April 28, 1942. O. W. JOHNSON 2,280,916

CENTRIFUGAL APPARATUS

Filed Nov. 23, 1938 3 Sheets-Sheet 1

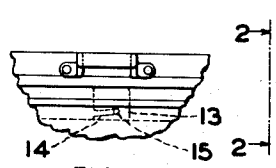


FIG.-2

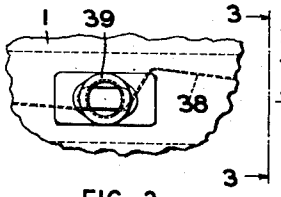


FIG.-3

FIG.-1

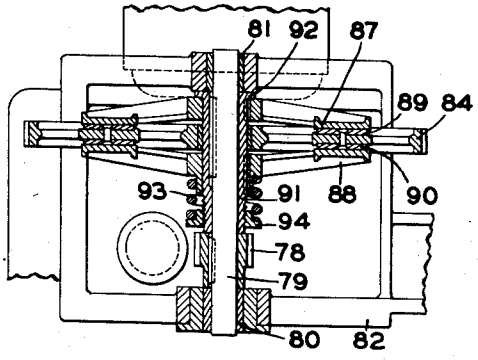
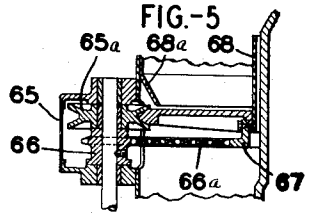


FIG.-4

FIG.-5



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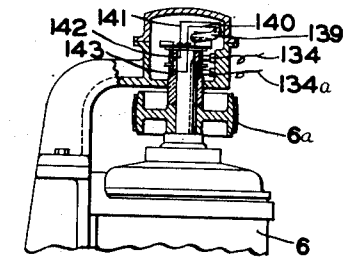


