

Feb. 4, 1958

R. SINN

2,822,127

CONTINUOUS CENTRIFUGE

Filed Sept. 30, 1953

2 Sheets-Sheet 1

FIG. 1

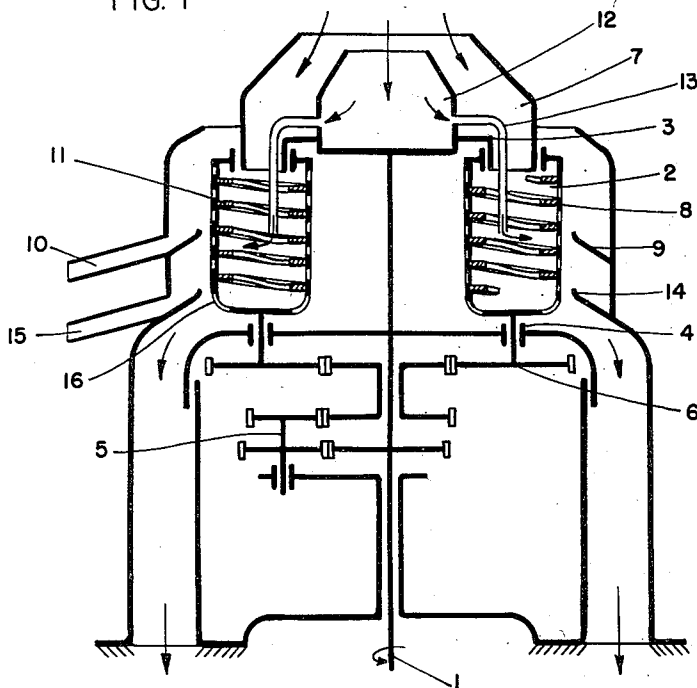
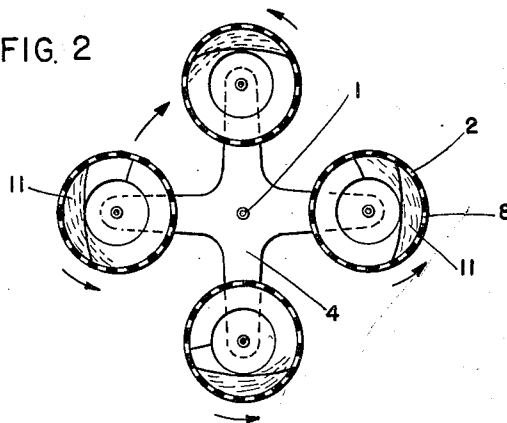


FIG. 2



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2 Sheets-Sheet 2

FIG. 3

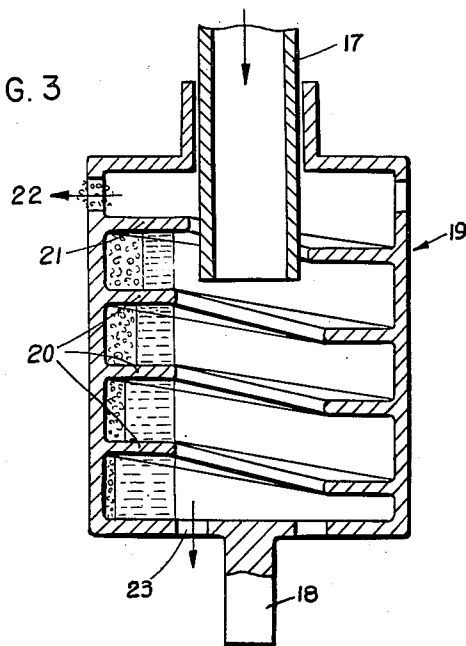
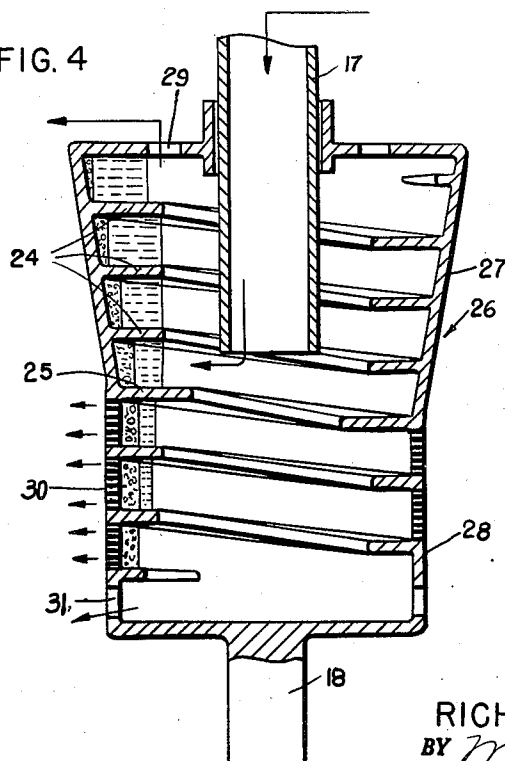


