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Patented June 6, 1911.

2 SHEETS-SHEET 1.

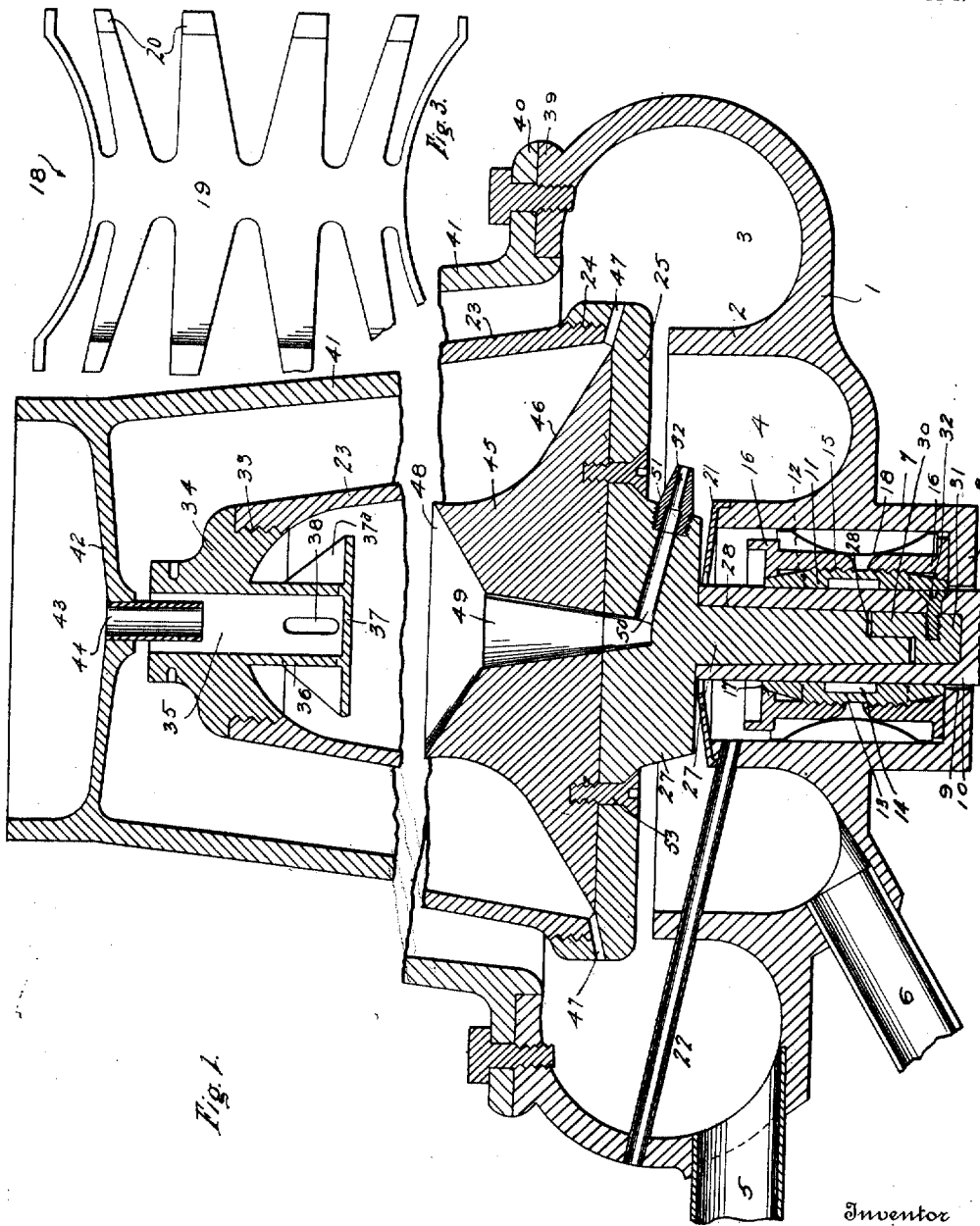


Fig. 1.

