July 15, 1941. A. BAILLY 2,249,306

CENTRIFUGAL HYDROEXTRACTOR

Filed Jan. 10, 1938

Fig. 1.

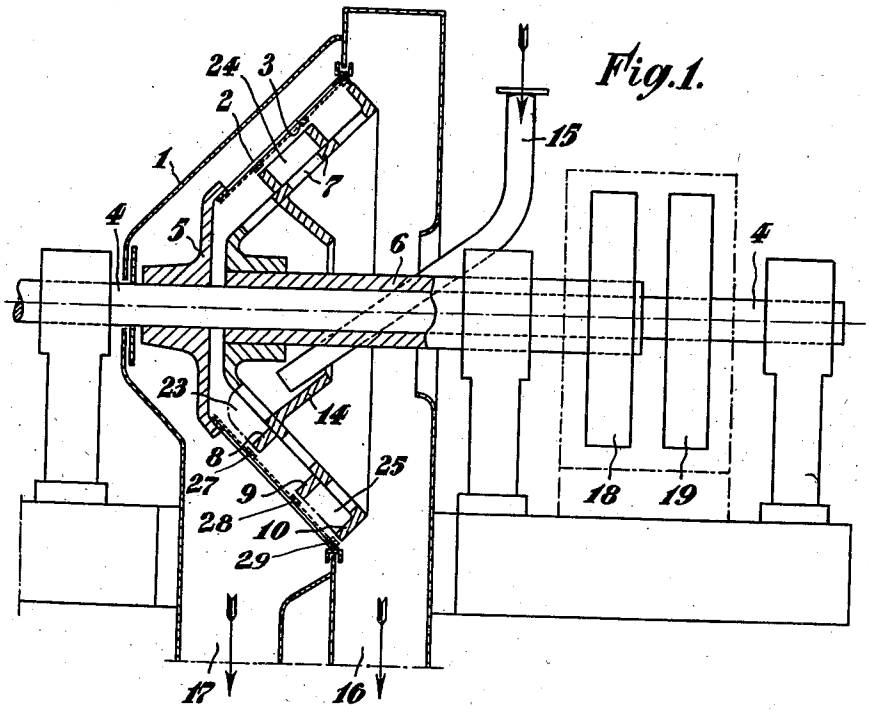
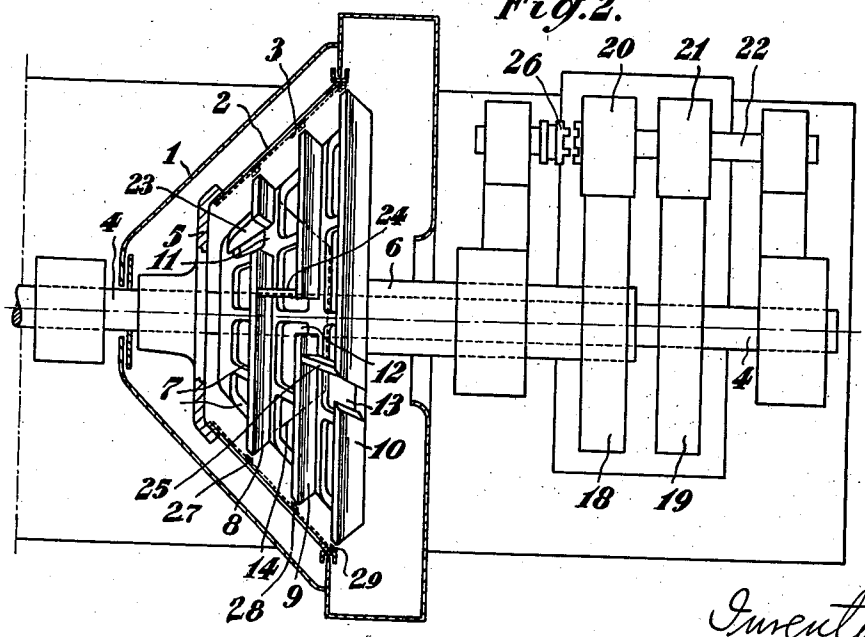


Fig. 2.



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Patented July 15, 1941 2,249,306

UNITED STATES PATENT OFFICE

2,249,306

CENTRIFUGAL HYDROEXTRACTOR

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Application January 10, 1938, Serial No. 184,304
In Belgium February 4, 1937

2 Claims. (Cl. 210—69)

My invention relates to a hydro-extractor comprising substantially a basket of widening out shape associated with a filtering or pervious wall and mounted upon a rotatable shaft, and a rotary drum constituted by a mesh-like carcass and mounted on a separate shaft coaxially with the said basket and within the latter, said drum being provided externally with projections extending up to a point adjacent to the filtering wall upon which the material to be squeezed is caused to travel under the effect of the centrifugal force, which projections oppose the displacement of the material so as to retain the latter in the hydro-extractor as long as may be desired. According to the invention, use is made preferably of annular projections of reduced thickness, disposed at intervals upon the outer surface of the drum, said projections being provided with gaps arranged in angularly shifted relationship to one another, so that the material to be squeezed, which is charged into the hydro-extractor at the narrowest end of the basket, should be able to pass beyond the various projections in succession while travelling along the inner face of the filtering wall under the effect of the centrifugal force.

