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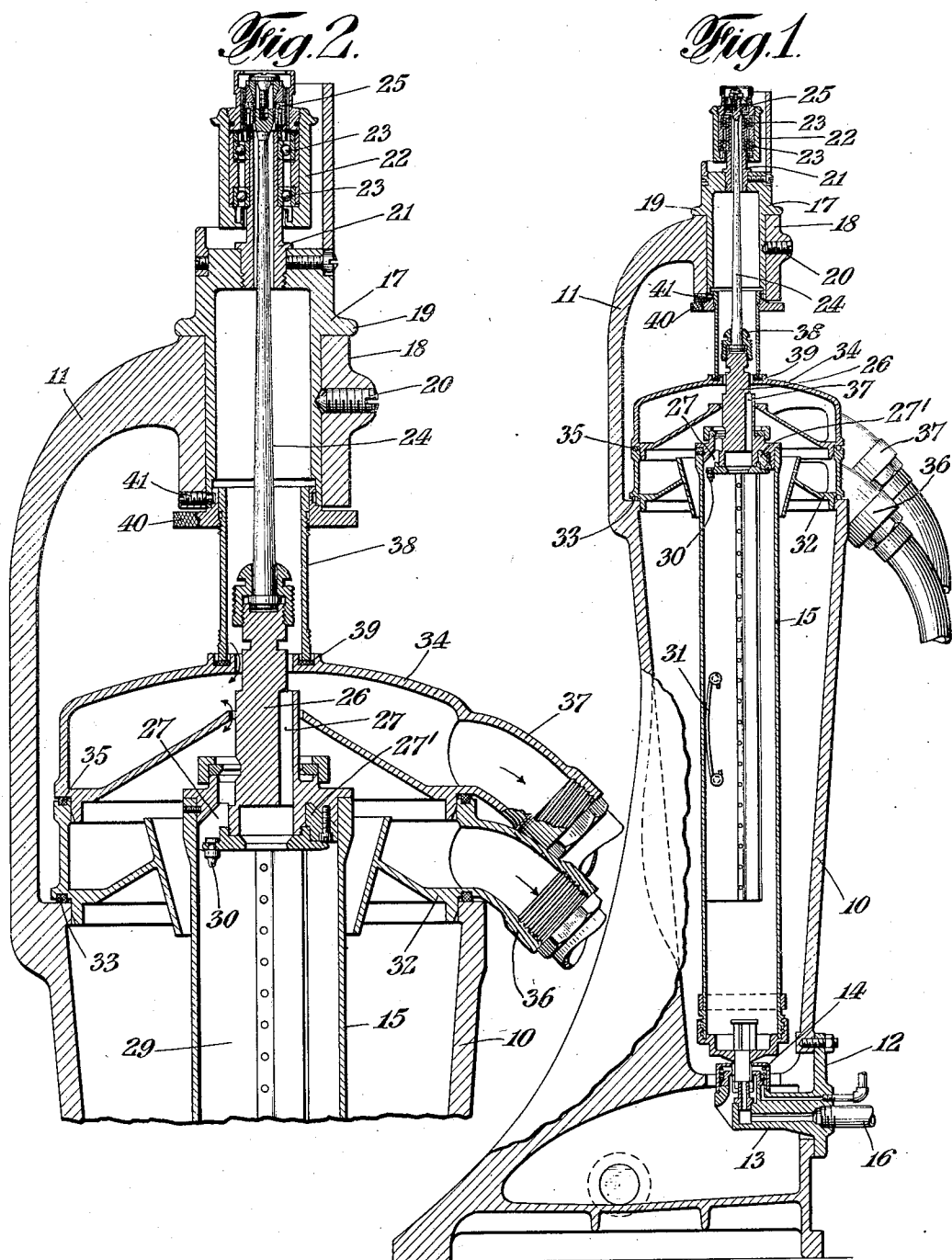
L. D. JONES ET AL

1,625,613

CENTRIFUGAL MACHINE

Filed April 15, 1926

3 Sheets-Sheet 1



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April 19, 1927.

