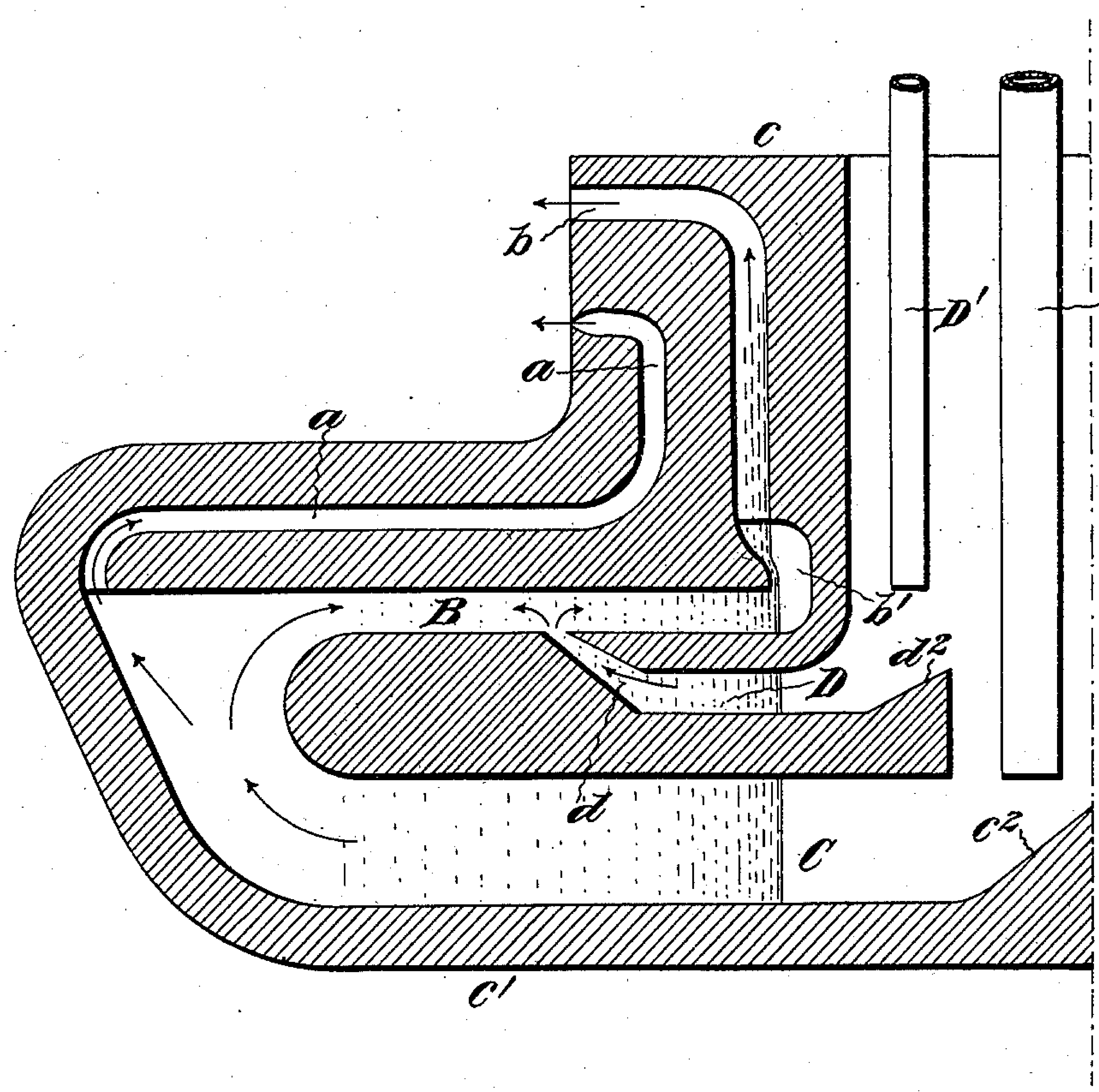
No. 671,573. Patented Apr. 9, 1901.

F. H. A. WIELGOLASKI.

ORE SEPARATOR.

(Application filed Aug. 25, 1899.)

(No Model.)



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FRANS HENRIK AUBERT WIELGOLASKI, OF CHRISTIANIA, NORWAY.

ORE-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 671,573, dated April 9, 1901.

Application filed August 25, 1899. Serial No. 728,494. (No model.)

To all whom it may concern:

Be it known that I, FRANS HENRIK AUBERT WIELGOLASKI, a subject of the King of Sweden and Norway, residing at Majorstuveien 26, in the city of Christiania and Kingdom of Norway, have invented certain new and useful Improvements in Ore-Separators, of which the following is a specification.

My invention has relation to the separation of finely-divided solids held in suspension in liquids.

The difficulties in the mechanical separation of finely-divided solids from the liquid in which they are held in suspension are well known, and these difficulties are apparently due to the fact that the behavior of the finely-divided particles is different from that of particles of measurable dimensions. Experiments made by me with such finely-divided substances held in suspension in water—as, for instance, elutriated substances—have shown the impossibility of effecting the separation of the constituents by centifugal action in machines as generally constructed; and my invention has for its object a method of and apparatus for effecting this separation by centrifugal action.

