

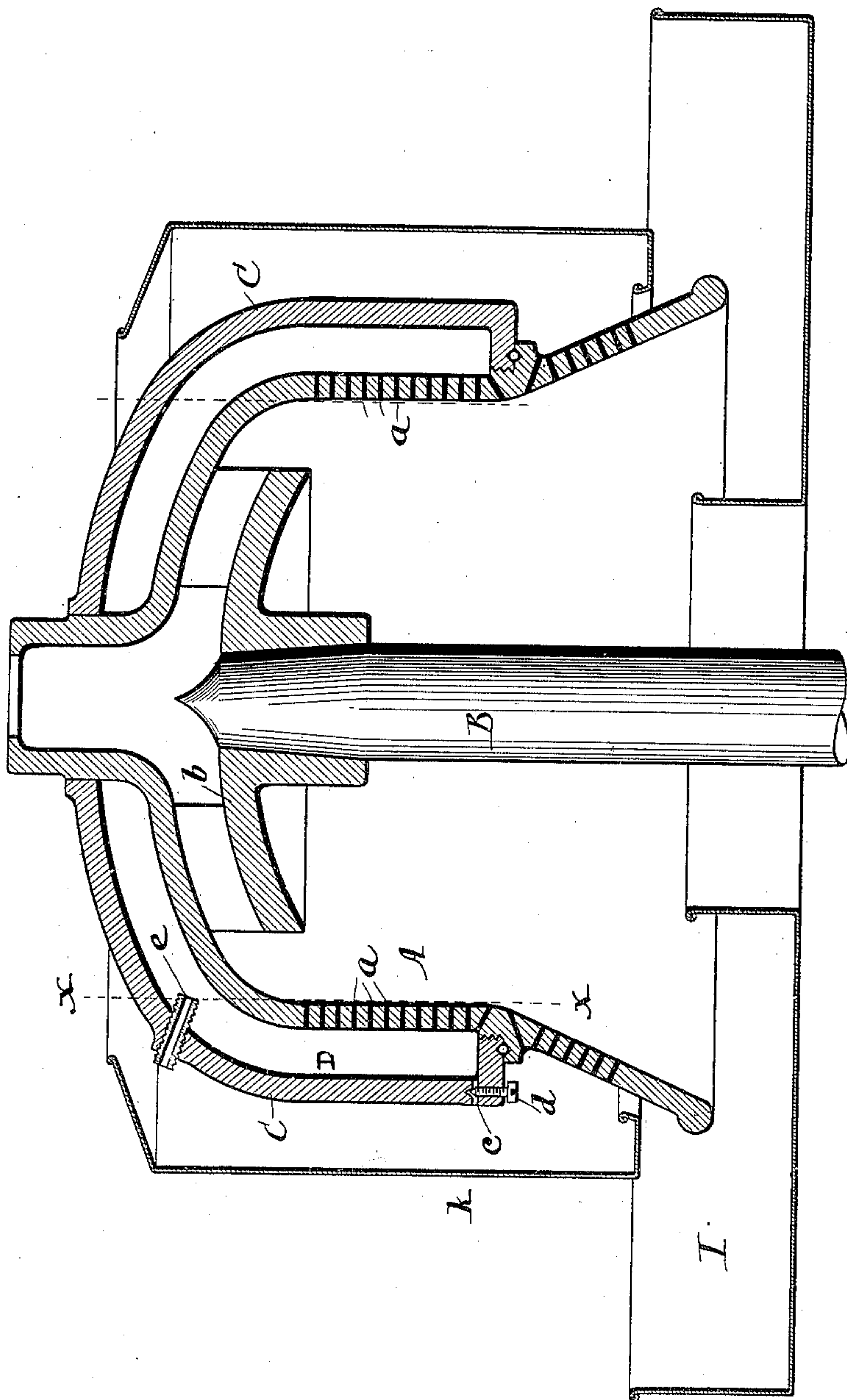
No. 652,657.

Patented June 26, 1900.

E. W. BEACH.
CENTRIFUGAL SEPARATOR.

(Application filed Sept. 3, 1897. Renewed Nov. 6, 1899.)

(No Model.)



Witnesses:

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CENTRIFUGAL SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 652,657, dated June 26, 1900.

Application filed September 3, 1897. Renewed November 6, 1899. Serial No. 736,061. (No model.)

To all whom it may concern:

Be it known that I, EDWARD W. BEACH, a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Centrifugal Separators, of which I do declare the following to be a full, clear, and exact description, sufficient to enable others skilled in the art to make and use the same.

10 The invention is directed to the centrifugal treatment of mixed solids and liquids—such as distillery-slops, paper-pulp, cotton-seed, and oil, &c.—and designs to effect a continuous discharge of the isolated constituents in keeping with the regulated inflow of the blended material to the bowl.

15 The nature of the invention will appear from the description following, which sets forth in detail the structure of one form of apparatus employed to practice the improvement and will be more distinctly defined by claims at the close of the description.

The drawing exhibits the bowl and its adjuncts in longitudinal central section.

25 The body A of the bowl is here shown of general bell-like form and has rows of holes *a* at the vertical and in the flaring dependent skirt of the bowl-wall. The elongated neck of the vessel is open above to admit the inflowing mixture, which falls upon the crown-plate *b* and is deflected thence toward the periphery. Plate *b* is the intermediary, serving to attach and sustain bowl A from the driving-shaft B, by which shaft the bowl is rotated. The shaft may be mounted in neck-and-step bearings, according to familiar practice, and through the medium of a pulley on the shaft and a belt leading thence can be driven from any convenient source of power.