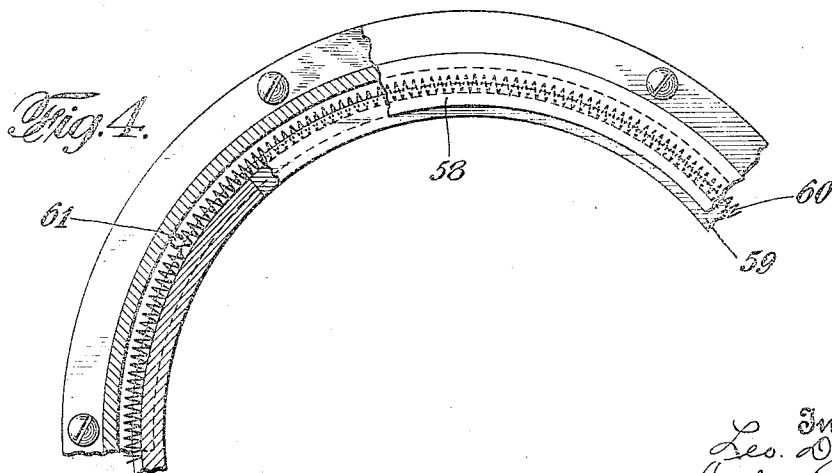
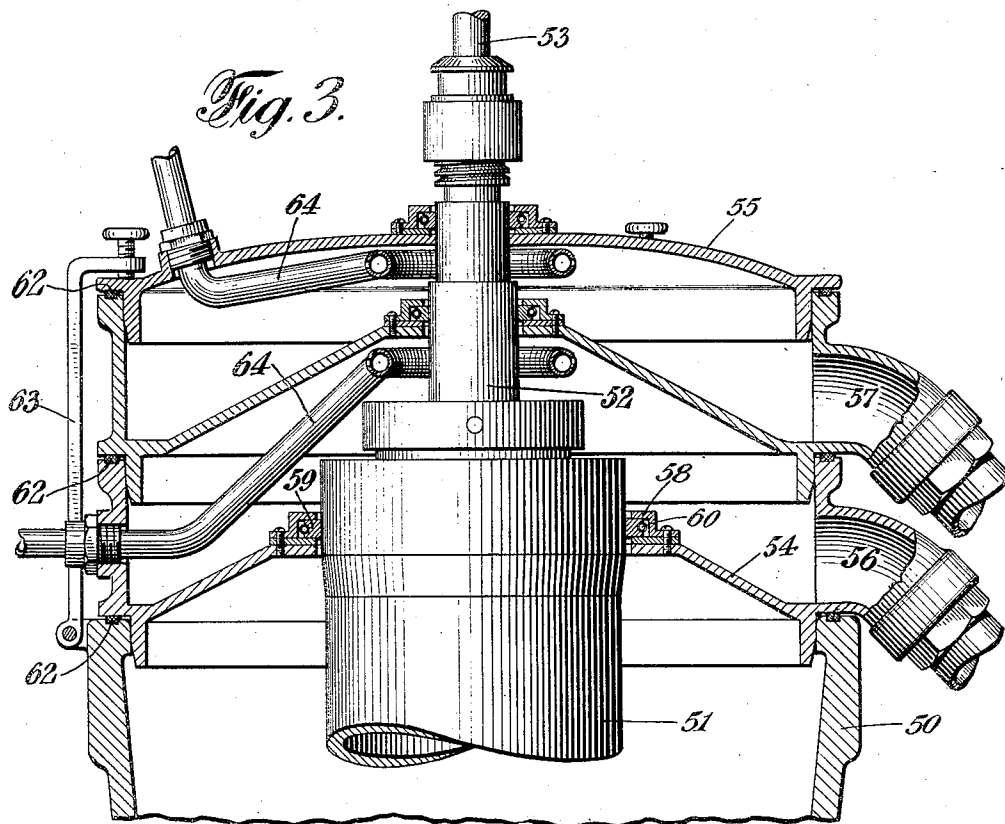
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CENTRIFUGAL MACHINE

