

D. B. WESTON & M. H. BARKER.

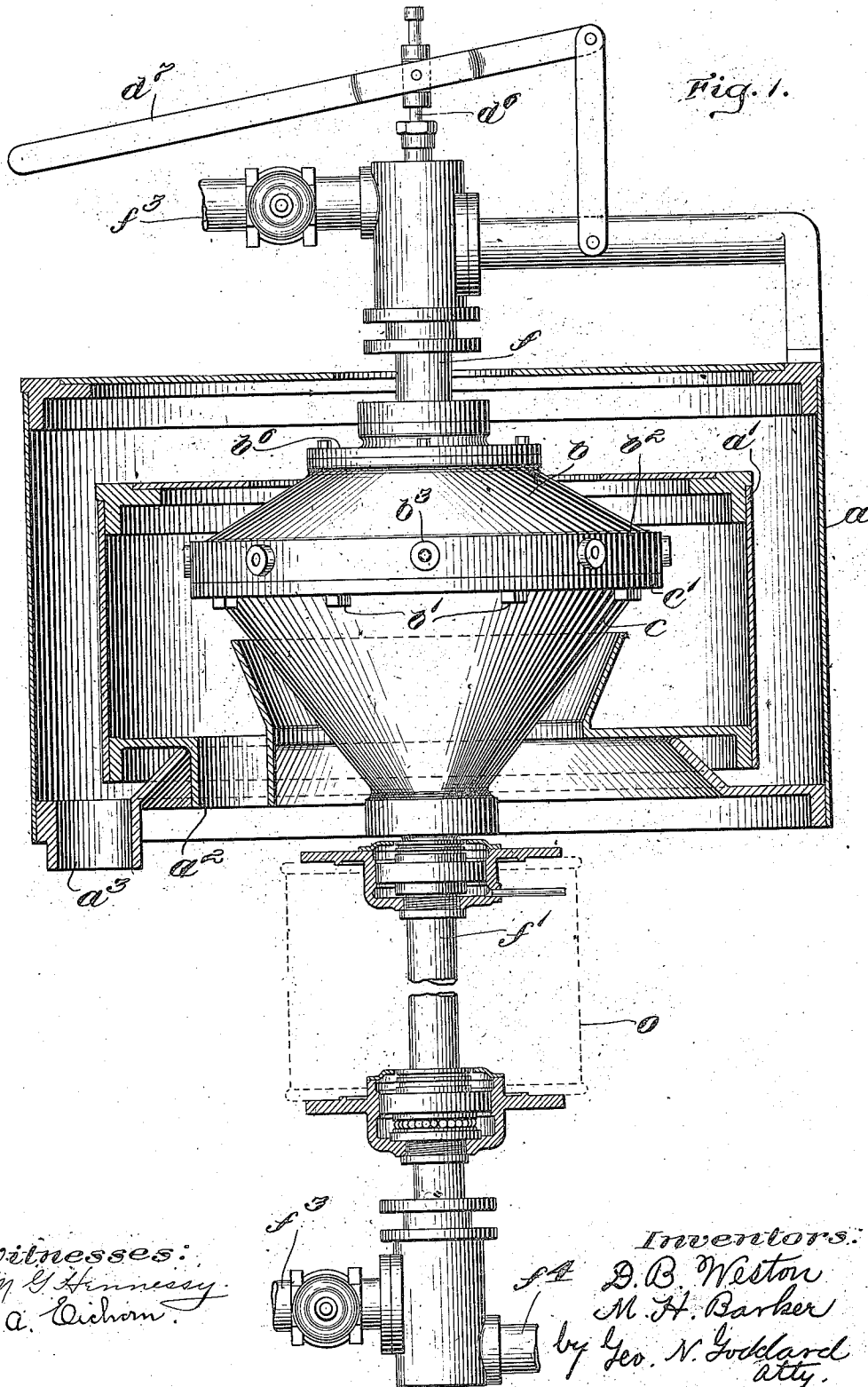
CENTRIFUGAL SEPARATOR.

