No. 879,255. PATENTED FEB. 18, 1908.

H. M. GOODMAN.

CENTRIFUGAL SEPARATING MACHINE.

APPLICATION FILED JUNE 14, 1907.

2 SHEETS—SHEET 1.

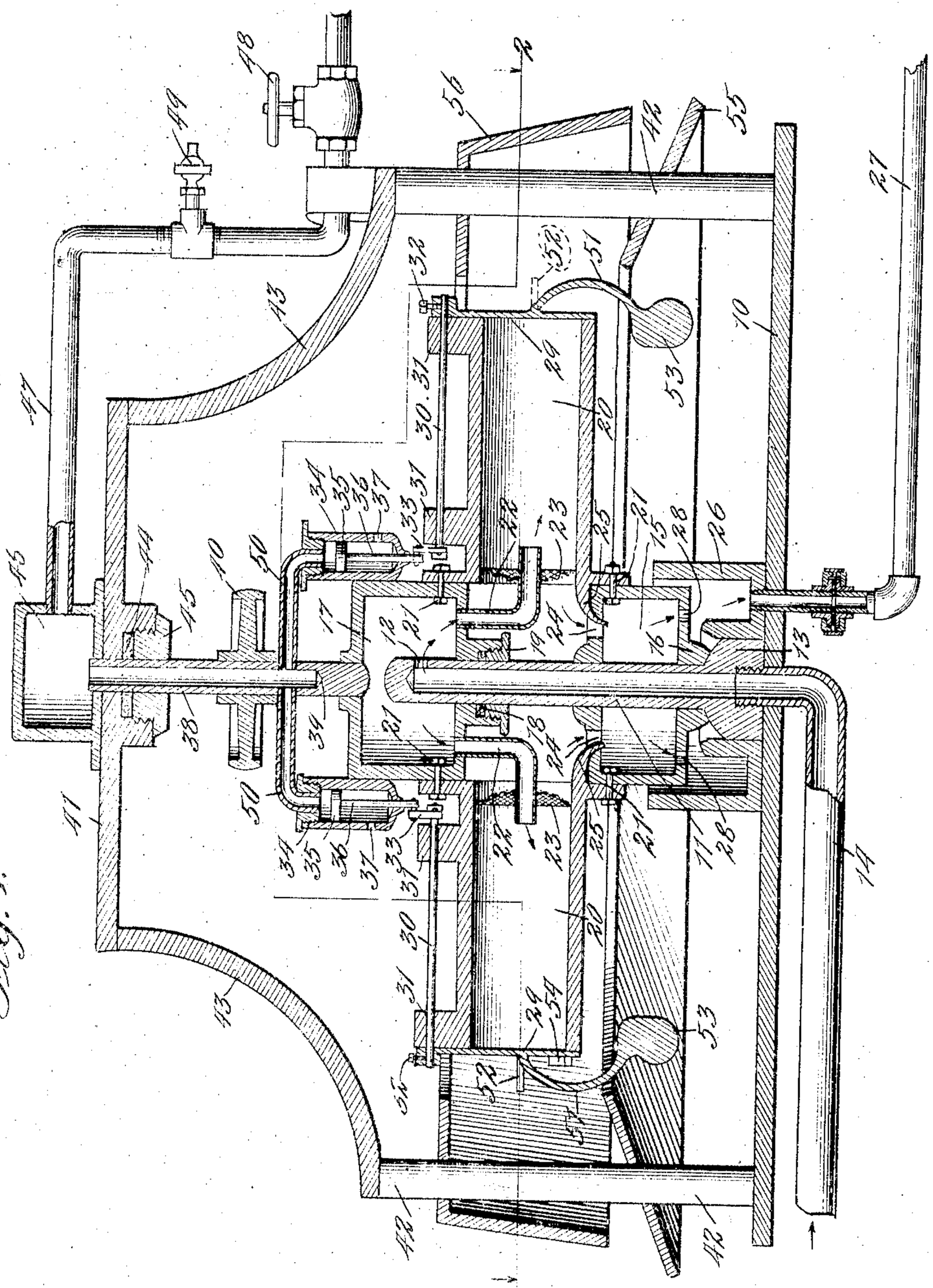

Fig. 1.