FIG.- 10

FIG.-6

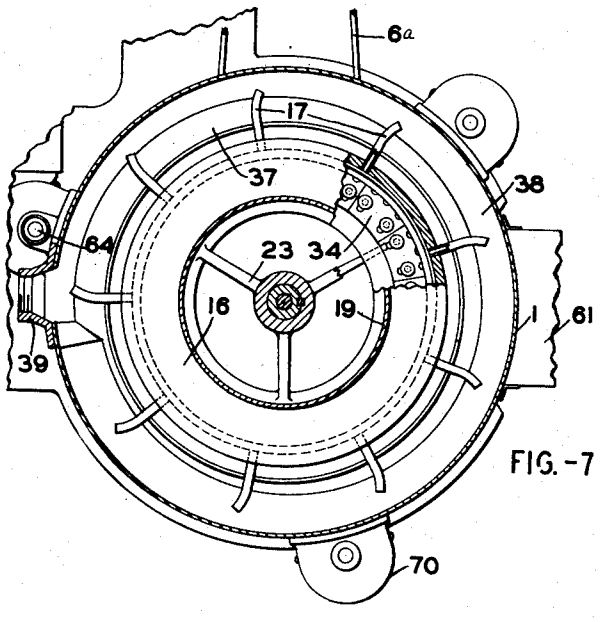


FIG.-7

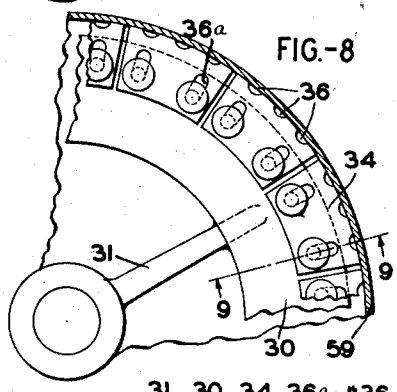


FIG.-8

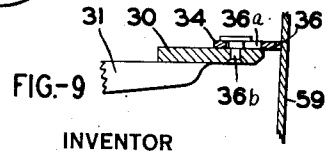


FIG.-9

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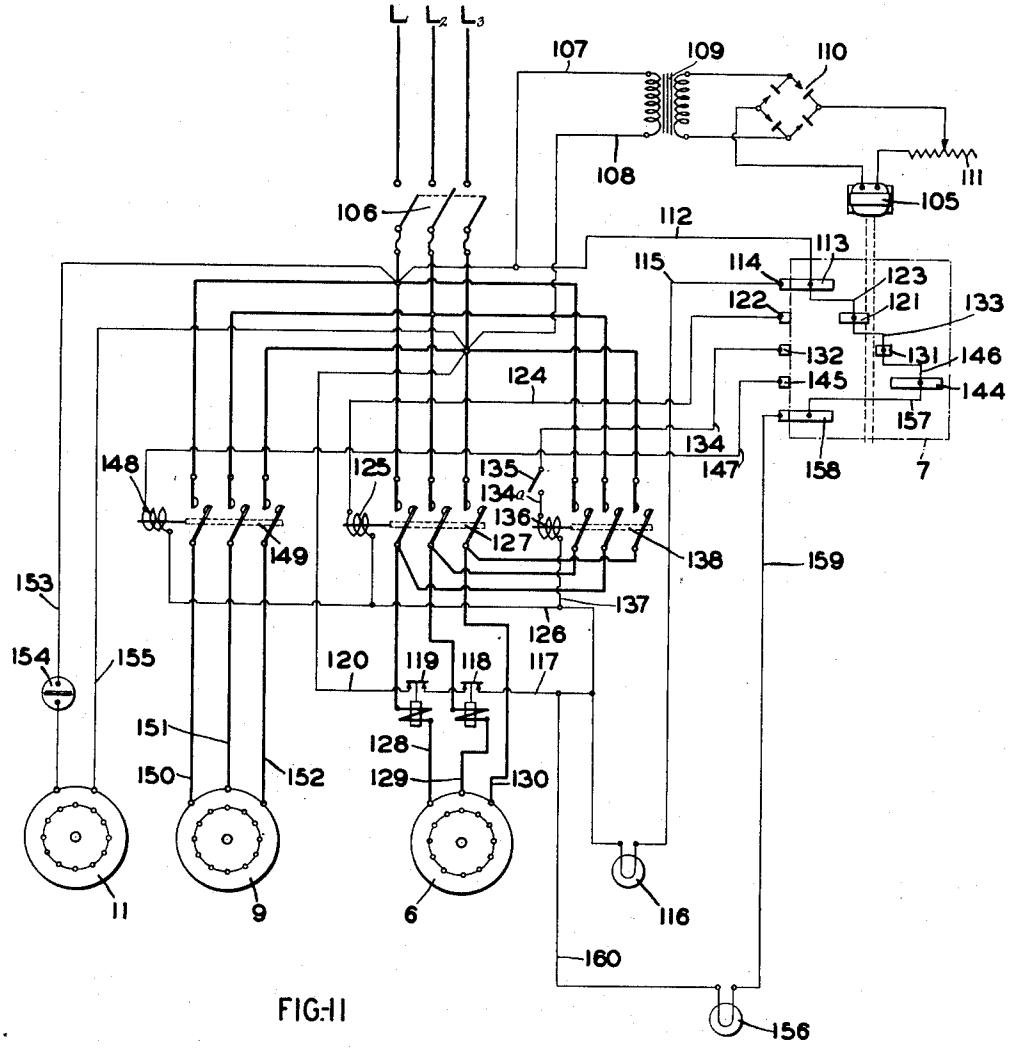


FIG-11

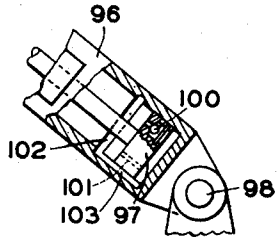


FIG.-13

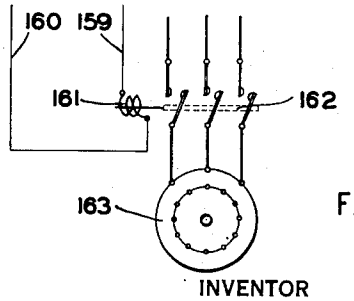


FIG.-12

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UNITED STATES PATENT OFFICE

2,280,916

CENTRIFUGAL APPARATUS

Oscar W. Johnson, Rochester, N. Y., assignor to The American Laundry Machinery Company, Norwood, Ohio, a corporation of Ohio

Application November 23, 1938, Serial No. 241,927

21 Claims. (Cl. 210—73)

My invention relates to centrifugal separators or extractors, and more particularly to apparatus of this type which is particularly adapted for treating mixtures to separate the solid from the liquid phase.

In treating mixtures, such as a mixture of fruit in a sugar solution or chemical mixtures or suspensions of various types, for the purpose of separating the liquid from the solids, it is often desirable to quickly remove the liquid and to collect both the liquid and solid phases.

It is the purpose of the present invention to provide a centrifugal separator which is suitable for this purpose and while my invention will be described in connection with the treating of perishable products, such as fruit, which have been quickly frozen by means of a liquid solution that is capable of remaining in the liquid state at the freezing temperature of the perishable product, it will be understood that my improved apparatus is not limited in this respect as it may be employed for any desired purpose, such as for separating solids from liquids in general, or it may be employed as an extracting device for various purposes, such as for extracting liquid or solvents from fabrics in laundry application.

In preserving fruit, such as strawberries or raspberries, it is the practice to quickly freeze the berries at a temperature of approximately 3° to 5° F. in an aqueous solution of sugar of sufficient concentration to maintain the solution in the liquid state at that temperature, and to then quickly remove and recover the solution from the berries for further use and to collect the berries for preservation as a food product. In accordance with my invention the sugar solution is removed from the berries by centrifugal action, the berries are removed from the centrifuge and collected for deposition in suitable containers and the parts of the apparatus are automatically restored to their original position in a predetermined time to receive an additional charge.

It is, therefore, an object of my invention to provide an improved centrifugal device by means of which liquid may be quickly separated or extracted from solids and by means of which the solids may be readily removed from the centrifuge after the separating or extracting operation.