APPLICATION FILED MAY 9, 1911.

Patented Mar. 23, 1915

2 SHEETS—SHEET 1.

1,132,814.



witnesses:
M. G. Hennessy.
J. A. Eichorn.

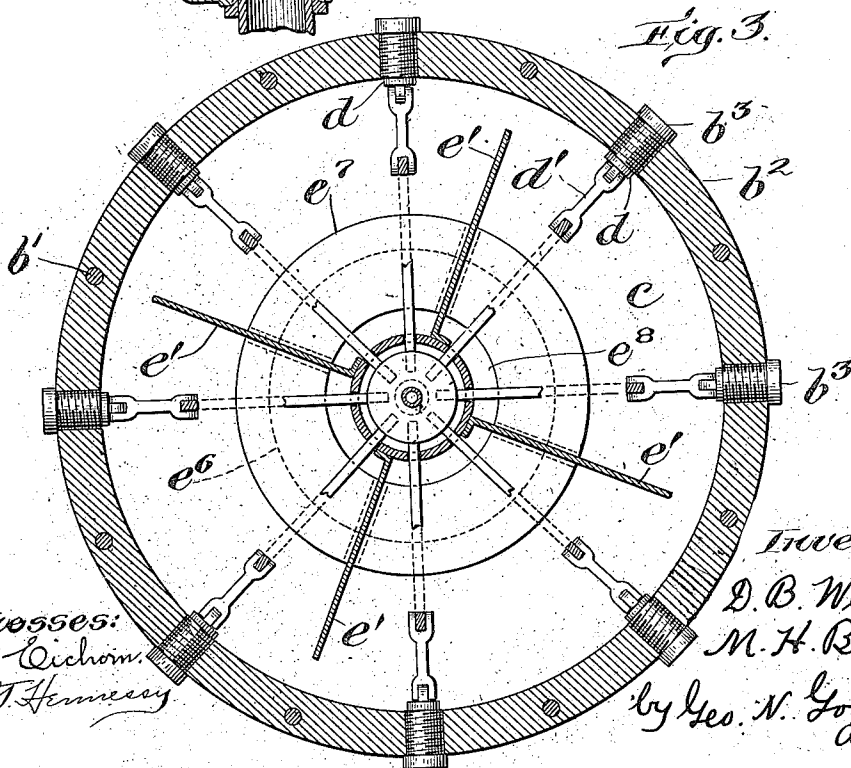
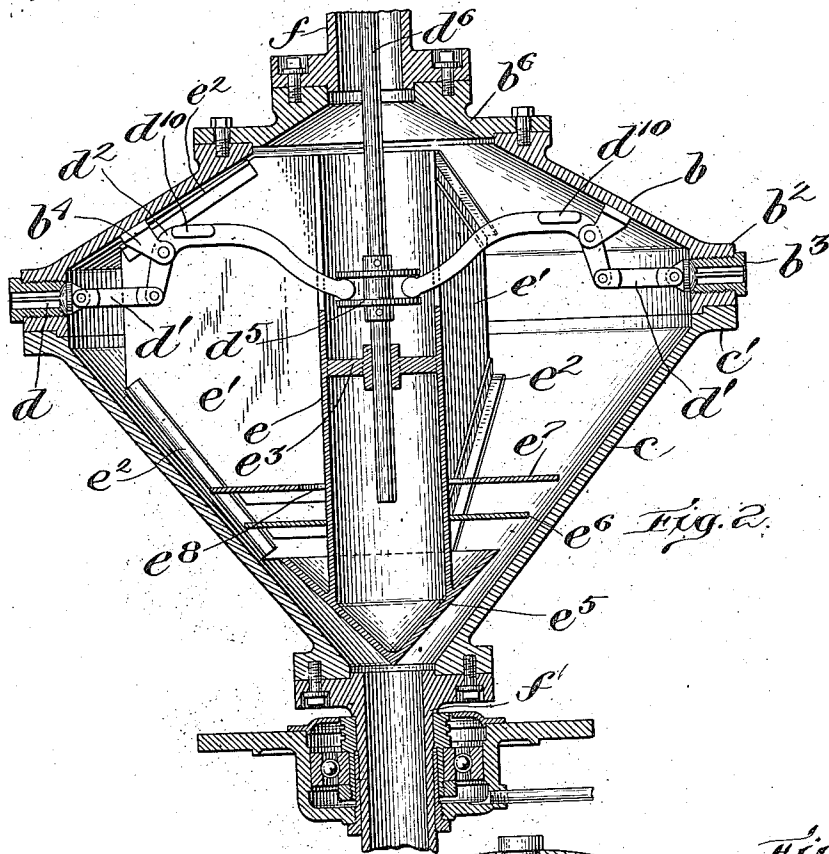
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UNITED STATES PATENT OFFICE.