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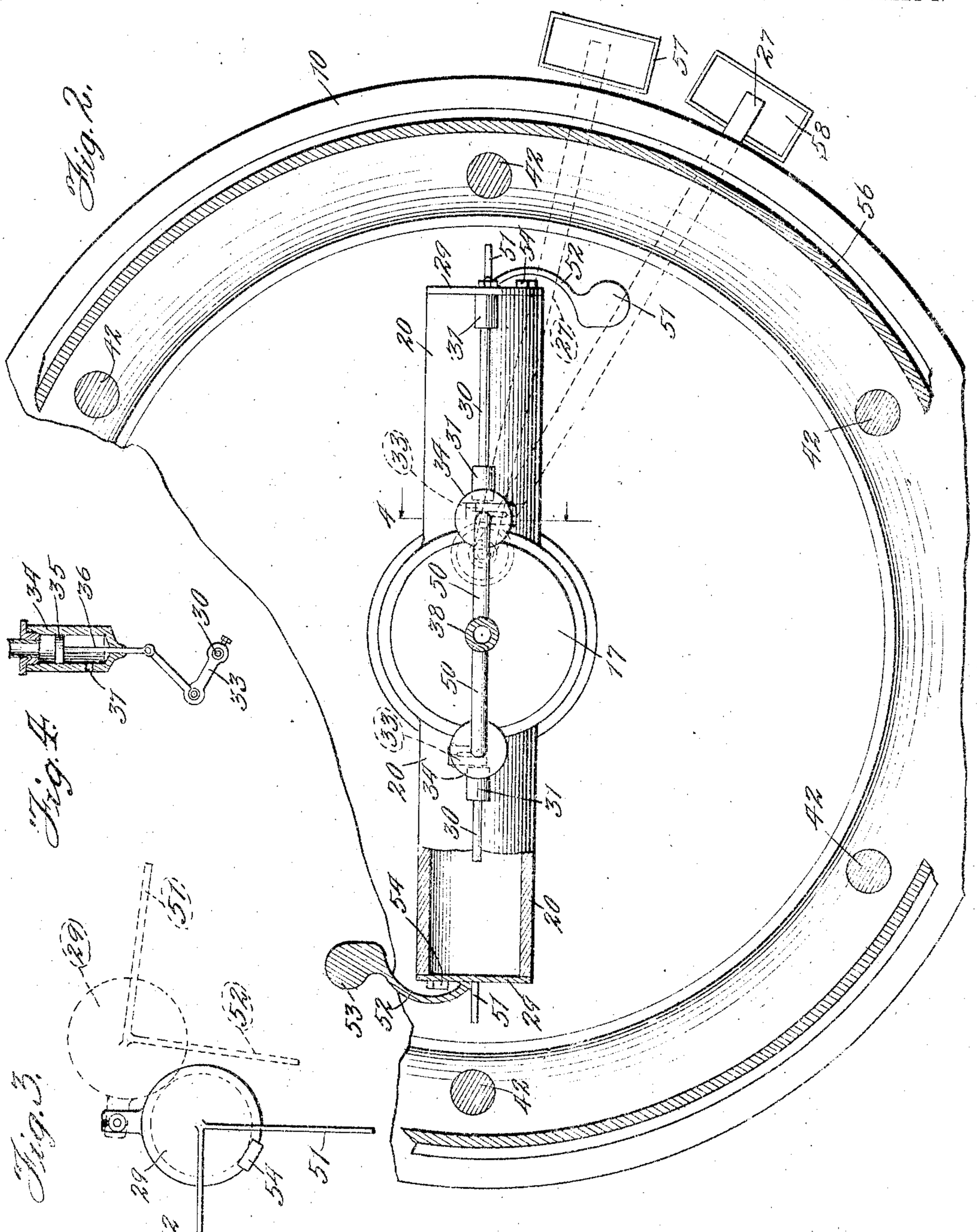

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UNITED STATES PATENT OFFICE.

HENRY M. GOODMAN, OF LOUISVILLE, KENTUCKY.