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3 Sheets-Sheet 2



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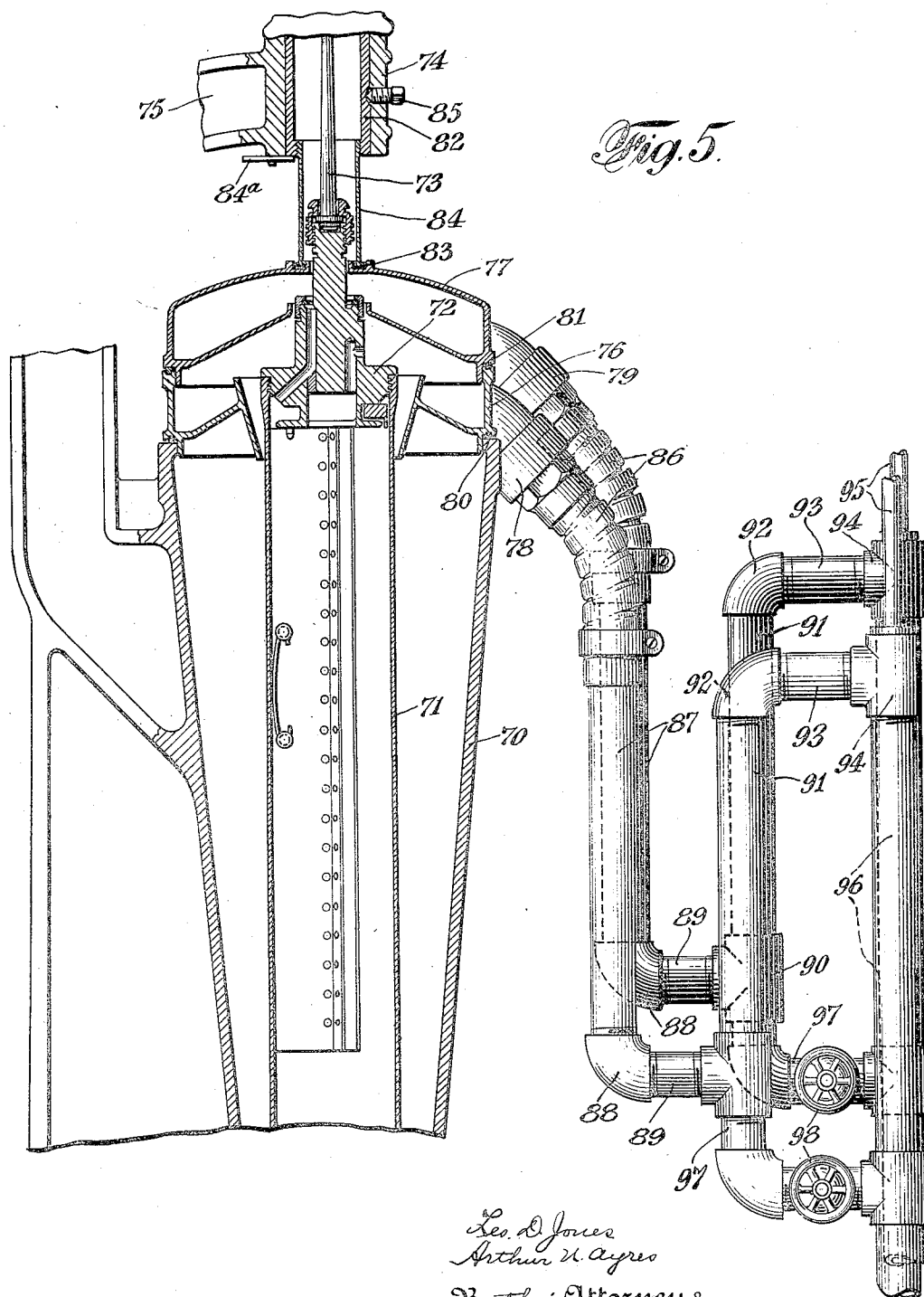
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CENTRIFUGAL MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL MACHINE.

Application filed April 15, 1926. Serial No. 102,156.

This invention relates to centrifugal machines and more especially to that type of centrifugal machine in which a separator bowl is rotated through the medium of a spindle connected to the head of the bowl.