FIG. 4



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2,822,127

CONTINUOUS CENTRIFUGE

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2 Claims. (Cl. 233—2)

This invention relates to a centrifuge of the continuous service type.

Continuous centrifuges have already been proposed in which one or more, for example two, three, four or more drums revolve about a common main axis and are also rotatable about their own axes. The material to be centrifuged which is introduced into these drums is thrown, by reason of centrifugal force, to the surfaces farthest away from the main axis. By the additional relatively slow rotation of the drums about their own axes, the product separated on the shell is moved towards the axis of rotation of the main shaft, so that the direction of the centrifugal force on the separated product, with reference to the shell surface of the drum, changes and after a half rotation of the drum is even reversed. The separated material is thus detached sooner or later from the drum shell and can be intercepted for example by a collecting plate and conveyed out from the drum. Centrifuges constructed in this way have the advantage over other continuously-operating centrifuges with sieve drums that the filter material is protected and that therefore it is possible to use all the filter materials which are commonly used in discontinuous centrifuges. They have the shortcoming, however, that in the embodiments hitherto proposed the centrifuged material had a high final humidity and the conveyance of the centrifuged material through the drums did not take place satisfactorily.

I have now found the said drawbacks do not occur when the individual drums, which may for example be cylindrical or conical, are provided, according to my invention, with an inwardly-open spiral walk. The spiral walk may be integral with the drum or may be an insertion which is pushed into the shell of the drum and secured therein. When the centrifuge is a sieve centrifuge, the said insertion can at the same time be used as a carrier or holder for the filter material, if desired with the interposition of one of the known supporting fabrics. The material to be centrifuged, and if desired a washing liquor separately therefrom, are each introduced into the individual drums through a distributing means rotating therewith, preferably through the bearings of the drums which are made hollow. In the case of a centrifuge provided with sieve drums, the liquor carried by the material to be centrifuged passes outwardly through the sieve, while the solid material remains in the spiral walk and, with suitable choice of the direction of the spiral walk, is caused to move, by reason of the rotation of the drum about its own axis, through the drum to the outlet for the solid material, the solid material having the tendency to remain at or move to the shell surface of the drum farthest away from the main shaft. The residence time of the centrifuged material in the drums and consequently the final humidity can be adjusted at will be appropriate choice of the speed of rotation of the individual drums.

The said rolling away of the centrifuged material in the spiral walk has the advantage, as compared with

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centrifuge constructions where the layer of solid material is not moved, that new surfaces are constantly being provided and brought into contact with the sieve surface.

When equipping centrifuges of the kind having drums with imperforate shells, the pitch of the spiral walk should be such that the direction of the spiral proceeds so that the solid material is moved towards the outlet for the same. On the side of the drum where the inlet for the material to be centrifuged lies, the depth of the thread of the spiral walk is increased so that the introduced liquor to be treated does not flow over towards the outlet for the solid material. The effluent liquor flows over the thread of the spiral walk towards the end of the drum opposite to the inlet, where outlet openings are provided for the liquor. The solid material or sludge is at the bottom of the individual spiral walks and is conveyed, countercurrent to the liquor, towards the outlet openings for the solid material by the individual rotation of the individual drums.