CENTRIFUGAL SEPARATING-MACHINE.

No. 879,255. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed June 14, 1907. Serial No. 378,939.

To all whom it may concern:

Be it known that I, HENRY M. GOODMAN, a citizen of the United States, residing at Louisville, in the county of Jefferson, in the State of Kentucky, have invented certain new and useful Improvements in Centrifugal Separating-Machines, of which the following is a specification.

This invention relates to improvements in centrifugal separating machines for instance, machines adapted to separate crystallized sugar from syrup; the separation of coagulated proteids from the excess of water in which they are contained; also the separation of sand and silicous matter from large amounts of water, etc., and the primary object of the invention is to provide improved means for delivering the material to be separated into the machine, and improved means for permitting the escape of the liquid from which the material has been separated.

A further object is to provide improved means for discharging the material from the machine without interrupting the motion thereof.

A further object is to provide an improved discharge gate or valve for closing the separator cylinder and which is adapted to be closed and held closed by the action of the air on a portion of the gate or valve during the motion of the machine.

A further object is to provide improved fluid controlled mechanism for actuating the gate or valve to permit the discharge of the material.

A further object is to provide an improved support for receiving the discharged material and an improved shield for directing the material onto the support when it leaves the cylinder.

A further object is to provide an improved machine of this character which will be simple, durable and cheap in construction, and effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects, as will appear, the invention consists in the features of novelty in the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings, illustrating an exemplification of the invention, and in which—

Figure 1 is a longitudinal sectional view of an improved machine of this character constructed in accordance with the principles of this invention. Fig. 2 is a horizontal sectional view on line 2—2 of Fig. 1. Fig. 3 is a detail elevation of the gate or valve for closing the end of the cylinder and showing the same in dotted lines in an open position. Fig. 4 is a detail sectional view of the operating means for the gate or valve.

Referring more particularly to the drawings and in this exemplification of the invention, the numeral 10 designates a suitable supporting base, to which is secured a vertical tubular member or pipe 11, which is closed at its upper end and is provided with an aperture 12 extending through the side thereof adjacent the closed end. The base of this member or pipe 11 is preferably enlarged as at 13 and passing through the supporting base 10 is a supply pipe 14, which is secured to the member or pipe 11 in such a manner as to communicate with the opening therein.

Surrounding the tubular member or pipe 11 preferably adjacent the base thereof is a closed chamber 15, the bottom of which is preferably provided with an enlarged portion 16 adapted to rest upon the enlargement 13 of the pipe or member 11, and surrounding the upper extremity of the pipe or member 11 is a closed chamber 17. This chamber is spaced from the chamber 15 and is so located with relation to the top of the pipe or member 11 that the aperture 12 therein will be located within the chamber 17. A suitable packing 18 surrounds the pipe or member 11 and is held in position by a suitable bushing 19 to form a liquid tight joint.

Secured to the chambers 15 and 17 are cylinders 20 preferably two in number, which are arranged diametrically opposite each other and communicate with the space formed between the chambers 15 and 17. These cylinders 20 may be held in position in any desired or suitable manner, preferably by means of screws or bolts 21, which pass through suitable flanged portions on the cylinders 20 and through the walls of the respective chambers 15 and 17.

The chamber 17 is provided with apertures or openings in the bottom thereof and leading from said apertures or openings are pipes or tubular members 22 which extend into the space between the chambers 15 and 17 and the free ends are preferably bent at a right angle to extend into the respective cylinders 20 so as to discharge preferably at the dia-

metric centers thereof and terminate just beyond the adjacent ends of the cylinders.

Located within the cylinders 20 and secured to the walls thereof are shields 23 which surround the end of the tubular members 22 and said shields are preferably constructed of any suitable reticulated material, such as wire gauze or the like.