In machines of this type, the bowl is rotated in a casing and the separated materials are discharged in dispersed condition into compartments formed by superposed annular covers surrounding the head of the bowl and provided with suitable outlets. The orifices in the covers through which the head of the bowl extends are of somewhat larger diameter than the corresponding diameters of the bowl, to allow for the vibration of the bowl inherent to centrifugal machines. Rotation of the bowl causes rotation of the air surrounding it in the same direction, due to the surface friction between the air and the bowl. The centrifugal force developed in the air by its rotation tends to cause flow of air toward the outer portions of the covers and through the orifices and along the bowl toward that portion of largest diameter. The liquid being discharged from the bowl has an ejector action on the air which adds to the effect of the centrifugal force. Under these conditions there is flow of air through the outlets with the result that some of the vapors or dispersed substances discharged from the bowl are carried by air currents into the atmosphere or into a compartment other than the one in which they were discharged; thus causing loss of substance, pollution of the atmosphere or intermingling of the separated substances.

It is an object of this invention to overcome the undesirable conditions above outlined by substantially preventing flow of air into or out of as well as between the discharge compartments.

According to this invention, this object is attained by substantially closing the annular space between the inner edge of the top cover and the head of the bowl, sealing from the atmosphere the outlets from the discharge compartments and making vapor tight the junction between the covers and between the covers and the casing. This may be done by mounting the driving spindle for the bowl in a substantially vapor tight bearing, providing enclosed means between the bearing and the top cover, inter-

posing means between the bearing and the top cover for exerting pressure on the top cover through the enclosing means to compress gaskets interposed between the bottom cover and the casing between the covers themselves and between the top cover and enclosing means and also providing traps in the outlets from the discharge compartments. The provision of the spindle enclosing member and the traps in the outlets substantially prevents flow through the orifices in the covers and the outlets and the provision of the gaskets and pressure exerting means prevents leakage from the compartments which would occur under the pressure developed therein with the upper orifice closed and outlets trapped if covers of the usual slip fit type were used. As a result, the separated substances are restricted to the compartments in which they are discharged and the pipes connected therewith. There is substantially no escape to the atmosphere or to another compartment, thereby preventing a loss of substances, pollution of the atmosphere and mixture of the separated substances.

Other objects, novel features and advantages of the invention will be apparent from the following description and accompanying drawings, wherein—

Figure 1 is a vertical section through a machine embodying the invention, the pipes leading to the traps being broken off;

Fig. 2 is a similar view on an enlarged scale of the upper portion of the machine;

Fig. 3 is an enlarged view of a modified form of the invention;

Fig. 4 is an enlarged view of a detail of Fig. 3; and

Fig. 5 is a vertical section, partially broken away, showing in detail the traps for the outlets of the discharge compartments and a modification of the spindle-enclosing member.

Referring now to Figs. 1 and 2, 10 is a support that may be in the form of an upwardly opening casing from the upper end of which projects an overhanging bracket 11. In the lower part of the casing 10 is provided a hole closed by a cover 12 having an inwardly projecting tubular portion 13 upon which is mounted what is commonly known as a drag assembly 14. Within the casing 10 is provided a long tubular

bowl 15, the lower end of which is guided by the drag assembly 14 in a well-known manner, there being provided a nozzle by means of which liquid substances to be separated
 5 are introduced into the bowl 15, and a pipe 16 leading to the tubular portion 13 from any suitable source of supply.

A hollow bearing base 17 is mounted in the head 18 of the bracket 11 and has an
 10 annular projection 19 engaging the head 18, properly to position the base, the latter being held in the head by means of a set screw 20. A bearing sleeve 21 is threaded into the
 15 upper end of the base 17 and supports a driving pulley 22 through the medium of suitable antifriction members 23. A spindle 24 is flexibly connected to one end of the pulley 22, as by means of a rubber coupling
 25 25. The spindle extends through the base 17 and projects below the lower face of the head 18 of the bracket 11.