DAVID B. WESTON, OF SHARON, AND MELVILLE H. BARKER, OF BOSTON, MASSACHUSETTS.

CENTRIFUGAL SEPARATOR.

1,132,814.

Specification of Letters Patent.

Patented Mar. 23, 1915.

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To all whom it may concern:

Be it known that we, DAVID B. WESTON and MELVILLE H. BARKER, citizens of the United States, and residents, respectively, of Sharon, Massachusetts, and Boston, Massachusetts, have invented certain new and useful Improvements in Centrifugal Separators, of which the following is a specification.

10 This invention relates to centrifugal separators used for the separation of solids from liquids and is employed in the manufacture of starch as well as for other purposes.

15 The object of the invention is to produce a simple and efficient mechanism by which the separation of the solid contents from the liquid introduced into the machine may be expeditiously and continuously accomplished and to afford a construction whereby the 20 extraction may take place under a pressure corresponding to a much higher temperature than a boiling point.

It is also the purpose to afford a construction of receptacle which shall afford complete access to the interior and shall admit 25 of quick and convenient replacement of parts.

In the accompanying drawings we have illustrated the preferred form of embodying 30 the principles of this invention.

Figure 1 is a side elevation of a complete machine the surrounding casing being shown in central section. Fig. 2 is a detail central section showing the construction of the receptacle and of the valve mechanism. Fig. 35 3 is a horizontal section or plan view of the receptacle on a sectional plane immediately above the valve ports.

In the practice of our invention according to the form illustrated in the drawings, we employ a stationary casing preferably consisting of two concentric chambers a and a' one within the other and having separate offtakes a^2 , a^3 . Inside the casing 45 is rotatably supported the centrifugal receptacle by which the separation of the solid from the liquid introduced therein is effected. This rotary receptacle comprises an upper member b and a lower member c both 50 of which are frusto conical in shape and are joined together at their larger ends so as to form a receptacle in the shape of a double cone outwardly flared from the ends toward the middle and detachably joined together by means of bolts b' at a point where

their peripheral flanges b^2 , c' meet. One member, preferably the upper member has a depending flange b^2 of sufficient depth to permit the formation therein of a series of radial outlets or holes in which are preferably secured a series of detachable bushings or ports b^3 . These bushings or ports are made detachable in this instance by forming peripheral screw threads thereon, which are screwed into the radial holes in the flange b^2 . At their inner ends these bushings are finished to form valve seats for the radial inwardly opening valves d .

In order to control the valves at will, each valve is provided with a link d' connected 70 to one end of an angle lever or arm d^2 which is fulcrumed in a supporting bracket b , b^4 secured to the inside of the receptacle. These valves are opened by raising the inner ends of the levers d^2 , and are closed by depressing the inner ends of said levers. 75 This to and fro movement of the valve levers is accomplished by means of a flange collar or spool d^5 secured to a vertical slide rod d^6 , which passes up through the hollow shaft 80 and is at its upper end secured to an actuating lever d' , by which the movement and adjustment of all the radial valves is controlled.