The top of the chamber 15 is provided with suitable apertures or openings 24 located adjacent each of the cylinders 20 and said cylinders are provided with a projecting lip or portion 25, which extend into the apertures or openings 24 so as to direct the liquid from the cylinder 20 into the chamber 15. Surrounding the enlarged portion 13 of the tubular member or pipe 11 and preferably supported by the base 10 is a chamber or catch basin 26, leading from the bottom of which is a discharge or outlet pipe 27. The chamber 15 is provided with apertures 28 in the bottom thereof which communicate with the chamber or catch basin 26. The cylinders 20 are preferably arranged horizontally and the free extremities thereof are open. Any suitable means may be provided for closing the open ends of the cylinders. A suitable and efficient means for accomplishing this purpose comprises a gate or valve 29, which is pivotally supported by one extremity of a suitable shaft or axle 30, which latter is journaled in suitable bearings 31 on the cylinder 20. Any suitable means may be provided for securing the gate or valve 29 to the extremity of the shaft or axle 30, such as a screw or bolt 32 or the like. The other end of the shaft or axle is provided with a crank arm 33, which is preferably located adjacent the chamber 17. Supported in any desired or suitable manner adjacent the crank arms 33 are cylinders 34 arranged within which are suitable piston heads 35 connected to piston rods 36, which extend through the cylinders 34 and are connected to the respective crank arms 33. Each of the cylinders 34 are provided with exhaust openings 37 to permit the piston heads to move downwardly within the cylinders and when said piston heads are so moved, the piston rods 36 will move the crank arms 33 to rock the shaft or axles 30 and move the gates or valves 29 about their points of pivotal support to open the free ends of the cylinders 2.

Secured to the top of the cylinder 17 is a hollow shaft 38 which is preferably closed at one end as at 39 and secured to said shaft is a belt or pulley wheel 40. The upper end of the shaft is journaled in a suitable bearing in a suitable plate or member 41, which is supported and held in position by means of spaced standards 42, which are secured to the base 10 and surround the cylinders 20 and chambers 15 and 17 and arms 43, which rise from the tops of the supports or standards 42 and upon which the plate or member 41 rests. A suitable packing 44 surrounds the shaft 38 and a bushing 45 is provided for holding the packing 44 in place to form a fluid tight joint. The upper end of the tubular shaft 38 extends into and communicates with a suitable fluid chest 46, to which is connected a suitable supply pipe 47 provided with a throttle 48 and an exhaust valve 49.

Leading from and communicating with the tubular shaft 38 are pipes or tubular members 50, which communicate with the cylinders 34 preferably through the tops thereof, so that when the throttle 48 is opened to permit the fluid to pass into the chest 46 through the pipe 47, it will pass through the tubular shaft 38 and pipes 50 into the cylinders 34 and move the pistons 35 downwardly to rock the shafts 30 and open the gates or valves 29. Each of the gates or valves 29 is provided with projecting arms 51, 52, preferably arranged at right angles to each other, as shown more clearly in Fig. 3 of the drawings. These arms are each provided with an enlarged free extremity 53 for a purpose to be set forth. Secured to each of the cylinders 20 is a lip or projection 54 which is preferably arranged to one side of the center thereof and serves to hold the valves or gates 29 in a closed position.

Arranged between the uprights or standards 42 and preferably below the free ends of the cylinders 20 is an inclined shelf or support 55 and arranged above said shelf and preferably spaced therefrom and surrounding the uprights or standards 42 is a shield 56 and against which the material will be discharged when the gates or valves 29 are open, so that the material will be directed upon the supporting shelf 55.

Assuming the parts to be in the position as shown in Fig. 1, the operation will be as follows: The material to be separated is fed into the chamber 17 through the pipe 14 in any desired or suitable manner, preferably by means of a pump (not shown). When this pump is operated, the material will be forced into the chamber 17 through the pipe 14, tubular member or pipe 11, and through the opening 12. From the chamber 17 the material, together with the liquid, will pass through the tubular members or pipes 22 and be discharged into the cylinders 20. Motion being imparted to the shaft 38 through the medium of the pulley wheel 40, the chambers 15 and 17, together with the cylinders 20, will be rotated about the tubular member or pipe 11, the enlarged portion 16 of the chamber 15 resting upon the enlargement 13 for a bearing. The rapid rotation of the cylinders 20 will cause the material which is discharged therein through the tubular members or pipes 22 to be thrown