A head 26 forms the top of the bowl 15 and is provided with one or more passageways 27 through which the separated material is discharged, the passageways having
 25 three wings 27' that cause the substances contained in the passageways to rotate with the bowl. Within the bowl 15 is provided a three-wing member 29, each wing of which
 30 is engaged by a pin 30 carried by the head 26, so that the wing member is rotated at the same speed as the bowl, whereby the materials to be separated are caused to rotate at the bowl speed. On each wing of
 35 member 29 is provided a spring 31 which frictionally engages the inner wall of the bowl 15 to hold the member 29 at proper elevation.

An annular cover 32, preferably of cast
 40 metal, rests upon the upper edge of the casing 10 and surrounds the upper end of the bowl 15, there being interposed a gasket 33 between the casing and the cover. An annular cover 34, preferably of cast metal, rests
 45 upon the cover 32 and also surrounds the head 26, there being a gasket 35 interposed between the cover 34 and the cover 32, and the bottom of the cover 34 forming with the cover 32 a compartment for receiving material discharged from one of the passages
 50 27. A discharge spout 36 is provided in the lower cover and a similar spout 37 is provided in the upper cover. Connected with each spout is a pipe (broken away)
 55 leading to a suitable collection receptacle, there being provided in each pipe a trap to seal off its compartment from the atmosphere. These traps are shown in detail in Fig. 5, and will be described in detail in
 60 connection with that figure.

The spindle and the upper part of the head 26 projecting beyond the cover 34 are enclosed by a tubular member 38 having one end extending into the bearing base 17 and
 65 the other end extending into an annular

groove formed in the upper face of cover 34, there being provided a gasket 39 in this groove. A nut 40 into which screws the upper end of the member 38 is provided with a portion fitting into the base 17, this portion having a groove into which fits a dog
 70 point screw 41 whereby the nut 40 is rotatably supported from the head 18. Threads are provided at the bottom of the member 38 which may be engaged with the threads in
 75 the nut 40 to hold the member 38 up in the bearing 17 when it is desired to have access to the connection between the spindle 24 and the head 26 of the bowl.

By turning the nut 40, pressure may be
 80 exerted through the member 38 to compress the gaskets 33, 35 and 39 to form vapor-tight joints. As the bearing 23 provides a substantially vapor-tight closure at the upper end of the spindle-enclosing casing,
 85 the discharge compartments are effectively sealed off from the atmosphere by means of this closure, the traps in the pipes leading to the collection receptacle and the gaskets 33, 35 and 39. The sealing off of the compartments from the atmosphere effectively prevents escape of the separated substances into the atmosphere and also prevents intermingling of the separated substances, for
 90 there can be no influx of air into the compartments through the spouts 36 and 37 and, although rotation of the bowl 15 may cause the air in the compartment to rotate and thus build up pressure in the compartments,
 95 there can be no flow from one compartment to another, as there is no vent from either compartment. Without such sealing, there would be a flow of air between the compartments and also into and out of the compartments, which may be very objectionable, as,
 100 by this flow, there may be an escape of material to the atmosphere with a consequent pollution thereof, as well as loss of the separated materials and intermingling in one compartment of the materials which had just been separated by centrifugal action in the bowl.

Referring now to Figs. 3 and 4 in which is disclosed a modified form of sealing the space between the spindle and the cover, 50
 115 represents the enclosing casing, 51 the bowl, 52 the head of the bowl, and 53 the driving spindle. Covers 54 and 55 surrounding the head 52 form compartments into which the separated materials are discharged from the bowl 51. The compartments are provided with discharge spouts 56 and 57, from which pipes (broken away) lead to a suitable collection receptacle (not shown). Means are provided for sealing off the compartments from each other and for sealing off the top compartment from the atmosphere and the lower compartment from the casing, thereby substantially preventing flow of vapor between compartments, as well as preventing
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flow of vapor out of either compartment or flow of air into either compartment. This means comprises annular trough-shaped members 58 carried by the covers and opening toward the bowl head. Within each trough is mounted a plurality of segments 59 composed of carbon or other suitable material, the inner surfaces of which are in contact with the outer surface of the head 52. These segments are loosely mounted in the member 58, so that they may move to allow vibration of the head when rotated. To ensure good contact of the segments with the head, there is provided a garter spring 60 arranged in the groove provided in the periphery of the segments, one loop of the spring passing around a pin 61 whereby the spring and segments are held against rotation. The contractile force of the spring 60 forces the segments 59 into engagement with each other, the segments forming a substantially vapor-tight seal between the rotating head and the stationary covers. Gaskets 62 are provided between the covers and between the lower cover and casing 50, and clamps 63 exert pressure to compress the gaskets and establish vapor-tight connection between the various compartments. Here, again, flow of vapor from the compartments under the influence of currents produced by rotation of the bowl 51 is prevented, since the segments prevent flow of air and there is no escape vent because of the gaskets. Consequently, there is no flow between the compartments and the separated substances are retained in the compartments into which each is discharged. In the separation of certain substances, it may be desirable to introduce an inert gas within the discharge compartments. For this purpose are provided pipes 64 which encircle the head 52 and are provided with perforations through which the inert gas may be distributed throughout the chambers.