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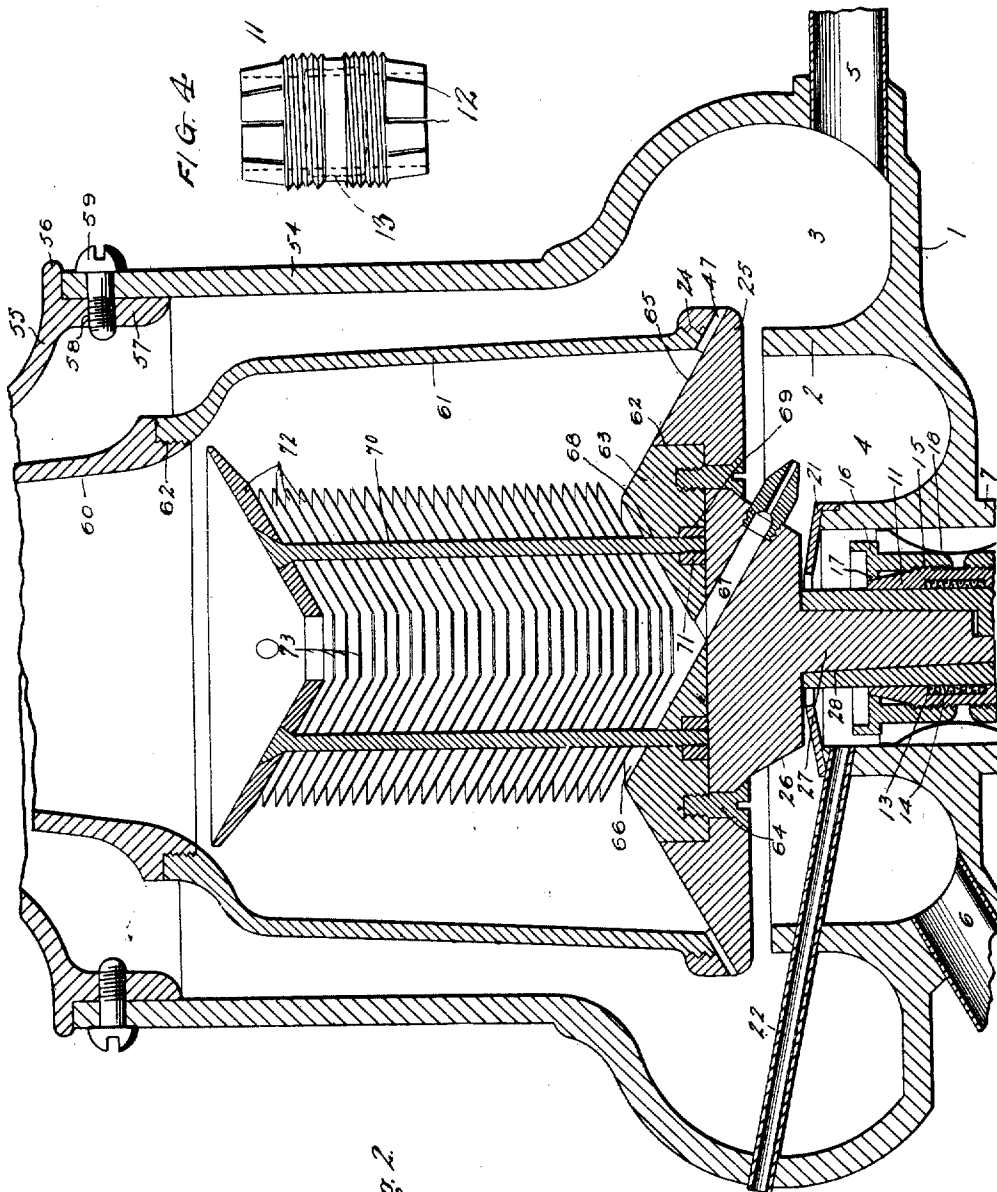


Fig. 2

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UNITED STATES PATENT OFFICE.

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SEPARATOR-BOWL.

994,553.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed May 19, 1910. Serial No. 562,162.