Another object of my invention is to provide an improved centrifugal separator and associated mechanism which are substantially automatic in operation and by means of which liquid may be quickly separated from solids in a mixture containing both solids and liquid while the centrifuge is operating at a comparatively high speed, including means for expelling the solids from the centrifuge while it is rotating at a comparatively low speed and restoring the apparatus to its operative position to receive another charge.

Another object of the invention is to provide an underdriven extractor embodying a basket having a bottom and a side wall, the side wall being capable of vertical movement relative to the bottom for discharge purposes, together with means located below the basket and, more specifically, extending upwardly through the basket spindle, for raising and lowering the basket wall, to thereby avoid overhead obstructions which might otherwise interfere with access to the basket for loading, inspection or other purposes.

Other objects and advantages of my invention will be apparent as the specification proceeds.

My invention will be better understood by reference to the accompanying drawings in which

Fig. 1 is a sectional elevational view of my improved apparatus taken on the line 1—1 of Fig. 6, parts of the motor casing being shown in side elevation;

Fig. 2 is a fragmentary side elevational view as seen from a plane passing through line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 2 as seen from a plane passing through the line 3—3 of Fig. 1;

Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 1, the lever being omitted;

Fig. 5 is a cross-sectional view on the line 5—5 of Fig. 6;

Fig. 6 is a sectional plan view taken on the line 6—6 of Fig. 1, the casing for the lever actuating motor being broken away to show the speed reducing gear structure;

Fig. 7 is a sectional plan view taken on the line 7—7 of Fig. 1, parts of the underlying structure being broken away;

Fig. 8 is an enlarged detail plan view of the scraping mechanism shown in Fig. 7;

Fig. 9 is a cross-sectional view on the line 9—9 of Fig. 8;

Fig. 10 is a detail sectional view taken on the line 10—10 of Fig. 6, showing the centrifugal switch mechanism on the driving motor;

Fig. 11 is a diagrammatic view of a control circuit for the apparatus;

Fig. 12 is a diagrammatic view showing a modification of a portion of the control circuit; and

Fig. 13 is a detail view of the dash-pot shown in Fig. 1.

According to my invention I employ an underdriven extractor which from some standpoints, such as its spindle mounting, may be of standard

form. The extractor spindle carries a basket having a bottom and an imperforate outer wall, the said outer wall being capable of vertical movement for discharge of the solid matter, as will more fully appear hereafter. To avoid overhead obstructions, such as might interfere with access to the basket for loading, inspection or other purposes, I preferably utilize mechanism for raising and lowering the basket wall, which is mounted or located below the basket top, such as beneath the basket and which, preferably, is connected to the basket wall by operating means which extends upwardly through the basket spindle, which is tubular or hollow for the purpose. Therefore, the basket spindle is mounted so that its oscillating point or center is above the floor, giving access to the lower end of the spindle, from beneath, for the operating means for the basket wall.

As illustrated in the drawings, my improved apparatus comprises a casing 1, a container 2 having an imperforate wall and elevated outlet openings arranged within the casing, a tubular spindle 3 for rotating the container, a frame 5, a motor 6 for driving the spindle, a control device 7, a lever 8 for raising the wall of the container, a motor 9 for actuating lever 8, a rotatable platform 10 having a bevelled edge arranged below the container and a motor 11 for rotating the platform.

In accordance with my invention, the berries mixed with the sugar solution, are first introduced through casing 1 into container 2 which is adapted to be driven at a comparatively high speed to remove the sugar solution from the berries. For this purpose the cover 12, which is secured to the casing 1 in any desirable manner, such as by means of flanges 13 having slots 14 adapted to receive pins 15 extending from the casing wall, is provided with a central chute 15a which is inclined downwardly and inwardly. The container 2 is also provided with an attached closure or cover 16 having elevated outlets, shown as outwardly extending tubes 17 secured to the cover, and a central opening surrounded by a downwardly extending annular flange 18 to which an upwardly and outwardly inclined chute 19 is secured, the opening of chute 19 being concentric with the opening of chute 15a to provide a passageway for the mixture of berries into container 2.

Container 2 is connected to the spindle to be rotatably driven thereby and to provide slidable movement of the walls and cover of the container with respect to the bottom portion. As illustrated in the drawings, the bottom portion 20 of the container is provided with a hub 21 which is keyed to rotatable spindle 3 and the annular flange 18 is provided with spokes 23 terminating in a hub 24 which is keyed to spindle 3 at 25. For the purpose of rotating the container, spindle 3 is provided with an outwardly flared portion 26 to receive the hub 27 of a pulley 28 which is connected by belt 6a to the shaft of motor 6. Upon energizing motor 6, container 2 is rotated and the mixture is thrown outwardly and upwardly.

To maintain the fruit in the centrifuge while expelling the solution, an annular baffle 30 is arranged in container 2 below its outlet openings 17, which openings may be either in the cover portion as shown or adjacent the upper edge of the body portion. The baffle 30 is provided with spokes 31 which permit flow of the mixture into the container, the spokes 31 terminating in a hub 32 which is secured to spindle 3 by any suitable means, such as a set screw 33. The baffle 30 is also provided with a series of radially slidable plates 34 (Figs. 8 and 9), each having a plurality of apertures 36 in its outer edge and each being provided with radially elongated slots 36a, each of the slots being adapted to loosely receive the shank of a rivet 36b passing through the baffle wall. Upon rotation of container 2 the mixture is thrown outwardly and upwardly, the solution passing upwardly through apertures 36 and out through tubes 17 which extend over a baffle 37 attached to the side of the casing, the solution being discharged onto an inclined annular plate 38 along which it drains to an outlet 39.