The invention will be further described with reference to the accompanying diagrammatic drawings in which:

Fig. 1 is a sectional elevation of a sieve centrifuge,

Fig. 2 is a horizontal section through the individual drums of the centrifuge of Fig. 1,

Fig. 3 is a sectional elevation of a single drum having an imperforate shell and

Fig. 4 is a sectional elevation of a drum which is constructed at the top as an imperforate drum and at the bottom as a sieve drum.

Referring first to Figs. 1 and 2, four drums 2 are arranged symmetrically about a main shaft 1. They are mounted on stub shafts 3 rigidly secured to the main shaft 1 and in arms 4, and they receive additional individual rotary movement through a gear drive 5 and pinions 6.

The material to be centrifuged is introduced into a distribution device 7 rotating with the main shaft 1 and passes through the hollow stub shafts into the interior of the individual drums. In the drums the material is thrown outwardly, with reference to the main shaft 1.

The liquid fraction of the material to be centrifuged, i. e. the mother liquor, passes out through a sieve shell 8, is collected in a collecting channel 9 and flows off through a pipe 10. Part of the solid material separated in the drums is slowly conveyed inwardly (see Fig. 2) by reason of the additional rotary movement of the same, and then rolls outwardly in the inwardly-open spiral walk 11 and, at the same time, downwardly corresponding to the pitch of the spiral walk. Into a vessel 12 rotating with the main shaft 1 there can be introduced washing liquor which is distributed through pipes 13 to the individual drums. The washing liquor thrown out again from the drums is collected in a collecting channel 14 and removed through a pipe 15. The solid material leaves the drums through openings 16 at the end of the spiral walk.

Figure 3 shows by way of example one drum having an imperforate shell and Figure 4 shows a drum constructed partly as an imperforate drum and partly as a sieve drum. Both of these drums revolve about a main shaft (not shown) which lies to the right of the drums. Moreover the drums also rotate slowly about their own axes and are mounted at the top in hollow stub bearings 17, which serve at the same time for the introduction of the material to be centrifuged, and at the bottom on pegs 18.

In Fig. 3, the drum 19 is provided with spiral walks 20 and 21, the spiral walk 21 having a greater depth of thread than the spiral walk 20. The solid material leaves through openings 22 and the liquor through openings 23.

In Fig. 4, the inwardly open spiral 24 provided in the upper, conically constructed section 27 of the drum 26 has different depths of thread, in particular a considerably

deeper thread 25 which prevents the material to be centrifuged which is introduced into the upper section 27 of the drum from passing into the lower cylindrical section 28. The upper section 27 of the drum 26 acts as an imperforate centrifuge. The specifically heavier sludge separates at the point farthest away from the main shaft (to the left in the drawing), while liquor overflows over the threads 24 in the upper spiral walk and leaves the drum through the openings 29. Any sludge entrained is separated in the upper spiral walk and is conveyed downwardly again in the spiral walk by reason of the slow rotation of the drum itself. It moves with a small part of the liquor into the lower section 28 of the drum 26 which is constructed as a sieve drum, where the liquor is thrown out through a sieve 30 and the solid material leaves the drum through openings 31.

What I claim is:

1. A continuous centrifuge comprising a plurality of drums, means to rotate said drums rapidly about a main axis lying outside the drums, means to revolve each drum slowly about its own axis, each drum including a full-walled section having a liquid outlet at its free end and an adjoining sieve section having a solids outlet at its free end, distributing means associated with

said drums and adapted to rotate about the main axis with the drums and also adapted to provide a feed inlet for each drum within the full-walled section thereof, and a laterally extending spiral track adjacent the inner wall of each said drum and terminating short of the axis of the drum but extending further toward the drum axis where the full-walled section adjoins the sieve section than in the remainder of the full-walled section, said track spiralling longitudinally of the drum so that solids travel thereon from the full-walled section to the sieve section and through the latter to the solids outlet.

2. A continuous centrifuge as defined in claim 1 wherein the full-walled section has a smaller diameter at the end adjoining the sieve section than at the free end where liquid is discharged.

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