by centrifugal force outwardly towards the free end thereof or against the gates or valves 29. The liquid which enters the cylinders 20 with the material will flow towards the pipe or member 11 and pass through the shields or guards 23 into the chamber 15 through the apertures 24 and from the chamber 15 through the apertures 28 into the receptacle or trap 26 from where it is conducted by means of the discharge pipe 27 to a suitable receptacle 57. The material will also be held in the cylinders 20 by means of the guards or shields 23. This operation will be continued until the cylinders 20 are substantially filled with the material or until the liquid, which is discharged through the free end of the pipe 27 into the receptacle 57, becomes thick, from which the operator will know that the cylinders are substantially full. The free ends of the pipe 27 may be then moved to another receptacle 58, as shown in Fig. 2 of the drawings, and from the receptacle 58 it may be led to any desired point of discharge, such as, for instance, the tank or vat from which the feeding pump receives its supply.

When the discharge liquid becomes thick, the operator then stops the feed pump and will permit the cylinders to be rotated until the flow of liquid ceases. After the liquid ceases to flow the operator then opens the throttle 48, which permits the fluid to enter the chamber 46 through the pipe 47 and from the chamber it will pass through the tubular shaft 38 and pipes 50 into the cylinders 34 to move the pistons 35 and rock the shafts 30 to open the gates or valves 29. When the gates or valves 29 are thus opened and held in their open position by the pressure of the fluid acting upon the piston heads 35, the material in the cylinders will be thrown out by centrifugal force against the shield 56, which latter will deflect the same onto the shelf or support 55 from which it may be collected into any desired receptacle.

After the cylinders 20 have been emptied of the separated material, the exhaust valve 49 may be opened to permit the escape of the fluid which has entered the cylinders 34. As the fluid escapes through the exhaust valve 49, the valves or gates 29 will be closed by the action of the air against the enlarged portions 53 of the arms 51, 52, in the following manner. When the valve or gates are held open they will assume the position shown in dotted lines in Fig. 3 of the drawings so that the enlargement 53 of the arm 52 will be presented to the air as the machine revolves. The resistance formed by the air will cause the gate or valve to be moved about its point of pivotal support until the enlargement 53 on the arm 51 is presented to the air, as shown in full lines in Fig. 3 of the drawings. When the arm 51 is in the position shown in full lines in Fig. 3, the edge of the gate or valve will engage the projecting lip or stop 54 and hold the gate or valve 29 against further movement. The action of the air upon the enlargement 53 of the arm 51 will hold the gates or valves closed during the rotation of the machine and until the fluid is forced into the cylinders 34 to operate the pistons 35 and move the valves or gates 29 against the resistance of the air. While there is shown and described in this exemplification only two cylinders for separating the material, it is obvious that any number of cylinders may be provided and it will also be understood that the chambers 15 and 17 instead of being constructed independently of each other and secured to the cylinders 20, they may be constructed integrally.

In order that the invention might be fully understood by those skilled in the art, the details of the foregoing embodiment thereof have been thus specifically described, but

What I claim—

1. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material into the chamber at the open end thereof, means for permitting the liquid to escape, means for moving the closure to permit the separated material to be discharged by centrifugal force, and means for automatically returning the closure to its normal position to close the chamber and for holding the closure in said position.

2. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material into the chamber at the open end thereof, means for permitting the liquid to escape, and fluid controlled means supported by the chamber for moving the closure to permit the separated material to be discharged by centrifugal force.

3. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material into the chamber at the open end thereof, means for permitting the liquid to escape, fluid controlled means supported by the chamber for moving the closure to permit the separated material to be discharged by centrifugal force, and means for automatically returning the closures to close the chamber.

4. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material into the chamber at the open end thereof, means for permitting the liquid to escape, means for moving the closure to permit the material to be discharged, and means operatively related to the closure and influenced by the resistance of the atmosphere for automatically returning the closure to close the chamber.

5. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material into the chamber at the open end thereof, means for permitting the liquid to escape, means for moving the closure to permit the material to be discharged, means operatively related to the closure and influenced by the resistance of the atmosphere for automatically returning the closure to close the chamber, and a stop for limiting the return movement of the closure.

6. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material to the chamber at the open end thereof, means for permitting the escape of the liquid, and means for moving the closure to permit the material to be discharged, said closure being provided with a projecting portion having an enlarged surface exposed to the air, and against which surface the air forms a resistance to move the closure to close the cylinder when the chamber is rotated.

7. A centrifugal separating machine including a rotatable open chamber, a closure for one end of the chamber, means for feeding the material to the chamber at the open end thereof, means for permitting the escape of the liquid, means for moving the closure to permit the material to be discharged, said closure being provided with a projecting portion having an enlarged surface exposed to the air, against which surface the air forms a resistance to move the closure to close the cylinder when the chamber is rotated, and a stop for limiting the last said movement of the closure, said closure being held against the stop by the resistance of the air.

8. A centrifugal separating machine including a rotatable open chamber, a closure for one end thereof, means for feeding the material to the chamber at the open end thereof, means adjacent the open end for preventing the escape of the material and for permitting the escape of the liquid, fluid controlled means for operating the closure to permit the material to be discharged, and separate means for automatically returning the closure to its normal position to close the chamber.

9. A centrifugal separating machine including a rotatable chamber, a closure for one end thereof, means for feeding the material to the chamber at the open end, a reticulated guard adjacent the open end of the chamber to prevent the escape of the material and to permit the escape of the liquid, fluid controlled means for operating the closure to permit the material to be discharged through the other end, and separate means for automatically returning the closure to its normal position to close the chamber.

10. A centrifugal separating machine including a rotatable chamber, a closure for one end thereof, means for feeding the material into the open end thereof, fluid controlled means for moving the closure to permit the material to be discharged from the chamber by centrifugal force, a guard against which the material is discharged, a shelf for receiving the discharged material, and means for automatically returning the closure to close the chamber.

11. In a centrifugal separating machine, the combination of a rotatable separating chamber open at both ends, a receiving chamber rotatable with the separating chamber, means for supplying the material to be separated to the receiving chamber, means for delivering the material from the receiving chamber to the separating chamber at one end thereof, a closure for the other end of the separating chamber, a liquid chamber also rotatable with the separating chamber and having communication therewith for receiving the liquid from the separating chamber, said liquid chamber having a discharge, means for moving the closure to permit the material to be discharged and separate means for returning the closure to close the said separating chamber.

12. In a centrifugal separating machine, the combination of a rotatable separating chamber open at both ends, a receiving chamber rotatable with the separating chamber, means for supplying the material to be separated to the receiving chamber, means for delivering the material from the receiving chamber to the separating chamber at one end thereof, a closure for the other end of the separating chamber, a liquid chamber also rotatable with the separating chamber and having communication therewith for receiving the liquid from the separating chamber, said liquid chamber having a discharge, fluid controlled means for moving the closure to permit the material to be discharged by centrifugal force from the separating chamber, and means operatively related to the closure and influenced by the atmospheric resistance caused by the rotation of the separating chamber for automatically returning the closure to close the chamber.

13. In a centrifugal separating machine, the combination of spaced horizontally disposed cylinders arranged end to end, spaced chambers arranged between the adjacent ends of cylinders, a supply pipe leading into one of the chambers, said chamber being provided with a discharge outlet leading into each of the cylinders, the other chamber being provided with inlet openings having communication with the chambers and a discharge outlet, said chamber being adapted to receive the liquid from the chambers, means for rotating the cylinders and cham-

bers to separate the material, and means for discharging the separated material from the cylinders by centrifugal force.

14. In a centrifugal separating machine, the combination of spaced horizontally disposed open cylinders, arranged end to end, spaced chambers arranged between the adjacent ends of cylinders, a supply pipe leading into one of the chambers, said chamber being provided with a discharge outlet leading into each of the cylinders, the other chamber being provided with inlet openings having communication with the chambers, and a discharge outlet, said chamber being adapted to receive the liquid from the chambers, means for rotating the cylinders and chambers to separate the material, gates for closing the other ends of the cylinders, means for operating the gates to permit the separated material to be discharged by centrifugal force and means for automatically returning the gates to close the cylinders.