To provide a support for the lower end of the spindle and to permit a certain amount of oscillatory motion of the container due to unbalanced loads, support 5 is provided with an inwardly extending annular flange 40 located a substantial distance above the base 41 and terminates at its upper end in an annular ring 42 forming an opening through which spindle 3 extends. Supported upon the flange 40 is a housing 40a having an annular flange 42a which forms a seat for a ring 43 formed of a suitable resilient material, such as rubber, and upon which rests the flange 44 of a bearing sleeve 45, above which flange 44 is a second resilient ring 46 held in place by means of a nut 47. Bearing sleeve 45 supports a thrust bearing 48 for tubular spindle 3 and at its upper end is threaded to receive an umbrella-shaped disk 49 locked in place by nut 50 which prevents oil passing upwardly from the bearing from flowing to the resilient rings. Spindle 3 carries a rubber cushion 51 which engages the ring 42 of housing 5 to limit container oscillation.

In accordance with my invention, improved means are also provided to remove the berries after the sugar solution has been expelled. For this purpose a slidable rod 55 extends through the hollow spindle 3 and is provided with a head 56 at its lower end. When rod 55 is moved upwardly, its upper end engages a thimble 57 threaded to hub 24 and moves it, together with chute 19 and the cover and side wall 59 of container 2 upwardly to the position shown in dotted lines, Fig. 1. The inclined container bottom is provided with a gasket 58 to receive the bevelled lower edge of the container wall, thereby sealing the joint when the container wall is in its normal operative position. During the upward movement of the side wall 59, plates 34 which have been thrown radially outwardly by centrifugal force during liquid separation, engage the side wall, which moves them in as the wall rises, scraping the berries off said wall and discharging them upon rotating platform 10 which carries them to deflector 60 which guides them outwardly through the chute 61 in the casing for deposition in desired containers.

Table 10 may be rotated by any desirable means. As shown in the drawings, its driver is a motor 11, the shaft of which is connected through speed reducing gearing, indicated generally by the numeral 62, with a worm gear on the shaft 64, which at its upper end extends into a casing 65 and has affixed thereto a cog wheel 66 connected by chain 66a to cog wheel 67 on a flange of table 10, an upwardly extending flange 68 being also attached to the table for preventing the berries from coming in contact with support 5 and a downwardly inclined flange 68a being

attached to the casing 1 to guide the berries onto the table. To maintain chain 66a taut, an idler cog wheel 68b is carried by an arm 68c pivotally mounted to support 5, said idler cog being held in engagement with chain 66a by means of spring 68d. For supporting platform 10 for rotative movement, a plurality of grooved rolls 65a are provided which are arranged in casings 65, 69 and 70 to receive the bevelled peripheral edge of the platform, although obviously the rolls may be supported in any other desirable manner. For example, they may be secured to the inside of the casing and arranged below the platform, and an appropriate seal provided to prevent the sugar solution which may cling to the berries from seeping between the platform and the casing.

Any suitable means may be provided for moving rod 55 upwardly, although in view of the desirability of providing a slow rotation of the container during the removal of the berries, there may be a slight oscillation of rod 55 and the lifting means is therefore preferably separate from the rod. A lost motion direct connection, however, may be provided to compensate for oscillation, if desired.

As illustrated in the drawings, rod 55 is moved upwardly by means of the lever 8 which is pivoted to the frame at the point 75 and is provided with a roll 76 lying below head 56 of rod 55 and with a segmental gear 77 at the other end driven by a pinion 78 keyed to a shaft 79 journalled in bearings 80 and 81.

Pinion 78 is driven by the motor 9 through pinion 83, gear 84 and shaft 79 to rotate lever 8 in a counterclockwise direction, Fig. 1, the movement of the lever being limited by a resilient bumper 85 provided with a cap 86. To insure the complete raising of rod 55, gear 84 is not attached directly to shaft 79, but frictionally through plates 87 and 88 arranged on opposite sides of gear 84 which are held in engagement with said gear by spring 93. Plates 87 and 88 are slidably keyed on sleeve 91 and nut 94 may be adjusted to provide frictional clutch power transmission from pinion 83 to pinion 78, the clutch slipping when lever 8 engages resilient bumper 85.