Referring now to Fig. 5 in which is disclosed in detail the traps in the pipes leading from the discharge spouts to the collection receptacles and in which is disclosed a modified enclosing member for the spindle, 70 designates the casing, 71 the bowl, 72 the head of the bowl and 73 the driving spindle which extends through the head 74 of the bracket 75. Covers 76 and 77 surrounding the head 72 form compartments into which separated materials are discharged from the bowl 71, the compartments being provided with discharge spouts 78 and 79. Between the casing 70 and the cover 76 is arranged a gasket 80 and between covers 76 and 77 is arranged a gasket 81.

In the head 74 is provided a sleeve 82, the lower end of which is interiorly threaded. In the upper face of the cover 77 is provided an annular groove in which is arranged a gasket 83. A tubular member 84

surrounds the spindle 73 with its lower end engaging the gasket 83. The upper end of the member 84 is screwed into the threaded portion of sleeve 82. A latch 84^a is pivoted to the head 74 and may be used to hold the member 84 within the sleeve 82 to which portion it may be slid when it is desired to have access to the connection between the spindle 73 and the head 72. Rotation of the member 84 by virtue of its threaded connection with the sleeve 82, which is held in position by a set screw 85, forces the lower end of the member 84 into contact with the gasket 83 and through it exerts pressure on the covers 76 and 77 to compress the gaskets 80 and 81, thereby obtaining vapor-tight joints.

In this figure are disclosed the details of the traps and connecting pipes for conducting separated liquids from the compartments to the collection tanks. To each discharge spout is connected a short flexible tube 86, which in turn is connected to a vertical pipe 87, at the lower end of which is provided an elbow 88. A nipple 89 connects the elbow 88 with a T 90. To one end of the T is connected a vertical pipe 91, at the upper end of which is provided an elbow 92, which is connected by a nipple 93 with a T 94. To one end of the T 94 is connected a vent pipe 95 to prevent siphoning of liquid in the trap, and the other end is attached to a pipe 96 leading to a collecting receptacle, not shown. The other end of the T 90 is connected to a pipe 97 leading through a valve 98 to the pipe 96. The substances discharged into the compartments flow by gravity through the tubes and pipes to the collecting tanks. A portion of the liquid remains in the trap formed by the pipe 87, elbow 89, nipple 91, T 90 and pipe 92 to form a trap to seal off the compartments from the atmosphere. While the seals or traps for the discharge spouts have been shown only in Fig. 5, it has been previously explained that these traps are to be used in connection with the modifications disclosed in Figs. 1 and 2.

It is, of course, understood that while the device above disclosed is equipped with two discharge compartments, the invention is equally applicable to a machine having one or a plurality of discharge compartments. Moreover, it is contemplated that various structural modifications may be made without in any way departing from the scope of the invention as defined in the appended claims.

With each of the constructions above described, the flow of air through the discharge compartments under the centrifugal force developed in the air by the rotating bowl is prevented. Consequently, the separated substances are restricted to the compartments into which they are discharged and the pipes leading therefrom to the col-

lection receptacles. There is substantially no escape to the atmosphere or to another compartment and loss of substance, pollution of the atmosphere and mixing of separated substances is prevented.