The receptacle is provided with a central 85 cylindrical member e , which is supported by a radial partition or vanes e' resting on the lower member and extending upward into engagement with the upper member. Each vane or partition e' is held in position 90 by angle iron ribs e^2 secured to the inside of the receptacle. The central tube e is provided with a spider e^3 which forms a guide for the lower end of the vertical slide rod of the valve actuating mechanism. The lower 95 end of the central tube is provided with a conical deflector e^5 , which serves to spread or deflect outwardly the inflowing liquid which enters through the hollow shaft below. There may be also used a series of horizontal deflecting plates e^6 , e^7 , the lower deflecting plate e^6 may be imperforated and so located that its periphery is separated 100 by a narrow annular space from the opposing portion of the receptacle. The upper deflector e^7 extends substantially nearer to the adjacent wall of the receptacle to make a relatively narrow passage, and is provided with perforations or openings e^8 adjacent to the central tube, so that the tend- 110

ency will be for the solid or heavier constituents to pass beyond the outside of this deflector, while the lighter liquid constituents pass through the openings nearer the center. At top and bottom the receptacle is 5 secured to the upper section f and the lower section f' of a hollow shaft. To the lower section f' of the shaft may be secured a direct connected motor o or any suitable means for driving the shaft. The shaft is 10 hollow so as to admit through the inlet pipes f^3 , f^4 the liquid to be subjected to treatment, and also a supply of steam if desired. The upper section f of the central 15 shaft is also hollow and forms the outlet for the receptacle leading to the offtake pipe f^5 .

The upper section b of the receptacle is shown provided with a removable cap b^6 20 whose lower portion is detachably bolted to the main body portion b , and whose upper portion is bolted to the upper shaft f . All joints throughout are made steam tight so as to permit the use of high pressure 25 superheated steam, since many substances admit of more easy separation of their solid constituents when heated above the boiling point. By using the removable cap b^6 , it is possible to operate the machine 30 with the top open, so as to allow the lighter liquid content to flow through the opening and discharge into the outer casing, while the solid content is discharged into the inner casing through the valve ports. The 35 use of the radial vanes or partitions serve to impart a rotary motion to the liquid content more quickly after their introduction into the receptacle, but it will be noticed that these partitions terminate a short dis- 40 tance from the peripheral wall carrying the valves, so that there may be communication from one compartment to the other, such communication is also afforded above and below the inner ends of said partitions. 45 The liquid to be separated is introduced through the pipe f^3 under pressure and flows upward through the hollow shaft until it impinges upon the deflector e^5 , by which it is deflected toward the outside of 50 the receptacle. As the fluid passes upward the heavier constituents under the action of centrifugal force tend to flow outwardly as far as possible, while the lighter liquid portion assumes the interior position. As the 55 receptacle becomes nearly full the liquid portion flows out through the upper end and discharges through the outlet pipe f , when the top of the receptacle is closed or into the outer casing a when the top cap is removed. 60 After the operation of separation has effectively commenced, the lever d' may then be raised to allow the discharge of the more solid constituents, which have assumed the position adjacent to said valves. In order 65 to neutralize the action of centrifugal force

on the valves we prefer to provide each valve lever with a counter-balancing weight d^{10} , so as to make it more easy to operate the valve mechanism.

By forming the valve ports entirely in the 70 upper member, by which the valve mechanism is also secured, it becomes possible to lift off the upper member of the receptacle to get access to the interior, without disturbing the valves. Moreover, as the ports 75 are easily unscrewed or detached from this upper receptacle, it becomes possible to easily remove them for the purpose of keeping them clean, of grinding the valve seat or of making any repairs or renewals. 80

What we claim is:

1. A centrifugal separator embracing in its construction a pressure-tight separator chamber whose conical walls are flared out- 85 wardly to the plane of its greatest diameter, said chamber being provided with a series of valved discharge ports located in its periphery, upper and lower hollow shaft sections secured to the opposite ends of the chamber to rotatably support the same and 90 to allow the inflow and outflow of liquid during the rotation of the receptacle about its vertical axis, substantially as described.