After the berries have been removed and motor 9 has been deenergized, rod 55, influenced by the weight of chute 19, cover 16 and wall 59 of container 2, descends and through head 56 acting on roll 76 turns lever 8 in a clockwise direction, Fig. 1, until it engages resilient bumper 95. The downward movement of the rod 55 is impeded by the braking effect of the gears and motor. To further assist in preventing too rapid descent of the rod 55, a dash-pot snubbing device 95a may be provided, shown in detail in Fig. 13, including a casing 96 containing oil or other suitable fluid and a piston 97. One end of casing 96 is attached at 98 to the frame 5 and the piston rod is attached at 99 to the segmental gear so that upon movement of the lever in a counterclockwise direction the piston rod is moved outwardly from its casing. To provide free outward movement of the piston rod the piston is provided with a ball check valve 100. Upon downward movement of the rod 55, however, check valve 100 remains closed and the inward movement of piston 97 in casing 96 is impeded by the pressure of the fluid below the piston which must now pass through a restricted opening 101 in the piston. As the rod 55 approaches the limit of its downward travel, however, it is desirable to accelerate its movement so that the beveled wall portion of the container will be forced into tight engagement with gasket 58 to provide a tight seal between the side walls and the bottom 20 of the container 2. For this purpose the walls of casing 96 are provided with an annular groove 102, a short distance from the bottom of the casing, which communicates with a longitudinal groove 103 leading to the bottom of the casing, thereby providing a greater area for the passage of fluid as the piston approaches the limit of its inward travel, thus permitting rod 55 to descend more rapidly. When rod 55 reaches its lowermost position, it will be noted that its upper end is spaced below the head of thimble 57 and therefore does not prevent movement of wall 59 into sealing engagement with the bottom of container 2.

In accordance with my invention means are provided to coordinate and control the operation of my improved apparatus in accordance with a predetermined schedule. For this purpose a control system is provided as shown in Fig. 11 of the drawings, including a control device 7, provided with electrically connected segments which may be adjustable, the control device being operated by a motor 105, current for which is supplied from line L_1, L_2 and L_3, when switch 106 is closed, through conductors 107 and 108, a transformer 109, a balanced rectifying bridge 110, and a potentiometer 111, the speed of motor 105 and consequently the time sequence being regulated by means of the potentiometer.

As illustrated in Fig. 11, when container 2 is in the position shown in Fig. 1 of the drawings, and switch 106 is closed, a circuit is established from line L_1, through conductor 112, segment 113 on control device 7, terminal 114, conductor 115, lamp 116, conductor 117, overload switches 118 and 119 and conductor 120, to line L_3. Lamp 116 is accordingly illuminated and an indication is given that the container is ready for a charge. After the mixture of berries in the sugar solution has been placed in container 2, and motor 105 has moved control device 7 to a position in which segment 121 on control device 7 is in engagement with terminal 122, a circuit is established from line L_1 through conductor 112, segment 113, conductor 123, segment 121, terminal 122, conductor 124, magnetic coil 125, conductor 126, conductor 117, overload switches 118 and 119, and conductor 120 to line L_3. The energization of coil 125 closes switch 127, and a circuit is established from line L_1, L_2 and L_3, to motor 6 through conductors 128, 129 and 130.

Motor 6 being now energized, container 2 is rotated rapidly to expel the sugar solution therefrom, the liquid passing out through tubes 17 upon the inclined plate 38 and outwardly through the opening 39 in casing 1. After segment 121 has passed terminal 122, motor 6 is deenergized. However, container 2 still continues to rotate at a comparatively high speed. When segment 131 is moved into contact with terminal 132, a circuit is established from line L_1, through conductor 112, segment 113, conductor 123, segment 121, conductor 133, segment 131, terminal 132, conductor 134, switch 135, conductor 134a, coil 136, conductors 137 and 117, overload switches 118 and 119, and conductor 120 to line L_3. At this time switch 135 which is associated with motor 6, as shown in Fig. 10 of the drawings and which will be subsequently described, is closed. Upon energization of coil 136, switch 138 is closed and current is supplied from L_1, L_2 and L_3, to motor 6

through conductors 129, 128 and 130, which provides a reverse phase which tends to rotate the motor in the opposite direction and thereby produces a braking effect. When the speed of motor 6, due to friction and the braking effect of the line current, becomes sufficiently slow, switch 135 leading from conductor 134 to conductor 134*a*, is opened, thus breaking the supply of current to coil 136, which permits switch 138 to open.

Switch 135, as illustrated in Fig. 10 of the drawings, is of conventional form and comprises an inclined tube 139 for the mercury, which is supported on the shaft of the motor. When the speed of the motor is sufficiently rapid the mercury is thrown to the upper portion of container 139 which effects contact between conductors 140 and 141, leading to collector rings 142 and 143 which are mounted on an insulating sleeve surrounding the motor shaft and which are connected through brushes to conductors 134 and 134*a*. As the speed of the motor decreases, however, the contact between conductors 140 and 141 is broken, which opens the circuit between conductor 134 and 134*a*. Motor 6 which is now no longer influenced by the braking action of the line current, coasts gradually to stopping position.