To all whom it may concern:

Be it known that I, JAMES C. ALEXANDER, a citizen of the United States, residing at Roseburg, in the county of Douglas and State of Oregon, have invented certain new and useful Improvements in Separator-Bowls, of which the following is a specification.

My invention relates to a machine for separating liquids of different specific gravities by means of centrifugal force.

An important object of my invention is to provide a machine of the above character to be used in separating cream from milk and cream from buttermilk and so constructed that the milk and cream are discharged into separate receptacles.

A further object of this invention is to provide a separator comprising a bowl which increases in diameter downwardly, so that the action of centrifugal force upon the fluids contained therein is increased as these fluids gravitate toward the lower portion of said bowl.

In the accompanying drawings, forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a central vertical section, through the separator, parts thereof being broken away to save space. Fig. 2 is a similar view of a slightly different form of separator. Fig. 3 is a side view of a spring member forming a portion of my invention. Fig. 4 is a side view of a sleeve for forming a bearing for the spindle.

In the drawings, wherein is illustrated a preferred embodiment of my invention, the numeral 1 designates the body portion of the separator, which is shown as being circular and divided internally by means of a wall 2, into concentric outer and inner collecting chambers 3 and 4. This body portion 1 is stationary and is to be supported by any desirable means. The collecting chambers 3 and 4 are provided respectively with discharge pipes 5 and 6, as shown. The body portion 1 is provided at its center with a cylindrical casing or housing 7, the upper end of which is formed open, and the lower end of which is partially closed by means

of a head 8. This head 8 is provided at its center with a cylindrical opening 9, adapted for the reception of a vertically disposed spindle 10. This spindle as shown, extends through the housing 7, and is journaled through a bearing sleeve 11, which tapers from its center toward its end. This sleeve has each of its ends provided as shown, with longitudinally arranged slots 12, and the same is provided centrally thereof and upon its internal surface with an annular groove 13. Within this groove 13 is arranged a strip of felt 14, or other suitable fibrous material for absorbing oil and supplying the same to the spindle 10. This sleeve 11 is externally screw threaded as shown at 15, for coöperation with clamping rings 16. These clamping rings are provided with inwardly extending beveled flanges 17, which engage the tapering ends of the sleeve 11. By this construction the ends of the sleeve 11 may be contracted by screwing up the clamping rings 16, whereby the wear caused by friction between said sleeve and the spindle 10 is taken up.

Within the housing 7 is arranged a spring member 18, which comprises a cylindrical body portion 19, upon which are formed spaced outwardly bent strips 20. Pairs of strips 20 extend in opposite directions, and engage the housing 7 near its lower end and center, as shown. The body portion 19 of the spring member 18, engages the clamping rings 15 as shown, and tends to hold the sleeve 11 in its proper concentric position with relation to the housing 7. The opening 9 through which the spindle 10 passes, is formed slightly larger than the spindle, to permit of said spindle having slight lateral play, which is quite necessary when starting the machine. The spring member 18 yieldingly holds the sleeve 11, whereby said spindle is capable of moving laterally as above stated, when first started to rotate, but when the spindle attains its full or proper speed it will automatically retain its proper vertical position as a top does. The housing 7 is provided with a suitable annular cover 21, which prevents any lubricants from passing into chamber 4 from within

the housing 7. A supply pipe 22 passes through the chambers 3 and 4 and supplies oil or the like to the bearings within the housing 7.

