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Kirk et al.

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[54] **INERTIA CENTRIFUGE**

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[52] **U.S. Cl.** **233/32**

[51] **Int. Cl.** **B04b 5/04**

[58] **Field of Search** ..... 233/32, 33, 13, 17, 18, 233/23, 27, 28, 46, 47 R

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[57] **ABSTRACT**

The present invention is a centrifuge that converts swirl produced by inertia, of the fluid mixture, into a separating force used in conjunction with centrifugal force for separation of lights from heavies.

1 Claim, 3 Drawing Figures

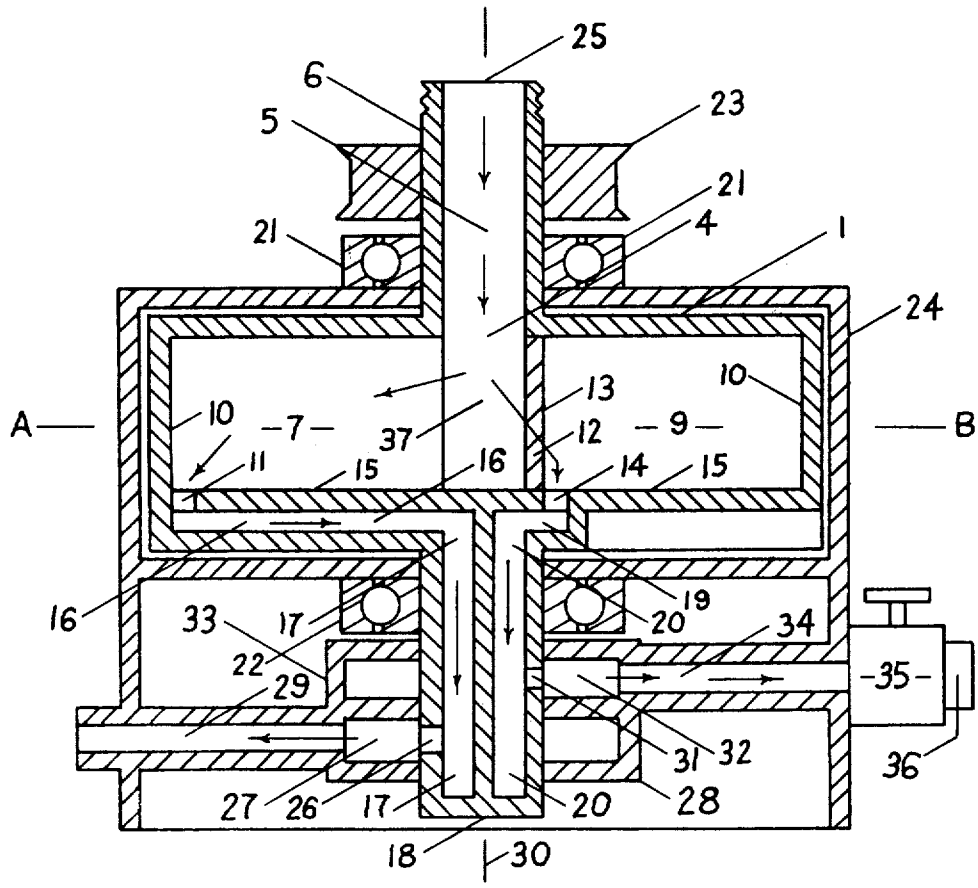


FIG. 1

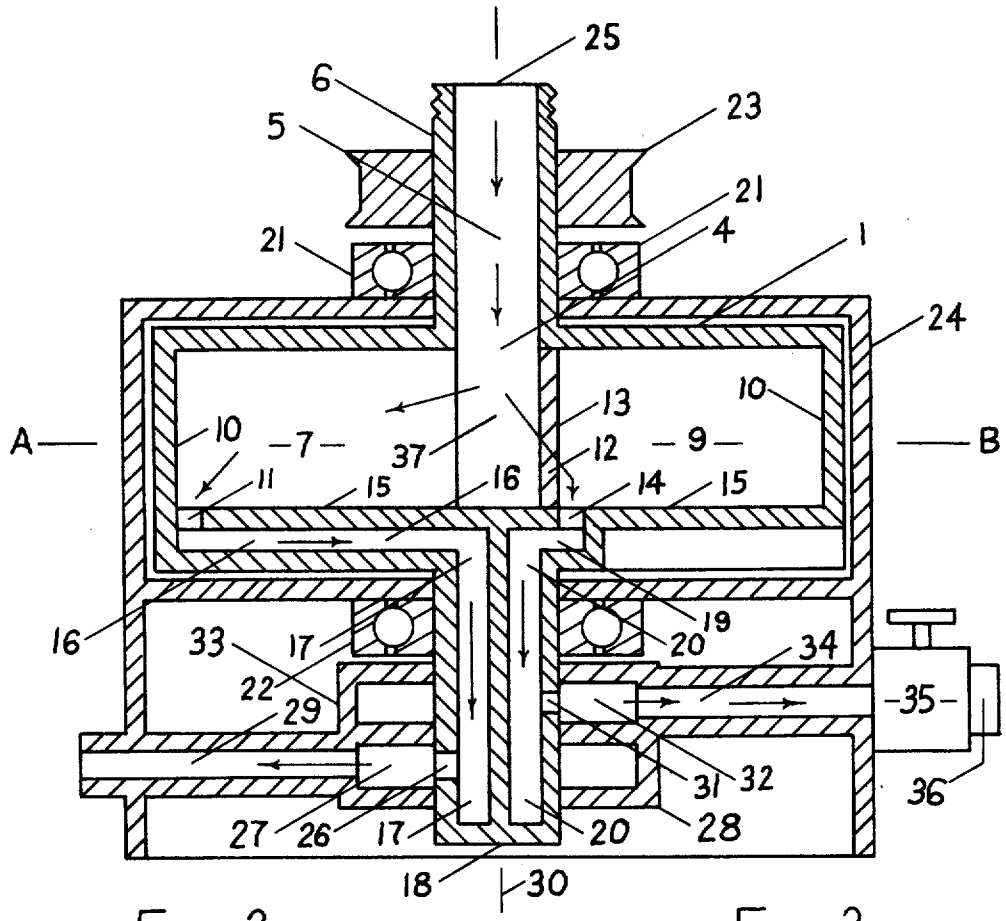


FIG. 2

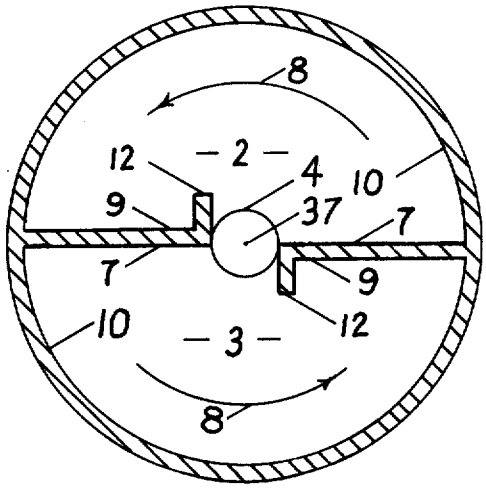
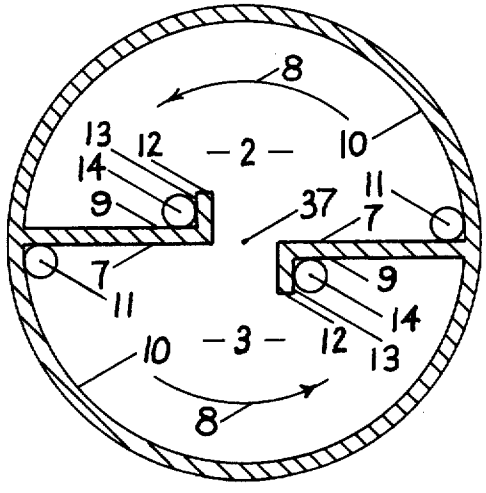


FIG. 3



INERTIA CENTRIFUGE

SUMMARY OF THE INVENTION

The object of this invention is to provide a, non-swirl producing, driving lagging edge of a pocket which compacts heavies against this lagging edge with compaction of heavies against the lagging edge forcing lights around the pocket in the direction of rotation, thereby converting inertia to a separating force.