During the slow rotation of container 2, contact 144 on control device 7 is moved by motor 105 into engagement with terminal 145 and a circuit is established from line L_1 to conductor 112, segment 113, conductor 123, segment 121, conductor 133, segment 131, conductor 146, segment 144, terminal 145, conductor 147, coil 148, conductors 126 and 117, overload switches 118 and 119, and conductor 120 to line L_3. When coil 148 is energized it closes switch 149, thereby supplying current to motor 9 from line L_1, L_2 and L_3, through conductors 150, 151 and 152. Upon energization of motor 9, lever 8 is rotated in a counterclockwise direction, which raises chute 19, cover 16 and wall 59 of container 2, and the berries fall from container 2 by gravity assisted by centrifugal force resulting from the slow rotation of the basket, and are also removed by the positive action of the baffle 30 and plates 34 which engage against the inner periphery of the container and scrape the berries therefrom, the plates 34 being adapted to be moved inwardly as inclined wall 59 is raised.

When segment 144 passes terminal 145, motor 9 is deenergized and rod 55, influenced by its own weight and the weight of chute 19 and the top and side walls of container 2, descends in the manner previously described. Container 2 is thus returned to the position shown in Fig. 1 of the drawings and as control device 7 moves segment 113 into engagement with terminal 114, light 116 is illuminated, signifying that the container is ready for the next charge.

During the operation of the apparatus, current is supplied to motor 11 from lines L_1 and L_3, through conductor 153, switch 154 and conductor 155 which rotates table 10. It will be noted that this circuit is independent of the circuits to motors 9 and 6 and table 10 may, therefore, be intermittently or continuously operated.

Means may also be provided to coordinate the operation of my improved apparatus with other apparatus. For instance, when container 2 is in a position to be loaded, a signal 156, such as a light, may be established at a distant point, for instance, the signal light might be placed on the freezing machine which would indicate to the operator at that station that the extractor was ready for loading. Signal 156 may be operated by establishing a circuit from line L_1 through conductor 112, segment 113, conductor 123, segment 121, conductor 133, segment 131, conductor 146, segment 144, conductor 157, segment 158, conductor 159 to signal 156 and from thence to conductors 160 and 117, overload switches 118 and 119, and conductor 120 to line L_3. Instead of supplying a signal, means may also be provided to operate a portion of another device when container 2 is ready to be loaded. For instance, as shown in Fig. 12 of the drawings, the conductor 159 instead of leading to lamp 156 may energize a coil 161 which is effective in closing a switch 162 to motor 163, which might be utilized to discharge berries which have been frozen in the sugar solution, into container 2, or motor 163 might be employed to drive a control device operatively connected to other machinery, or it might be of such a form as to insure that all machine conditions are right for the next operating sequence.

What I claim is:

1. Apparatus of the class described comprising a container for a mixture composed of solid and liquid material, said container having a downwardly inclined bottom having a resilient gasket adjacent its outer periphery, an imperforate wall having elevated outlet openings and a reenforcing strip at the bottom edge which engages the resilient gasket on the periphery of the bottom when said container is in normal position, a movable control device, means for rotating said container to expel the liquid, means operatively associated with said control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, and actuating means arranged below said container operatively associated with said control device and with the wall for raising the wall from the bottom while the container is undergoing deceleration to permit discharge of solid material from the container between the wall and the bottom.

2. Apparatus of the class described comprising a container for solid material having a liquid associated therewith, said container having a downwardly inclined bottom, a wall having a cover and elevated outlet openings, said wall being movable upwardly away from and downwardly into engagement with said bottom, means for rotating said container to expel the liquid through said outlet openings, a movable control device, means operatively associated with said control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, actuating means arranged below said container operatively associated with said control device and with the wall for raising it from the bottom while said container is undergoing deceleration, said wall being adapted to descend by gravity into engagement with said bottom when said actuating means is released, and means associated with said actuating means for impeding the descent of said wall.

3. Apparatus of the class described, comprising a rotatable container for solid material having liquid associated therewith, said container having outlet openings and including a bottom and a wall, said wall being movable away from and toward said bottom, a casing surrounding said container having an outlet opening, a table arranged below said container, means for rotat-

ing said container to expel liquid therefrom, a movable control device, means operatively associated with said control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, actuating means operatively associated with said control device for raising the wall of said container from said bottom while said container is undergoing deceleration, thereby permitting the solid material to fall onto said table, means for rotating said table, and means associated with said casing and being effective during the rotation of said table for deflecting the solid material through the outlet opening in said casing.

4. Apparatus of the class described comprising a rotatable container for solid material having liquid associated therewith, said container having outlet openings and including a bottom and a downwardly and inwardly inclined wall, said wall being movable away from and toward said bottom, a casing having an outlet opening, a table arranged in said casing below said container, means for rotating said container to discharge the liquid therefrom, actuating means arranged below said container and operatively associated with said wall for raising it away from said bottom, a vertical spindle disposed centrally of said rotatable container, and stationarily mounted with respect to up-and-down movement of said wall, baffle means carried by said spindle, scraping means mounted for radial outward sliding movement on said baffle means, and located near the upper end of the basket wall when the wall is in lowered position, and adapted to engage said wall for removing the solid material onto said table as the wall is raised, means for rotating the table, and means associated with said casing and being effective upon the rotation of said table for deflecting the solids through the outlet opening in said casing.