I have found that when a liquid holding in suspension a finely-divided solid is simply caused to flow by centrifugal action in the direction in which the centrifugal forces are exerted a separation of the finer particles cannot be effected. I have discovered, however, that if a liquid is caused to flow in a direction opposite to that in which the centrifugal forces are exerted and caused to intercept the stream of liquid holding the finely-divided solid in suspension the particles of solid will separate from such liquid and flow in opposition to the intercepting liquid in the direction in which the centrifugal forces are exerted and can thus be effectually and readily separated in a centrifugal machine of proper construction. I have furthermore discovered that if the exhaust or ejection orifice in the periphery of the centrifugal is contracted to substantially a mere slit but little liquid will be ejected from said orifice with the solid particles, and I have furthermore discovered that the separation will be materially expedited by causing the solid particles after flowing through and with a portion of the liquid to flow in the same direction as the intercepting body of liquid, then to rise and flow in the direction in which the centrifugal forces are exerted, and in causing the liquid holding the solid in suspension after flowing in a direction opposite to that in which the centrifugal forces are exerted to flow likewise in an upward direction and then in the direction in which said centrifugal forces are exerted, the solid particles and the liquid from which they are separated, together with the intercepting liquid, being ejected from the centrifugal at different elevations.

In the accompanying drawing I have shown by a vertical section so much of a centrifugal machine constructed to carry out my invention as will suffice for a full understanding thereof.

The body or shell of the centrifugal machine consists of a cylindrical upper portion c and a circular lower portion c' of considerably greater diameter than said upper portion c, the periphery of said lower portion c' being inclined inwardly. In the lower portion c' of the shell is formed a circular chamber C, extending along the bottom from near the axis of the shell to its periphery and thence in an upward direction and gradually widening into trumpet shape in cross-section and communicating with a discharge-passage a and a circular chamber B, respectively, which latter communicates with a vertical discharge-passage b, said passages a and b having their outlets in the periphery of the upper cylindrical portion c of the centrifugal at different elevations, the outlet of passage b being above the outlet of passage a and the outlet for the latter passage being contracted to form in vertical section a nozzle having a comparatively narrow discharge-opening. In said lower portion c' of the centrifugal is formed still another circular chamber D between the chambers C and B and communicating through a gradually-contracted passage d with said chamber B at a point substantially midway of its inner and outer terminals. As shown, the chamber C is of considerably greater vertical sectional area than the chamber D, and the inner vertical wall of the two chambers is extended upwardly above the bottom of said chambers and inclined outwardly, as shown at c^2 d^2, while the circle formed by the inner vertical wall of chamber D is of greater diameter than that formed by the like wall of chamber C, so as to afford room for feeding a liquid to said chamber C and a liquid holding in suspension a finely-divided solid to chamber D through pipes C′ and D′, respectively, whose cross-sectional areas are proportionate to the vertical sectional area of said chambers. It will be observed that the discharge-passage b is of less cross-sectional area than that of the chamber B and that said passage b is eccentric to a passage b', connecting passage b with chamber B.

The vertical sectional areas of chambers B C D, passages a b, outlet of passage a, and feed-pipes C′ D′ will of course have to be varied in accordance with the specific gravity of the material to be separated from a liquid holding the same in suspension in order to insure a sufficiently energetic flow of intercepting liquid through the chamber B and in order to insure a proper rate of discharge of the separated material and the liquids.

In operation the liquid holding the substance in suspension is fed, as above stated, through pipe D′ to chamber D, and another liquid, as water, for instance, is fed through pipe C′ to chamber C, thus establishing antagonizing currents in chamber B, whereby and under the centrifugal action a separation of the heavier particles is effected, which particles move in the direction in which the centrifugal force is exerted to the periphery of the centrifugal and thence in a reversed direction along the passage a, from which they are ejected, and as passage a is very narrow as compared with the outer terminal of chambers B and C, and in view of the contracted outlet of said passage, the flow of the liquid therethrough becomes sluggish as compared with the velocity of motion of the heavier solid particles, so that but a comparatively small proportion of liquid will find its way out of said passage, and the bulk of the liquid and the very light particles of solid, even if of greater specific gravity than water, will be ejected through passage b.

It will be observed that the construction of the chambers and passages is such as to facilitate the flow of liquid therethrough.

The described method and apparatus, as will readily be seen, may be used for many purposes in the arts and manufactures and are also available for the separation from solutions of solids of undissolved parts.

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

1. In a centrifugal machine, means for feeding a washing fluid from the center, a chamber provided with reverse branch passages, a passage conducting liquid into one of said reverse passages in a direction opposite to the flow of the washing fluid therein, and means for feeding material to be separated, substantially as and for the purpose set forth.

2. In a centrifugal machine, a chamber carrying washing fluid, a pair of branching reverted passages at its outer end, a chamber arranged to receive material to be separated, and a passage leading from the latter chamber to one of said reverted passages, substantially as and for the purpose set forth.

3. In a centrifugal machine, a chamber carrying washing fluid, a pair of superposed branching reverted passages at its outer end, a chamber arranged to receive material to be separated, and a passage leading from the latter chamber to the lower reverted passage, substantially as and for the purpose set forth.

4. In a centrifugal machine, a chamber receiving a washing fluid, a pair of superposed branching reverted passages from its outer end, continuous vertical passages from each, discharging radially at different elevations, a chamber arranged to receive material to be separated, a passage leading from the latter chamber to the lower reverted passage and an eccentric chamber formed in said passage, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FRANS HENRIK AUBERT WIELGOLASKI.

Witnesses:
JOH. VAALER,
AUGUST OLSEN.