What we claim as new and desire to secure by United States Letters Patent is:

1. In a centrifugal machine, a casing, a bowl mounted in said casing, means to suspend and rotate said bowl, a discharge compartment supported by said casing and surrounding said bowl, and means to seal off said compartment from the atmosphere.

2. In a centrifugal machine, a casing, a bowl mounted in said casing, superposed annular covers supported by said casing and surrounding said bowl to form discharge compartments, means for exerting pressure to force said covers and casing into vapor tight contact and means to seal off the upper compartment from the atmosphere.

3. In a centrifugal machine, a casing, a bowl mounted in said casing, a bearing, a driving member for said bowl supported in said bearing, discharge compartments supported by said casing and surrounding said bowl, and means for sealing off said compartments from the atmosphere, said means comprising an enclosing member for said driving member interposed between said bearing and one of said compartments.

4. In a centrifugal machine, a casing, a bowl in said casing, a bearing, a driving member for said bowl supported in said bearing, discharge compartments supported in said casing and surrounding said bowl, said discharge compartments having spouts and means for sealing off said compartments from the atmosphere, said means comprising traps in said discharge spouts and an enclosing member for said driving member interposed between said bearing and one of said compartments.

5. In a centrifugal machine, a casing, a bowl mounted in said casing, a driving member for said bowl, discharge compartments surrounding said bowl, an enclosing member for said driving member having one end in contact with one of said discharge compartments, and means for exerting pressure through said enclosing member to force said compartments into contact.

6. In a centrifugal machine, a casing, a bowl in said casing, a bearing, a driving member for said bowl supported in said bearing, a discharge compartment supported by said casing, a second discharge compartment supported by said first discharge compartment, a member enclosing said driving member and interposed between said bearing and said upper compartment, gaskets between said enclosing member and upper discharge compartment, between said compartments and between said lower compartment and said casing, and means for exert-

ing pressure through said enclosing member to compress said gaskets.

7. In a centrifugal machine, a casing, a bowl in said casing, a bearing, a driving member for said bowl supported in said bearing, a discharge compartment supported by said casing, a second discharge compartment supported by said first discharge compartment, a member enclosing said driving member and interposed between said bearing and said upper compartment, gaskets between said enclosing member and upper discharge compartment, between said compartments and between said lower compartment and said casing, and means for exerting pressure through said enclosing member to compress said gaskets, and discharge compartments having spouts and traps in said spouts.

8. A centrifugal machine comprising: a casing having an overhanging bracket, a bowl mounted in said casing, a bearing supported by said bracket, a driving member for said bowl mounted in said bearing, superposed discharge compartments supported by said casing and surrounding said bowl, a member enclosing said driving member and interposed between said bracket and the upper compartment, gaskets between said enclosing member and upper compartment, between said compartments and between the lower compartment and casing, and means for exerting pressure through said enclosing member to compress said gaskets.

9. A centrifugal machine comprising: a casing having an overhanging bracket, a bowl mounted in said casing, a bearing supported by said bracket, a driving member for said bowl mounted in said bearing, superposed discharge compartments supported by said casing and surrounding said bowl, a member enclosing said driving member and interposed between said bracket and the upper compartment, gaskets between said enclosing member and upper compartment, between said compartments, and between the lower compartment and casing, and means for exerting pressure through said enclosing member to compress said gaskets, said discharge compartments having spouts and traps in said spouts.

10. A centrifugal machine comprising: a casing having an overhanging bracket, a bowl mounted in said casing, a driving member for said bowl passing through said bracket, superposed discharge compartments supported by said casing and surrounding said bowl, a member surrounding said driving member and having one end in contact with the upper discharge compartment and interengaging means on said bracket and enclosing member whereby pressure may be exerted through said enclosing member against said upper compartment.

11. A centrifugal machine comprising a

casing having an overhanging bracket, a bowl mounted in said casing, a driving member for said bowl passing through said bracket, superposed discharge compartments supported by said casing and surrounding said bowl, a member surrounding said driving member and having one end in contact with the upper discharge compartment, and a threaded connection between said enclosing member and bracket whereby pressure may be exerted through said enclosing member against said upper compartment.