5. Apparatus of the class described, comprising a container having elevated outlet openings and including a bottom, a wall and a closure for said wall, a casing surrounding said container having a liquid discharge opening communicating with the openings in said container and a solid discharge opening, a rotatable table arranged in said casing below said container, means for rotating said container, rotatable means arranged in said container below the elevated outlet openings for retaining the solids in said container while said container is rotating while permitting the liquid to discharge outwardly through the openings in said container and said casing, a movable control device, means operatively associated with said control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, means operatively associated with said control device for raising the wall of said container during said deceleration to permit discharge of the solids between the wall and bottom onto said table, means for rotating said table, and means associated with said casing and being effective upon the rotation of said table for deflecting the solids through the outlet for solids in said casing.

6. Apparatus of the class described, comprising a container for a mixture composed of a solid and liquid material, said container having a downwardly inclined bottom provided with a resilient gasket adjacent its outer periphery, an imperforate wall having elevated outlet openings and a reinforcing strip at its bottom edge which engages the resilient gasket on the periphery of the bottom when said wall is in normal position, means for rotating said container to expel the liquid through said outlet openings, a movable control device, means operatively associated with said movable control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, and actuating means operatively associated with said movable control device and with said wall for raising the wall from the bottom while said container is undergoing deceleration to permit discharge of solid material from the container between the wall and bottom, the wall of said container being adapted to descend by gravity when said actuating means is released to cause said wall and flange to engage said gasket.

7. Apparatus of the class described, comprising a container for solid material having a liquid associated therewith, said container having a downwardly inclined bottom, a wall having outlet openings, said wall being movable upwardly from and downwardly into engagement with said bottom, means for rotating said container to expel the liquid through said outlet openings, a movable control device, means operatively associated with said movable control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, actuating means operatively associated with said movable control device and with said wall for raising it from the bottom while said container is undergoing deceleration, said wall being adapted to descend by gravity into engagement with said bottom when said actuating means is released, and means associated with said actuating means for impeding the descent of said wall.

8. Apparatus of the class described, comprising a container for a mixture of a solid and a liquid, said container having a bottom, a wall movable upwardly away from and downwardly into engagement with the bottom and having outlet openings, means for rotating said container to force said mixture outwardly and upwardly, rotatable means arranged in said container below said outlet openings for retaining the solids in said container while the liquid discharges through said outlet openings, a movable control device, means operatively associated with said movable control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, actuating means operatively associated with said movable control device for raising the wall of said container to permit the solids to escape between the wall and bottom while said container is undergoing deceleration, said wall being adapted to descend toward the bottom when the force on said actuating means is released.

9. Apparatus of the class described, comprising a rotatable container for solid material having a liquid associated therewith, said container having a bottom and a side wall, said side wall having openings therein and being movable away from and toward said bottom, a casing surrounding said container having an outlet opening, a table arranged below said container, means for rotating said container to expel liquid there-

from, a movable control device, means operatively associated with said movable control device for applying a reversing force counter to the direction of rotation of said container, so as to decelerate the rate of rotation after a substantial portion of the liquid has been expelled, actuating means operatively associated with said movable control device for raising the wall of said container from said bottom during said deceleration, thereby permitting the solid material to fall onto said table, means for rotating said table, means associated with said container for preventing liquid associated with said solids from coming in contact with said rotating means, and means associated with said casing and being effective during the rotation of said table for deflecting the solid material through the outlet openings in said casing.

10. Apparatus of the class described comprising a container for solid material having a liquid associated therewith, said container having a downwardly inclined bottom, a wall having a cover and outlet openings, said wall being movable upwardly away from and downwardly toward said bottom, means for rotating said container to expel the liquid through said openings, actuating means arranged below said container and operatively associated with the wall for raising it upwardly from the bottom, said wall being adapted to descend by gravity into engagement with said bottom when said actuating means is released, means associated with said actuating means for impeding the descent of said wall, and means associated with said impeding means for reducing the effectiveness of the impeding means as the wall approaches the bottom in its downward travel.

11. Apparatus of the class described comprising a container having elevated outlet openings for a mixture of solids and a liquid, said container having a downwardly inclined bottom with a yieldable gasket surrounding its periphery, a wall movable upwardly away from and downwardly into engagement with the bottom and normally adapted to rest on said gasket, means for rotating said container to force said mixture outwardly and upwardly, means arranged in said container below said outlet openings for retaining the solids in said container while the liquid discharges through said outlet openings, actuating means for raising the wall of said container to permit the solids to escape between the wall and bottom, said wall being adapted to descend toward the bottom when said actuating means becomes ineffective, means associated with said actuating means for impeding the descent of said wall, and means associated with said impeding means for permitting a more rapid descent of said wall as it approaches said gasket.

12. Apparatus of the class described, comprising a container for a mixture containing solids and a liquid, including a cover therefor, said container being provided with elevated outlet openings, a baffle arranged in said container below said outlet openings and having extensions with apertures therein movable inwardly and outwardly relative to the container axis, means for rotating said container and said baffle whereby said extensions are moved outwardly and said mixture is thrown outwardly and upwardly, said baffle serving to hold the solids in said container while permitting the liquid to discharge through the apertures in said extensions and through the outlet openings.