15. In a centrifugal separator, the combination of spaced horizontally disposed open cylinders arranged end to end, spaced chambers arranged between the adjacent ends of cylinders, a supply pipe leading into one of the chambers, said chamber being provided with a discharge outlet leading into each of the cylinders, the other chamber being provided with inlet openings having communication with the chambers, and a discharge outlet, said chamber being adapted to receive the liquid from the chambers, means for rotating the cylinders and chambers to separate the material, gates for closing the other ends of the cylinders, fluid controlled means rotatable with the cylinders for operating the gates to permit the separated material to be discharged from the cylinders by centrifugal force, and separate means for returning the gates to close the cylinders.

16. In a centrifugal separator, the combination of spaced horizontally disposed open cylinders arranged end to end, spaced chambers located between the adjacent ends of the cylinders, a supply pipe projecting through one of the chambers and discharging into the other chamber and about which the cylinders and chambers are adapted to rotate as an axis, one of the chambers being provided with outlets discharging into the cylinders, the other chamber being provided with inlets having communication with and adapted to receive the liquid from the cylinders, said chamber being also provided with a discharge outlet, a closure for closing the free ends of the cylinders, and means for moving the closure to permit the separated material to be discharged from the cylinders by centrifugal force.

17. In a centrifugal separator, the combination of spaced horizontally disposed open cylinders arranged end to end, spaced chambers located between the adjacent ends of the cylinders, a supply pipe projecting through one of the chambers and discharging into the other chamber and about which the cylinders and chambers are adapted to rotate as an axis, one of the chambers being provided with outlets discharging into the cylinders, the other chamber being provided with inlets having communication with and adapted to receive the liquid from the cylinders, said chamber being also provided with a discharge outlet, a closure for closing the free ends of the cylinders, means influenced by the resistance of the air created by the motion of the machine for holding the closures in an operative position, and means for moving the closure to permit the separated material to be discharged from the cylinders by centrifugal force.

18. In a centrifugal separator, the combination of spaced horizontally disposed open cylinders arranged end to end, spaced chambers located between the adjacent ends of the cylinders, a supply pipe projecting through one of the chambers and discharging into the other chamber and about which the cylinders and chambers are adapted to rotate as an axis, one of the chambers being provided with outlets discharging into the cylinders, the other chamber being provided with inlets having communication with and adapted to receive the liquid from the cylinders, said chamber being also provided with a discharge outlet, a closure for closing the free ends of the cylinders, means for moving the closure to permit the separated material to be discharged from the cylinders by centrifugal force, and a guard for preventing the escape of the material from the other end of the cylinders.

19. In a centrifugal separator, the combination of spaced horizontally disposed open cylinders arranged end to end, spaced chambers located between the adjacent ends of the cylinders, a supply pipe projecting through one of the chambers and discharging into the other chamber and about which the cylinders and chambers are adapted to rotate as an axis, said pipe being provided with a bearing for supporting the chambers and cylinders, one of the chambers discharging into the cylinders and the other chamber being adapted to receive the liquid from the cylinders, a gate for closing the free ends of the cylinders, fluid controlled means rotatable with the cylinders and chambers for moving the gates to discharge the separated material, and separate means for automatically returning the gates to close the cylinders.

20. In a centrifugal separating machine, the combination of horizontal open cylinders arranged end to end and spaced from each other, a plurality of chambers disposed between and having communication with the cylinders, a tubular member passing through one of the chambers and discharging into

the other chamber, said member serving as an axis about which the cylinders and chambers rotate, gates for closing the free ends of the cylinders, fluid controlled means supported by and rotatable with the cylinders for opening the gates to permit the separated material to be discharged from the cylinders, said means comprising a rock shaft operatively related to the gates, a cylinder, a piston movable within the cylinder to rock the shaft, and means for supplying fluid to the cylinder.

21. In a centrifugal separating machine, the combination of horizontal open cylinders arranged end to end and spaced from each other, a plurality of chambers disposed between and having communication with the cylinders, a tubular member passing through one of the chambers and discharging into the other chamber, said member serving as an axis about which the cylinders and chambers rotate, gates for closing the free ends of the cylinders, fluid controlled means supported by and rotatable with the cylinders for opening the gates to permit the separated material to be discharged from the cylinders, said means comprising a rock shaft operatively related to the gates, a cylinder, a piston movable within the cylinder to rock the shaft, means for supplying fluid to the cylinder, means for exhausting the fluid from the cylinder, and separate means for closing the gates.

