, while provision is made for washing the basket and its filter linings almost instantaneously by providing suitable manual control by which the slow rotation of the basket may be prolonged and the wash water valve momentarily opened before the basket comes to a complete stop. The handle on the forward end of the rock shaft 33 makes it possible for the attendant to release the brake retaining dog 34^a from the brake lever to permit the brake to return to active position immediately after the basket washing operation. The great resulting advantages include material savings in the waste heretofore incurred by intermingling green liquor and wash syrup, the maintenance of full efficiency of the basket and its filter linings by the provision for washing them after each complete cycle without appreciable loss of time, and the accomplishment of a more complete and satisfactory control over centrifugal operations.

The advantages stated in describing the use of the improved apparatus in sugar manufacture are also of importance in other fields, as will be apparent to persons skilled in the art. It will also be understood that the invention is capable of adaptation to various forms and types of centrifugal apparatus without departing from the principles of the disclosure and the requirements of the claims.

What I claim is:

1. Centrifugal apparatus for purging, washing and drying sugar or like material having suitable driving means and a self-setting brake combined with a manually operable shipper mechanism for unsettling the brake and releasably locking it in off position by the drive energizing movement of the shipper mechanism starting the centrifugal in action, the driving means being releasable from, and shiftable to, active position without releasing the brake from its inactive position whereby the centrifugal may be temporarily operated under manual control to properly effect the unloading or the washing of the basket.

2. In centrifugal apparatus for purging, wash-

ing and drying sugar or the like, the combination with a driving clutch, a brake and a sprayer, of associated timing mechanism acting after predetermined intervals to start and to stop the operation of the sprayer, a curb surrounding the basket of the centrifugal and having a bottom comprising inner and outer annular collecting troughs separated by an intermediate partition, an inclined syrup deflecting ring overhanging said partition and movable downwardly to deflect the syrup from the curb into the inner trough and movable upwardly to inactive position permitting the flow of centrifuged liquid into the outer trough, and means controlled by said timing mechanism for retaining the deflector ring in syrup deflecting position and for raising said ring to inactive position in suitable coordination with the sprayer, whereby centrifuged liquid may be deflected into the inner trough and wash liquid collected separately in the outer trough.

3. In centrifugal apparatus, the combination of a driving clutch, a brake, spring actuated means for setting the brake to stop the centrifugal, and a shipper mechanism coordinated with the brake setting means to cause shifting of the brake to inactive position when energizing the driving clutch but capable of independent movement to clutch releasing position while the brake is still at inactive position.

4. In centrifugal apparatus, the combination of a driving clutch, a brake, means including a spring actuated rotative sleeve for setting the brake to stop the centrifugal, means including a clutch actuating shipper shaft operative when turned to clutch energizing position to cause rotation of said sleeve against said spring to brake inactive position, a detent for retaining the brake at inactive position against the tension of said spring, said shipper shaft being movable to and from clutch energizing position while the brake setting sleeve is held at inactive position.

5. The combination with a suspended centrifugal basket, of a surrounding curb whose bottom comprises inner and outer annular collecting troughs, a vertically movable inwardly inclined deflector ring arranged below the level of the basket to overhang an annular partition between the two troughs and adapted when lowered to rest upon an annular seat partly overhanging the outer trough and thereby to deflect into the inner trough centrifuged liquor flowing down the inside of the curb, an automatically timed sprayer acting to spray wash fluid against the contents of the centrifugal after a predetermined period of operation of the centrifugal, and means coordinated with the timed action of the sprayer for lifting the deflector to inactive position to allow the centrifuged wash fluid to flow into the outer trough.

6. In a centrifugal apparatus the combination of a centrifugal basket having a foraminous peripheral wall, a surrounding casing for receiving and directing downward the centrifugally expelled liquid whose lower portion contains separate annular connecting conduits for such liquid a sprayer for directing wash liquid against the contents of the basket, an inclined liquid deflector ring located below the level of the basket and adapted to rest upon an inwardly projecting annular ledge of the curb to deflect liquid to the inner conduit, and means for lifting the deflector ring from the ledge to inactive position thereby permitting liquid to flow down the inside of the curb into the outer conduit.