40 Inclosing the main portion of the bowl is a shell C, fitted about the bowl-neck above and threaded at its inturned end beneath to engage with the outer face of the bowl-wall. A water-tight packing serves to close the joint.

45 At one or more points through the shell-periphery most remote from the axis are a port *c* for the escape of liquid and a choke-screw *d* to obstruct or wholly close the orifice. At a point radially nearer the axis still another vent or vents occur, as at *e*, which may conveniently be in form of a tubule threaded to

a hole in shell C and projected inwardly more or less, as the operator may desire.

When the blended material to be treated is fed into the apparatus, the solid particles 55 of the mixture will generally be detained and will accumulate as a layer at the bowl-wall, while the liquid portions under centrifugal influence will force a passage through the layer and escape into the chamber D, established between the bowl and the inclosing shell C. Ordinarily the effect is to drain and dry the detained solids more or less thoroughly, as in the familiar centrifugal cages common to sugar-refineries, bleacheries, 65 starch-factories, &c. In consequence the solid components adhere stoutly to the bowl-wall and the more persistently by so much as the treatment is prolonged. To eject the separated solids in keeping with the escape 70 of the liquid portions, and thus to prevent an accumulation of the isolated materials, would admit of a persistent infeed of the fresh mixture and necessarily establish a continuous course of treatment, the separated components emerging from the apparatus simultaneously with the inflow of additional supplies. Various devices to effect this have been heretofore proposed, the chief object being to remove the compacting solids continuously at 80 the bowl-wall by aid of scrapers or the like, which served to dislodge and discharge the excess accumulations. No regard was paid to the liquids after their escape through the perforated bowl as a means for contributing 85 to the removal of the detained solids. The present invention corrects this oversight and utilizes the buoying and antifriction qualities of the separated liquids to accomplish centrifugally the persistent discharge of the solid 90 constituents.

On reference to the drawing it is seen that the port *c* of shell C has a definite efflux at any given rate of speed. If the port be closed more or less, the volume of liquid escaping 95 thence may easily be much less than the total volume emerging into chamber D from the bowl. The accumulated liquid will rise radially inward until it establishes a new outlet through tubule *e*, which in bore and number should suffice to take care of the excess. 100 At tube *e* the point of escape is that part of

the channel or passage nearest the axis, and on adjustment of the threaded tube this point can be radially varied. By projecting tube *e* farther into chamber D the free surface of the liquid is obliged to rise nearer to the axis in seeking the orifice of escape. Since chamber D and the interior of the bowl proper are in free communication through the holes in the bowl-wall, any radial rise of the liquid in the chamber toward the axis will be reflected and will cause a responsive rise of the liquid in the bowl-body. At all points the free surface of the detained liquid assumes a concentric position equidistant from the axis. Dotted line *x x* denotes the position such as may be assumed. In the relation stated it is obvious that the detained liquid presents a cushion-back at the inner surface of the perforate main wall and by so much acts to prevent the adhesion of the solids. The liquid also serves as a lubricant, and thus with every fresh supply of mixed materials projected centrifugally into the bowl the tendency is to dislodge, displace, and discharge past the free rim beneath a corresponding volume of solid ingredient. If the feed be continuous, the discharge will likewise be continuous. The excess of liquid finds constant escape through ports *c e*, which are adjusted in size and number to take care of such excess as the same accumulates for the given speed of the bowl and at definite infeed of the given mixture. By keeping port *c* always open there is a primary tendency for the bowl charge to flow toward such outlet, and this in turn induces in the detained solids a tendency to "creep" gradually along the inner face of the bowl-wall toward the escape rim or skirt. After the solids clear the area over which the cushion-back extends the flare of the bowl outward accelerates their movement and enables the separated stuff to be ejected rapidly into the receiving-pan I. The isolated liquids are projected simultaneously into pan *k*, from whence they can drain away.

Manifestly the details of procedure—as, for example, the radial location of the cushion-back of liquid—can be varied to conform the practice to the peculiarities of the mixture

undergoing treatment. It is equally obvious that the details of structure are likewise open to variation according to the mechanic's skill without material departure from the essentials of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In centrifugal machines for the treatment of mixed solids and liquids, the combination with an operating-bowl having a perforate wall with free rim thereto, of suitable means for detaining in measure the isolated liquid to constitute a cushion-back for the solid, substantially as described.

2. In centrifugal machines for the treatment of mixed solids and liquids, an operating-bowl for the continuous isolation and separate discharge of the ingredients present in blended mixture, said bowl having a perforate main wall with free rim thereto for constant exit of the separated solids, an outer jacket or shell to inclose said wall but leaving an open chamber between them into which the isolated liquids emerge and an escape-port extended from such chamber past the jacket-shell; said port being suitably adjusted to measurably detain the liquid at the chamber and raise its radial level so as to submerge the perforate main wall of the bowl, substantially as described.

3. In centrifugal machines for the treatment of mixed solids and liquids, an operating-bowl for the continuous isolation and separate discharge of the ingredients present in blended mixture, said bowl having a perforate main wall with free rim thereto for constant exit of the separated solids, an outer jacket or shell to inclose said wall but leaving an open chamber between them into which the isolated liquids emerge and an escape-port adjustable in said shell with its inner mouth located at about the radial distance of the perforate main wall from the bowl-axis, substantially as described.

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Witnesses:

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