5 The numeral 23 designates a separator bowl, which is formed conical and increases in diameter downwardly. The increase in the diameter of the bowl 23 downwardly, is an important feature of this invention, as
10 it causes the fluids being separated to be acted upon more greatly by centrifugal force as they gravitate toward the lower portion of said bowl. The lower end of the bowl 23 is externally screw threaded as at 24, for
15 engagement with a head 25. This head 25 is provided centrally thereof with a depending boss 26, centrally from which extends a trunnion 27. This trunnion is preferably
20 removably inserted within a corresponding socket 28, formed within the upper end of said spindle 10. The trunnion 27 is provided at its lower end with a semi-cylindrical
25 cut-out portion 29 adapted to receive the reduced end 30 of a key 31. This key is arranged within the lower portion of the socket 28 and is positively prevented from
rotating therein, by means of a screw 32. The upper end of the bowl 23 is internally
30 screw threaded as at 33 for engagement with a cap 34, which is provided with an axial opening 35. This axial opening has communication with a vertically disposed pipe
36, which is preferably formed integral with the cap 34. The lower end of pipe 36 is
35 closed by means of a horizontally arranged circular plate 37, which may be secured to said pipe 36 by any suitable means. The pipe 36 is further provided near the plate
40 37, with diametrically arranged openings 38, which are designed to feed material upon plate 37 outwardly of the pipe 36, whereby such material is initially spread outwardly
by being rotated by the flanges 37^a.
45 The body portion 1 is provided as shown at 39, with a horizontally disposed flange, for engagement with a horizontal flange 40 formed upon the lower end of a conical
50 outer casing 41. This outer casing is provided near its upper end with a wall 42, which forms with said casing a supply chamber 43. The wall 42 is provided centrally
thereof with a pipe 44, which extends within the axial opening 35, and is designed to
55 supply material from chamber 43 to within said axial opening.

The head 25 has removably arranged upon its upper surface, a directing member 45, which is approximately frusto-conical in
60 shape. The sides 46 of the member 45 are adapted to conduct material toward the outer discharge opening 47 of the bowl 23, which openings may preferably be disposed at diametrically opposite points and adapted

to deliver said material into the outer col- 65 lecting chamber 3. The member 45 is provided centrally thereof with a frusto-conical recess 48, communicating with an opening 49, which communicates with an angular
70 passage 50 extending through the boss 26 and adapted to discharge within the inner collecting chamber 4. The outer end of the passage 50 is enlarged and screw threaded, for the reception of an externally screw
75 threaded nozzle 51. This nozzle is provided with an axial opening 52 as shown, for controlling the flow of material through the passage 50. It is to be understood that the
nozzle 51 may be readily removed, and a
80 different nozzle substituted for it, the last named nozzle being provided with a different size axial opening, for controlling the passage of material therethrough. The
member 45 is removably held upon the head
85 25, by means of screws 53, which are preferably disposed at diametrically opposite points.

In the slightly modified form of my invention, as illustrated in Fig. 2, the body
90 portion 1 is extended upwardly for a considerable distance, to form a cylindrical section 54, which constitutes a portion of the outer casing designated in Fig. 1 by the
numeral 41. The section 54 has engagement
95 with the lower end of an outer casing 55. Said outer casing being provided with horizontal and vertical annular flanges 56 and
57. The flange 57 is provided with a screw
100 threaded opening 58 for the reception of a screw 59, which passes through the section 54 and accordingly detachably secures the
flange 57 to said section 54. It is thus seen
that in the modified form of my invention, the
outer casing is formed in two sections which
105 are readily removable. The separator bowl of the modified form of the invention, is substantially like the bowl 23 shown in Fig. 1, except that the same is formed in two sections
60 and 61, which have screw threaded engagement with each other as at 62 and are
110 accordingly readily separable. The shape of the separator bowl in the form of my invention shown in Fig. 2, is generally conical.

In Fig. 2, the head 25 is provided centrally thereof and upon its upper surface, 115 with a cylindrical recess 62, adapted for the reception of a member 63. This member is removably held within the recess 62 by means of screws 64. The head 25 is provided with sloping surfaces 65 for conducting
120 material to the discharge openings 47. The member 63 is provided centrally thereof with a conical recess 66, which communicates with a passage 67, adapted to discharge
125 within the inner collecting chamber 4. The member 63 is further provided with vertically disposed and diametrically arranged openings 68, which have counterbored en-

larged openings 69 communicating therewith. The openings 68 are adapted for the reception of vertically disposed rods 70, which are removably held in place by means of nuts 71, disposed within said counter-bored openings 69. The rods 70 have arranged thereon frusto-conical plates 72, which are in spaced superposed relation to each other. The diameters of each of the plates 72 decrease downwardly. It is to be understood that the plates 72 may be secured upon the rods 70 by any suitable means, and that said plates may be removable from said rods 70 for the purpose of cleansing the same. The plates 72 are provided at their centers with registering openings 73, which communicate with the upper mouth of the passage 67. The uppermost plate 72 is shown as being much heavier and larger than the other plates 72, and this is done for the purpose of providing a strong connection for the upper end of the rods 70.