According further to the invention, the outer edges of all the annular projections lie upon circumferences which are parallel to each other, so that the said projections, when revolving, sweep away over constant annular zones of the filtering wall, and therefore, the said zones may be replaced by impervious or full strips.

When the shafts of the basket and of the drum are driven in the same direction but at different speeds, continued working of the hydro-extractor will be obtained, the material to be treated being admitted in an uninterrupted manner to the narrowest end of the basket, and the squeezed material being discharged in a continued manner at the other end of the apparatus. To enable the hydro-extractor to work in a non-continued way, all that need be done is alternately to drive the basket and the drum at the same speed and at different speeds.

Simply by way of example, certain embodiments of the hydro-extractor according to the invention will be hereinafter described with reference to the accompanying drawing in which—

Fig. 1 is a view, partly in longitudinal section, of a hydro-extractor including a frusto-conical basket and drum, and

Fig. 2 is a plan view, partly in section, of the said hydro-extractor.

In the housing 1 of the hydro-extractor there is arranged a basket 2 associated with a filtering or pervious wall 3 and mounted upon a shaft 4 by means of a flange 5. On a hollow shaft 6 surrounding the shaft 4 there is mounted a mesh-like drum 7 the outer surface of which carries parallel annular or ring members 8, 9, 10 having each formed therein one or more gaps or notches 11, 12, 13. An annular apron member 14 is projecting from the inner face of the drum 7 in alignment with the ring member 8.

The material to be squeezed is supplied through the tube 15 discharging into the space limited by the apron member 14. The material passes through the holes in drum 7 into the portion of smallest diameter of the basket 2. Under the effect of the centrifugal force, part of the liquid squeezed out of the material passes through the wall 3, while the remainder of material and contained liquid tends to travel along the inclined wall 3, but is arrested in its travel by the ring member 8, except at the point where the gap 11 is provided. Inasmuch as the drum 7 and the basket 2 are rotated in the same direction but at different speeds, the gap 11 will appear in succession in all of the points of the annular zone of the basket facing the ring member 8, so that the material to be squeezed is allowed to pass through said gap in a continuous manner. The material will pass in the same manner successively through the gaps 12 and 13 until finally discharged through the conduct 16, while the liquid is collected through the conduct 17.

In order that the material may be retained the required time in the chambers limited by the ring members 8, 9, 10, the gaps 11, 12, 13 are angularly staggered with respect to each other. A plurality of such gaps may be provided in each ring member.

The basket 2 may have any widening out shape. It may be formed of a single conic frustum having a straight generatrix, as in the example illustrated, or it may consist of a plurality of conic frustrums assembled end to end and having differently inclined generatrices, the reason for such arrangement residing in the variation of the physical condition of the material treated, which is very moist when entering the basket and becomes more and more dry in proportion as it travels towards the discharge end. As a substitute for the plurality of conic frustrums, a surface of revolution generated by a curved generatrix may be used.

The design of the drum may comprise various embodiments similar to those disclosed with reference to the basket.

The ring members 8, 9, 10 may be made in

form of surfaces of revolution the directrices of which are circumferences parallel to each other, while the generatrices of the said surfaces are constituted by straight or curved lines which may or may not be parallel to each other.

As will be seen, the projections upon the drum have the function of interfering with the travel of the material effected under the action of the centrifugal force, so as to keep the material in the hydro-extractor for the time desired. While projections of annular shape are most desirable, they may still perform the same function when made in helical form with a small pitch angle, so that the said projections do not push the material but experience a push from the material which tends to travel along the filtering wall.

The inclination of the generatrix of the basket with respect to the axis of rotation of the latter, the number of ring members on the drum, the number and dimensions of the gaps in the ring members, as well as the speed of rotation of the basket and of the drum may be varied in accordance with the type of material to be treated.

The clearance between the outer edge of the rings and the inner surface of the basket may be adjusted, as mainly for the purpose of taking up the wear upon the said edge, by varying the relative position of the drum and the basket in the axial direction, such as by means of any convenient adjustable thrust arrangement, whereby the relative position of the shafts **4** and **6** may be predetermined.