2. A centrifugal separator embracing in its construction upper and lower conical 95 members outwardly flared from their opposite ends to their point of union, a series of valved ports located wholly within one member, and valve actuating mechanism supported by the same member in which the 100 ports are located, hollow shaft sections secured to the small end of each member to form respectively inlet and outlet passages for the flow of liquid, substantially as de- 105 scribed.

3. In a centrifugal separator the combination of the chamber comprising upper and lower members of frusto conical shape detachably secured together at their larger 110 ends and being pressure tight, a hollow rotary supporting shaft secured to the small end of one of said members, a similar hollow shaft secured to the opposite end of the other section, a series of peripheral ports, inwardly opening valves, levers for actuat- 115 ing said valves said levers being weighted to counterbalance the tendency of said valves to remain closed, substantially as described.

4. In a centrifugal separator the combination of a closed receptacle comprising oppositely flared conical members secured together in the plane of their greatest diameters one of said members being provided 120 with a series of peripheral openings, a series of removable bushings secured in said openings to form ports, valves mounted in said ports to open inwardly, valve actuating mechanism supported by the member con- 125 taining the ports, hollow shaft sections se- 130

cured to the upper and lower members at their small diameters to rotatably support said receptacle and permit the inflow and outflow of liquid, substantially as described.

5 5. A centrifugal separator comprising a receptacle whose upper and lower walls are inclined respectively upward and downward toward the axis of the receptacle said receptacle being provided with a series of
10 peripheral valved ports, upper and lower hollow shaft sections detachably secured to the opposite ends of said receptacle to rotatably support said receptacle and to afford
15 conduits for the inflow and outflow of liquids, a valve controlling rod passing through one of said hollow shaft members, and means external to said hollow shaft for actuating said valve controlling rod, substantially as described.

20 6. A centrifugal separator embracing in its construction the rotary receptacle flared outwardly from its opposite ends to an intermediate point and provided with valved ports at its greatest diameter, a hollow inlet
25 shaft secured to one end of said receptacle, a deflector arranged within said receptacle opposite to said shaft to deflect the inflowing liquid outwardly, a cooperating hollow shaft section secured to the opposite end of
30 said receptacle to provide an offtake for the liquid, substantially as described.

7. A centrifugal separator embracing a pressure tight chamber whose upper and lower walls are inclined inwardly from the
35 intermediate plane of its greatest diameter, a series of peripheral valves for controlling the discharge of solid matter, upper and lower hollow shaft sections secured to the opposite ends of said receptacle to rotatably
40 support the same, valve controlling mechanism disposed inside of said receptacle, and a valve controlling rod extending through one shaft section to permit the control of the valves while maintaining pressure in the receptacle, substantially as described.

8. A centrifugal machine embracing in its construction a rotary receptacle provided with lateral valved ports for the escape of solid matter, a hollow rotary shaft by which
45 said receptacle is supported and rotated said hollow shaft forming an inlet for the introduction into the receptacle of the liquid to be separated, said receptacle being provided at the end opposite said shaft with an outlet port for the escape of the liquid contents, substantially as described.

9. A centrifugal separator embracing in its construction, a pressure-tight separator chamber comprising two opposed frusto
50 conical members united at their larger diameters, each being provided at its apex end with a port to accommodate the flow of liquid through the chamber, a series of substantially radial partitions terminating
55 some distance short of the periphery of the chamber at its largest diameter to permit communication between the radial compartments of the chamber around the outside of the partitions, substantially as described.

In witness whereof, we have subscribed the above specification.

DAVID B. WESTON.

MELVILLE H. BARKER.

Witnesses to signature of David B. Weston:

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ARTHUR F. RANDALL,

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