12. A centrifugal machine comprising a casing having an overhanging bracket, a bowl mounted in said casing, a driving member for said bowl passing through said bracket, superposed discharge compartments supported by said casing and surrounding said bowl, a member surrounding said driving member and having one end in contact with the upper discharge compartment, a rotatable member carried by said bracket, a threaded connection between said rotatable member and said enclosing member whereby pressure may be exerted through said enclosing member against said upper compartment.

13. A centrifugal machine comprising a casing, a bowl mounted in the casing, superposed discharge compartments supported by said casing and surrounding said bowl, means for applying pressure to the upper compartment to compress gaskets for sealing said compartments, said discharge compartments having spouts and traps in said spouts.

14. In a centrifugal machine, a casing, a rotatable bowl in said casing, discharge compartments supported by said casing and surrounding said bowl, and yielding means carried by said compartments and contacting with said bowl.

15. In combination, a rotating member, a plurality of segments surrounding said member, and resilient means surrounding said segments to maintain them in contact with said rotating member.

16. In a centrifugal machine, a casing, a rotatable bowl supported in said casing, a cover for said casing surrounding said bowl, means carried by said cover and surrounding said rotating member, and resilient means for maintaining said surrounding means in contact with said rotating member.

17. In a centrifugal machine, a rotating bowl, a discharge compartment surrounding said bowl, an annular trough-shaped member carried by said compartment, a plurality of segments loosely mounted in said member, and resilient means for maintaining said segments in contact with said bowl.

18. In a centrifugal machine, a rotating bowl, a discharge compartment surrounding said bowl, and yielding means carried by said compartment and contacting with said bowl.

19. In a centrifugal machine, a support having a bearing therein, a spindle supported

in said bearing, a centrifugal bowl suspended by said spindle and having discharge openings, discharge compartments surrounding the discharge openings, and means for substantially closing the space between said bowl and compartments without interfering with the normal vibration of the bowl.

20. In a centrifugal machine, a rotatable bowl, a discharge compartment surrounding said bowl, a spout for said discharge compartment, a flexible hose connected to said spout, a trap connected to said hose, and a vented discharge pipe leading from said trap.

21. In a centrifugal machine, a rotatable bowl, discharge compartments surrounding said bowl, and means to prevent vapor flow from one compartment to the other.

22. In a centrifugal machine, a rotatable bowl, discharge compartments surrounding said bowl, and means to prevent escape of vapor from either compartment to the other or to the atmosphere.

23. In a centrifugal machine, a casing, a bowl in said casing, means to suspend and rotate said bowl, discharge compartments supported by said casing and surrounding said bowl, said discharge compartments having spouts, and means for sealing off said compartments from the atmosphere comprising traps in said discharge spouts.

24. A centrifugal machine comprising a casing having an overhanging bracket provided with a recess, a bowl mounted in said casing, a driving member for said bowl passing through said bracket and arranged within said recess, an enclosing member for said driving member, said enclosing member being slidable into and out of said recess, and means for retaining said enclosing member within said recess.

25. A centrifugal machine comprising a casing having an overhanging bracket provided with a recess, a bowl mounted in said casing, a driving member for said bowl passing through said bracket and arranged within said recess, an enclosing member for said driving member, said enclosing member being slidable into and out of said recess, and a latch for retaining said enclosing member within said recess.

26. A centrifugal machine comprising a casing having an overhanging bracket provided with a recess, a bowl mounted in said casing, a driving member for said bowl passing through said bracket and arranged within said recess, an enclosing member for said driving member, said enclosing member being slidable into and out of said recess, and co-acting means on said bracket and enclosing member for retaining said enclosing member within said casing.

In testimony whereof, we have signed our names to this specification.

LEO D. JONES.
ARTHUR U. AYRES.

Certificate of Correction.

Patent No. 1,625,613.

Granted April 19, 1927. to

LEO D. JONES ET AL.

It is hereby certified that error appears in the printed specification of the above-numbered patent requiring correction as follows: Page 4, line 82, claim 7, for the word "and" read *said*; 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 10th day of May, A. D. 1927.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.