The aforesaid shafts may be driven at different speeds by any convenient means, such as gear wheels **18**, **19** and pinions **20**, **21**, the gear wheel **18** being keyed onto shaft **6**, and gear wheel **19**, onto shaft **4**. The gear wheels **18** and **19** have slightly different tooth numbers. These gear wheels are interconnected through pinions **20** and **21** rigidly mounted on shaft **22** which is driven, for instance, from an electric motor (not shown) adapted to operate the hydro-extractor. Alternately the shafts **4**, **6** may be driven by other gearing, or by belts or chains.

In treating certain particular types of material it may be desirable to apply a non-continued squeezing action. To this effect all that need be done is to provide means whereby the relative rotary motion between the basket and the drum, it is to say between the shafts **4** and **6**, may be shut out, and for this it is only necessary to release one of those parts, for instance the shaft **6**, from its driving means.

Thus, in the embodiment exemplified in the drawing it is only necessary—instead of rigidly securing the toothed wheel **18** and the pinion **20** onto their respective shafts **6**, **22**—to connect either the toothed wheel **18** or the pinion **20** to the corresponding shaft, through the medium of a clutch **26**. Owing to the provision of the clutch, the drum may be released from its drive mechanism when in full operation. After the clutch is thrown out the drum will be driven forth (by reason of the fact that the material to be squeezed contacts the basket **2**, **3**, the drum **7** and the annular projections **8**, **9**, **10** of the latter) together with the basket and at the same speed as the said basket.

If desired, a speed gear shift mechanism may be provided whereby a velocity different from or equal to that of the basket may be imparted to the drum.

Due to the relative movement between the drum and the basket being shut out, the material ceases its travel inside the basket and may thus be subjected to squeezing for any desired lapse of time, the admission of the material into the basket through the tube **15** being cut off for the same period.

When the said period of time is over, the toothed wheel driving the drum is again thrown in, and the drum again takes up its relative movement with respect to the basket and enables the material treated to travel towards the discharge end of the hydro-extractor, while material to be treated is charged afresh through the tube **15**.

The clutch operating means may be so arranged as to effect the opening and the closure of the tube **15** simultaneously with the corresponding actuation of the clutch. The operation may be accomplished under the control of a conveniently adjusted automatically acting electrical device which may comprise, for instance, a clockwork adapted to periodically induce the said functions.

In the case that particles of the material treated stick now and then momentarily to the pervious wall of the basket, which may be effective in inducing unbalance and vibration, it is only necessary to have those particles detached, to thus enable them to continue their travel along the said pervious wall under the action of the centrifugal force. To this end it is simply necessary to provide auxiliary vanes **23**, **24**, **25** extending between every two adjacent annular projections in a direction which is, for instance, substantially at right angles to the latter, the said vanes being preferably arranged in alignment with the "trailing" edges of the gaps **11**, **12**, **13** i. e. those edges which pass in the second place opposite a given point of the basket on account of the relative movement of the drum and the basket.

As shown in the drawing, annular impervious zones, **27**, **28**, and **29** are provided in the pervious wall facing the outer edges of the annular projections **8**, **9**, and **10**. Those impervious zones or full strips reinforce the basket and stop the liquid which would have a tendency to escape along the filtering wall and to mix with the dried product.

What I claim is:

1. A hydro-extractor including a revolving basket supporting a pervious wall of widening out shape, a rotary drum positioned within the basket, coaxially arranged drive shafts for the basket and for the drum, means for admitting the material to be squeezed into the portion of smallest diameter of the basket, means for operating said shafts, annular projections arranged in spaced relation upon the outer surface of the drum for opposing the travel of material along the pervious wall under the action of centrifugal force, said projections having their outer edges extending to the neighborhood of the pervious wall and describing parallel circumferences during the rotation of the projections, angularly staggered gaps in said projections, and annular impervious zones in the pervious wall facing the outer edges of the annular projections.

2. A hydro-extractor including a revolving basket supporting a pervious wall of widening out shape, a rotary drum positioned within the basket, coaxially arranged drive shafts for the basket and for the drum, means for admitting the material to be squeezed into the portion of smallest diameter of the basket, means for operating said shafts, annular projections arranged in spaced relation upon the outer surface of the drum for opposing the travel of material along

the pervious wall under the action of centrifugal force, said projections having their outer edges extending to the neighborhood of the pervious wall and describing parallel circumferences during the rotation of the projections, angularly staggered gaps in said projections, transverse vanes uniting every two adjacent projections and placed adjacent that one edge of the gaps which last passes a definite point in the pervious wall consequent on the different velocities of revolution of the basket and the drum, and annular impervious zones in the pervious wall facing the outer edges of the annular projections.

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