The portions of the modified form of my invention which are like corresponding parts of the form of said invention, as shown in Fig. 1, have been given like numerals, and have not been described, as it is thought that the description of these parts in connection with Fig. 1 is sufficient for a clear understanding of the same.

In the operation of the form of my invention shown in Fig. 1, the fluids to be separated, such as milk or buttermilk, are introduced into the supply chamber 43. These fluids then pass through the openings 38 and are discharged upon plate 37. The fluids are engaged by the triangular flanges 37^a formed upon tube 36 and initially given a circular movement. As the fluids travel downwardly within the separator bowl, the action of centrifugal force upon the same is increased, which is due to the increased diameter of said bowl. By the action of centrifugal force, the milk is urged outwardly, which permits the cream to form a conical column in the center of the separator bowl. This column of cream will then be free to pass downwardly through openings 49 and 50 to within the inner collecting receptacle 4. The milk is discharged through the openings 47, into collecting chamber 3.

The operation of the form of my invention as illustrated in Fig. 2, is substantially like the operation above described. Special attention is called to the fact that (see Fig. 2) when the milk gravitates downwardly within the separator bowl, until the same becomes opposite to plates 72, should there be a small portion of butter-fat left in the milk, said butter-fat will be forced by the still greater action of centrifugal force, to gravitate down the plates 72 and through the openings 73. The skim milk will then be discharged into the chamber 3.

Having fully described my invention, I claim:—

1. In apparatus of the character described, a rotatable bowl, comprising a casing and a head having detachable connection therewith for closing the lower end of the same, said head being provided upon one side thereof with a recess, a member removably mounted within said recess and having detachable connection with said head, a plurality of upstanding rods connected with said member, and a plurality of spaced superposed substantially frusto-conical plates connected with said rods to be supported thereby.

2. In apparatus of the character described, a rotatable bowl, comprising a casing and a head having detachable connection therewith for closing the lower end of the same, said head being provided upon one side thereof with a recess, a member removably mounted within said recess and having detachable connection with said head, a plurality of upstanding rods rigidly and detachably connected with said member, and a plurality of spaced superposed substantially frusto-conical plates connected with said rods to be supported thereby, said plates being provided with registering openings and increasing in diameter upwardly.

3. In apparatus of the character described, a rotatable bowl comprising a casing and a head having detachable connection therewith for closing the same, said head being provided upon one side thereof with a recess, a member removably mounted within said recess and having detachable connection with said head, a plurality of upstanding rods connected with said member, a plurality of spaced superposed substantially frusto-conical plates connected with said rods to be supported thereby, an outer casing surrounding said bowl and extending above the same for forming a receptacle to supply material to be fed to the upper portion of said bowl, said bowl being provided near its lower end with inner and outer discharge openings, and said outer casing being divided into a plurality of receptacles to collect the discharge from the said openings.

4. In apparatus of the character described, a substantially frusto-conical separator bowl, comprising a casing and an approximately frusto-conical head decreasing in diameter upwardly for closing the lower end of said casing, said head being provided centrally thereof with a flaring discharge opening formed therethrough, a plurality of superposed substantially frusto-conical plates increasing in diameter upwardly arranged within said casing and connected with said head, said plates being provided near their centers with openings

formed therethrough, means to rotate said separator bowl, means to feed material to the upper portion of said separator bowl, means for collecting material passing through the discharge opening, said separator bowl being provided at its periphery with a plurality of discharge openings formed therethrough, and means to collect material passing through said plurality of discharge openings. 10

In testimony whereof I affix my signature in presence of two witnesses.

JAMES CHRISTIAN ALEXANDER.

Witnesses:
L. A. SANCTUARY,
A. T. BESTUL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