FIG. 1 is a sectional view taken vertically through a centrifuge embodying the present invention.

FIG. 2 is a cross section of the mixture inlet side of the rotor, 1 of FIG. 1, on plane AB of FIG. 1.

FIG. 3 is a cross section of the separated fractions outlet side of the rotor, 1 of FIG. 1, on plane AB of FiG. 1.

Referring to the drawings and particularly FIGS. 2 and 3, a centrifuge made in accordance with the present invention comprises a cylindrical rotor 1 of FIG. 1 illustrated by FIGS. 2 and 3.

Rotor 1 of FIG. 1 is comprised of a first tubular shaft 6 of FIG. 1, a chamber of pockets 2 and 3 of FIGS. 2 and 3, and a second tubular shaft 18 of FIG. 1.

FIG. 2 is the top half of rotor 1 with respect to FIG. 1 and is a view along line A–B upward toward the rotor top and FIG. 3 is a view along line A–B toward the bottom of the rotor. Port 4 of FIG. 2 illustrates the interior of inlet tube 5 of FIG. 1 which is enclosed by first tubular shaft 6. Area 37 of FIGS. 1, 2, and 3 provides mixture inlet to the pocket lagging edge 7.

FIG. 3 is the bottom half of rotor 1 with respect to FIG. 1. Port 11 of FIG. 3 is the heavies outlet and is located at the circumference end of the lagging edge 7 of pockets 2 and 3. Port 14 of FIG. 3 is the lights outlet and is located at the cylinder center end of the leading edge 9 of pockets 2 and 3. Inlet area 37 is blocked by the cylinder end 15 of FIG. 1 as shown on FIG. 3.

FIGS. 2 and 3 illustrate two pockets, members 2 and 3. These pockets are the improvement of the present invention.

Pressurized mixture comes out of port 4 of FIG. 2 from tube or passage means 5 which is enclosed by first tubular shaft 6 of FIG. 1. Upon entry into the high gravity chamber, either pockets 2 or 3, of FIG. 2, the lagging edge 7 grabs the mixture and spins it without swirl.

Inertia slaps the mixture against the lagging edge 7 and the heavies, meaning heavy specific gravity, compact nearest the lagging edge 7. This compaction forces the lights, meaning light specific gravity, out into the pocket in the direction of rotation, arrows 8 of FIGS. 2 and 3.

The inertia action contiues until the lights reach the leading edge 9 of FIGS. 2 and 3, all Figures.

In addition to the inertia action, centrifugal force is acting upon the mixture heavies until they reach the circumference 10 of the rotor.

Separated heavies are ejected from the pockets 2 and 3 at ports 11 of FIGS. 1 and 3 at the circumference end 10 of the lagging edge 7.

Separated lights are ejected from pockets 2 and 3 at ports 14 of FIGS. 1 and 3.

The lagging edge 7 is now defined as a wall, to obstruct the swirl of the mixture constructed from the cylinder center proximity to the circumference. The leading edge 9 is defined as an enclosure wall ahead, in the direction of rotation, of the lagging edge completing the enclosure. The pockets 2 and 3 are defined as these enclosures.

Baffle 12 prevents mixture from being forced directly into the lights ejection ports 14.

On FIG. 1; ports 14, lights; and ports 11, heavies; can eject internal of outlet cylinder end 15 or as shown externally through outlet cylinder end 15. As illustrated on FIG. 1, heavies ejection ports 11 eject into tubes or passage means 16 which eject into first compartment 17 which is contained by the second tubular shaft 18. The lights eject from ports 14 into passage means 19 which ejects into second compartment 20 which is also contained by the second tubular shaft 18.

The two pocket configuration of the preferred embodiment, pockets 2 and 3, is strictly for balancing. The device can have one or more pockets.

The 1, 6, and 18 rotor and shafts combination, supporting the pockets 2 and 3, is mounted for rotation on bearings 21 and 22 and driven by pulley 23 which is secured to first tubular shaft 6. Bearing and device support is supplied by housing 24.