22. In a centrifugal separating machine, the combination of horizontal open cylinders arranged end to end and spaced from each other, a plurality of chambers disposed between and having communication with the cylinders, a tubular member passing through one of the chambers and discharging into the other chamber, said member serving as an axis about which the cylinders and chambers rotate, gates for closing the free ends of the cylinders, fluid controlled means supported by and rotatable with the cylinders for opening the gates to permit the separated material to be discharged from the cylinders, said means comprising a rock shaft operatively related to the gates, a cylinder, a piston movable within the cylinder to rock the shaft, means for supplying fluid to the cylinder, means for exhausting the fluid from the cylinder, and means operatively related to the gates and actuated by the resistance of the air when the machine is in motion to automatically close the gates.

23. In a centrifugal separator, the combination of horizontal cylinders arranged end to end and spaced from each other, spaced chambers disposed between the adjacent ends of the cylinder, a tubular member passing through one of the chambers and discharging into the other chamber, and about which the chambers and cylinders rotate as an axis, tubular members leading from one of the chambers and discharging into the cylinders at the diametric center thereof and adjacent one end, the other chamber being provided with an opening communicating with each of the cylinders and a discharge outlet, a gate for closing the end of each of the cylinders, a shaft connected to one of the chambers, a bearing for the shaft remote from the chamber, a rock shaft supported by the cylinders and connected to the gates, a cylinder rotatable with the first said cylinders, a piston in the last said cylinder, a connection between the piston and the rock shaft for rocking the latter when the piston is moved, said shaft being provided with a passage having a source of fluid supply, and a tubular connection between the passage and the last said cylinder whereby the fluid will enter said cylinder to move the piston.

24. In a centrifugal separator, the combination of horizontal cylinders arranged end to end and spaced from each other, spaced chambers disposed between the adjacent ends of the cylinders, a tubular member passing through one of the chambers and discharging into the other chamber, and about which the chambers and cylinders rotate as an axis, tubular members leading from one of the chambers and discharging into the cylinders at the diametric center thereof and adjacent one end, the other chamber being provided with an opening communicating with each of the cylinders and a discharge outlet, a gate for closing the end of each of the cylinders, a shaft connected to one of the chambers, a bearing for the shaft remote from the chamber, a rock shaft supported by the cylinders and connected to the gates, a cylinder rotatable with the first said cylinders, a piston in the last said cylinder, a connection between the piston and the rock shaft for rocking the latter when the piston is moved, said shaft being provided with a passage having a source of fluid supply, a tubular connection between the passage and the last said cylinder whereby the fluid will enter said cylinder to move the piston, and means operatively related to the shaft for rotating the cylinders and chambers.

25. In a centrifugal separator, the combination of horizontal cylinders arranged end to end and spaced from each other, spaced chambers disposed between the adjacent ends of the cylinders, a tubular member passing through one of the chambers and discharging into the other chamber, and about which the chambers and cylinders rotate as an axis, tubular members leading from one of the chambers and discharging into the cylinders at the diametric center thereof and adjacent one end, the other chamber being provided with an opening communicating with each of the cylinders and a discharge outlet, a gate for closing the end of each of the cylinders, a shaft connected to one of the chambers, a bearing for the shaft remote from the chamber, a rock shaft supported by the cyl-

inders and connected to the gates, a cylinder rotatable with the first said cylinders, a piston in the last said cylinder, a connection between the piston and the rock shaft for rocking the latter when the piston is moved, said shaft being provided with a passage having a source of fluid supply, a tubular connection between the passage and the last said cylinder whereby the fluid will enter said cylinder to move the piston, and means operatively related to the gate by means of which the resistance of the air will automatically close the gates as the machine is revolved.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 11 day of June A. D. 1907.

HENRY M. GOODMAN.

Witnesses:
E. G. VAN METER,
M. J. DEMAREE.