13. Apparatus of the class described, comprising a container for a mixture of solids and liquids, said container having a downwardly inclined bottom and a wall having a cover and elevated outlet openings, said wall being movable away from and toward said bottom, means for rotating said container to force said mixture outwardly and upwardly, means arranged in said container below said outlet openings for retaining the solids in said container while permitting the liquid to discharge through said outlet openings and means for moving the wall of said container away from the bottom and said retaining means, said retaining means serving to remove the solids from said container during the movement of said wall.

14. Apparatus of the class described, comprising a container for a mixture composed of solids and a liquid, said container having a downwardly inclined bottom, a wall movable away from and toward said bottom and a closure for the wall, said container being provided with elevated outlet openings, a baffle arranged in said container below said outlet openings having movable extensions provided with apertures, means for simultaneously rotating said container and said baffle to move said extensions outwardly into engagement with said wall and to force said mixture outwardly and upwardly, the extensions on said baffle serving to prevent solids from rising beyond said baffle while permitting the liquid to discharge through the apertures therein and through said outlet openings, and means for moving the wall of said container away from the bottom and upwardly with respect to said baffle, said extensions serving to remove the solids from the wall of the container during its movement.

15. Apparatus of the class described comprising a rotatable container for a mixture composed of solids and a liquid, said container having a downwardly inclined bottom, an outwardly and upwardly inclined wall, and a cover, said container being provided with elevated outlet openings, and a rotatable baffle arranged in said container below said outlet openings having movable extensions which are moved outwardly and engage the wall while said container and baffle are rotating, said wall being movable away from and toward said bottom and upwardly with respect to said baffle and said extensions being adapted to be forced inwardly by the upward movement of said wall as the wall is moved away from the bottom.

16. Apparatus of the class described comprising a container for a mixture of solids and a liquid, said container having a downwardly inclined bottom, a wall movable upwardly away from and downwardly toward said bottom and a closure for the wall, said container having elevated outlet openings, means for rotating said container to force said mixture outwardly and upwardly, means adapted to engage said wall and arranged in said container and located below said outlet openings for retaining the solids in said container while permitting the liquids to discharge through said outlet openings during the rotation of said container, and means for moving the wall of said container away from its bottom and upwardly with respect to said baffle while the parts of the container are rotating, said solid-retaining means serving to remove the solids from the wall of said container during the upward movement of said wall.

17. Apparatus of the class described comprising a container for solids having a liquid associated therewith, said container having outlet openings and being composed of a bottom and a

wall, said wall being movable away from and into engagement with said bottom, a movable control device, means operatively associated with said control device and said container for rotating said container when the control device is in one position, and means operatively associated with said control device and said wall for moving the wall away from the bottom when the control device is in a second position.

18. Apparatus of the class described comprising a container for solids having a liquid associated therewith, said container having openings and being composed of a bottom and a wall, said wall being movable away from and into engagement with said bottom, a movable control device for actuating groups of operating elements in chronological sequence, means connected to and energized by said control means at one position thereof for rotating said container, means connected to and energized by said control means at a further position thereof for decelerating the rotational rate of said container, and power operated means connected to and energized by said control means at a still further position of said control device for moving said wall away from said bottom while said container is decelerating, and automatic means for stopping said container.

19. Apparatus of the class described, comprising a container for solids having a liquid associated therewith, said container having elevated outlet openings and being composed of a downwardly inclined bottom, a wall movable away from and toward said bottom and a closure for the wall, a movable control device, means operatively associated with said control device and said container whereby said container is rotated when said control device is in one position and the solids and liquid in said container are forced outwardly and upwardly, means for retaining the solids in said container while permitting the liquid to discharge through said outlet openings, means operatively associated with said control device and said container whereby a braking action is applied to said container, and means operatively associated with said container and said control device whereby the wall of said container is moved from the bottom while the container is still rotating to discharge the solid contents.

20. Apparatus of the class described, comprising a container having elevated outlet openings for a mixture composed of solids and a liquid, said container having a bottom, a wall movable away from and toward said bottom and a closure for said wall, a movable control device, means for moving said control device, means operatively associated with said container and said control device for rotating said container at a high rate of speed when said control device is in one position, whereby said mixture is forced outwardly and upwardly, means engaging said wall and arranged in said container below said outlet opening for retaining the solids in said container while permitting the liquid to discharge through said outlet openings, means operatively associated with said container and said control device whereby a braking action is applied to said container when the control device is in a second position, and means whereby the wall of said container is moved away from the bottom and said solid retaining means when said control device is in a third position, said retaining means being effective in removing the solid contents from said wall during its movement.

21. Apparatus of the class described, comprising a container for solids having a liquid associated therewith, said container having a bottom and a wall, said wall having outlet openings and being movable away from and into engagement with said bottom, a movable control device, power means operatively associated with said control device and said container for rotating said container when the control device is in one position, means for moving said control device to a second position to disconnect the power from said container operating means, and means operatively associated with said control device and said wall when the control device is in the second position for moving the wall away from the bottom while the container is still rotating to permit discharge of the solid contents.

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