7. In a centrifugal apparatus the combination

with a centrifugal basket having a foraminous cylindrical wall, a surrounding curb provided with conduits for collecting centrifugally expelled liquid from said curb, an annular ledge adjacent the inside of said curb below the openings in the basket wall and above said conduits, an annular deflector movable from a position in which it is supported by said ledge and deflects liquid from the curb into one of said conduits to a position away from the ledge permitting flow of liquid into another of said conduits, means for moving said deflector away from said ledge, and a jet pipe arranged below said ledge to deliver fluid jets against said deflector to weaken adhesion of the deflector to its supporting ledge to prevent sticking.

8. In centrifugal apparatus, the combination of a driving clutch, a self-setting brake, a sprayer, associated timing mechanism acting at predetermined but variable intervals after starting to start and to stop the sprayer and to open the clutch and release the self-setting brake to stop the centrifugal, and means operable manually independently of the timer mechanism for temporarily energizing the clutch while the brake is held in off position, thereby prolonging the revolution of the centrifugal, and means operable by hand independently of the timer for opening and closing the sprayer while rotation of the centrifugal is thus prolonged.

9. In a centrifugal apparatus the combination with a centrifugal basket having spaced discharge openings through its peripheral wall for the escape of the centrifugally expelled liquid from the basket, of a surrounding casing for receiving the centrifugally expelled liquid, said casing having a bottom comprising inner and outer annular troughs separated by an annular partition, an annular ledge projecting from the inside of the casing wall above said troughs, a vertically movable inclined deflector ring arranged to be seated upon said ledge and deflect liquid flowing down said ledge into the inner of said collecting troughs, and means for raising the deflector ring from the ledge to permit liquid to flow from the casing wall into the outer trough.

10. Centrifugal apparatus comprising, in combination, a curb for enclosing a suspended centrifugal basket, separate inner and outer annular troughs for collecting liquid expelled from the basket and flowing down the inner wall of the curb, an annular ledge projecting inwardly from the curb above said outer trough, an annular deflector ring constructed to seat against said ledge and to extend inwardly to a point overlying said inner trough, and means for separating said deflector and ledge to permit liquid flowing down the curb to pass between the deflector and ledge and into said outer trough.

11. Centrifugal apparatus comprising, in combination, a curb for enclosing a perforated centrifugal basket, separate inner and outer annular troughs adjacent said curb for collecting liquid flowing down the inner wall of the curb, an annular deflector ring located inwardly from said curb and extending inwardly to a point overlying said inner trough, seating means for said deflector being adapted in one position relative to said seating means to divert liquid flowing down the curb into the inner trough, and means for separating said deflector from its seating means to permit liquid flowing down the curb to pass into said outer trough.

12. In a centrifugal apparatus of the filtering type including a perforate basket and a stationary

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5 curb surrounding the basket in position to receive liquid expelled from the basket, inner and outer troughs adjacent said curb and below the basket for receiving liquid flowing down the curb, means between the curb and the trough farther therefrom including a movable annular member operative in one position to direct such

liquid into said farther trough, and means for shifting said annular member to another position providing a continuous annular passage for such liquid between the curb and the trough nearer thereto.

EUGENE ROBERTS. 5

CERTIFICATE OF CORRECTION.

Patent No. 2,145,633.

January 31, 1939.

EUGENE ROBERTS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 73, strike out the words "soon as"; page 5, second column, line 68, claim 11, before "being" insert the comma and words, said deflector; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of May, A. D. 1939.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.

CERTIFICATE OF CORRECTION.

Patent No. 2,145,633.

January 31, 1939.

EUGENE ROBERTS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, first column, line 65, claim 6, for the word "connecting" read --collecting--; same line and claim, after "liquid" insert a comma; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of December, A. D. 1940.

Henry Van Arsdale,

(Seal)

Acting Commissioner of Patents.