In detailed explanation of the device, function demands that the mixture enter the device, at port 25 the opening of tube or passage means 5 in first tubular shaft 6, under pressure in excess of that developed by the device by centrifugal force acting on the heavies. External pressure forces heavies from rotor circumference 10 back to second tubular shaft 18.

Entry to port 25 is through suitable plumbing second discharge port a slip coupling, not shown, attached to first tubular shaft 6.

Mixture is delivered from port 25 to the high gravity chamber, pockets 2 and 3, through tube or passage means 5 at port 4.

Heavies separation begins when the mixture enters pocket 2 or 3 from area 37 supplied by port 4. Mixture in a pocket is struck by the lagging edge of the pocket 7. Inertia of the mixture compacts heavies against 7, forcing lights in the direction of rotation, arrows 8. Centrifugal force completes heavy separation when the heavies reach the rotor circumference 10 and external pressure forces the heavies through port 11.

The heavies are forced from port 11, FIG. 1, into tube or passage means 16 which delivers into first compartment 17 contained in second tubular shaft 18.

Heavies are delivered from first compartment 17 through first discharge port 26, a hole through the wall of second tubular shaft 18, into chamber 27 enclosed by stationary slip coupling 28.

Heavies are removed from the device by pipe 29 attached to slip coupling 28 with 29 providing oulet to chamber 27.

Lights separation begins when inertial compacts heavies against the lagging edge of the pocket 7 which forces the lights; in the direction of rotation, arrows 8; out into the pocket, either 2 or 3.

Lights are forced from the lagging edge of the pocket 7 all the way around the pocket, 2 or 3, to the leading edge of the pocket 9 by inertia acting on the heavies. During this time, centrifugal force is constantly removing left over heavies thereby providing separated lights around rotor rotation axis 30 FIG. 1.

Lights are forced from the pockets, 2 and 3, through ports 14 by external pressure. Ports 14 deliver into passage means or tube 19 which delivers into second compartment 20 which is contained along with heavies first compartment 17 inside second tubular shaft 18.

Lights are delivered from second compartment **20** through second discharge port **31**, a hole in the wall of second tubular shaft **18**, into chamber **32** enclosed by stationary slip coupling **33**.

Pipe **34** provides lights passage means from chamber **32** to heavies pressure developing valve **35**.

Valve **35** restricts lights flow to develope back pressure on the heavies to move the heavies from port **11** through tube **16** and into first compartment **17**.

Lights outlet from the device is from pipe **34** through valve **35** into pipe **36**.

We claim:

1. A device that utilizes inertia and centrifugal force for separating fluid mixtures comprising a rotatable separating chamber, a first tubular shaft providing an inlet to said chamber, a second tubular shaft providing at least two compartment outlets to said chamber, means for rotationally driving said shafts and chamber, said chamber comprising a cylinder arranged to rotate with said first and second tubular shafts, said cylinder being positioned intermediate the inlet portions of said first shaft and the outlet portions of said second shaft, said cylinder sectioned into at least one pocket by a wall, extending radially from cylinder center proximity to the circumference and joined to said cylinder internal ends and at the circumference, said wall providing a lagging and leading edge for said rotatable pocket, said first tubular shaft arranged to deliver pressurized mixture to the lagging edge of said pocket, a heavies separation fraction ejection port positioned at the circumference end of said lagging edge of said pocket, means for passing said heavies from said heavies ejection port to said second tubular shaft, a first compartment of said second shaft having its intake communicating with the interior of said chamber, said first compartment provided with a first discharge port, stationary heavies removal plumbing for receiving pressurized discharge from said first discharge port, a lights separation fraction ejection port positioned adjacent said leading edge of said pocket, a baffle extending perpendicularly from the said pocket leading edge, said baffle extending around and slightly by the periphery of said lights ejection port preventing mixture from directly entering said port, means for passing said lights from said lights ejection port to said second tubular shaft, a second compartment of said second shaft having its intake communicating with the interior of said chamber, said second compartment provided with a second discharge port, stationary lights removal plumbing for receiving pressurized discharge from said second discharge port, valve means operable to control said lights fraction discharge thereby controlling relative proportion of the separation fractions discharged and developing back-pressure to induce heavies flow from said heavies ejection port to said first compartment of said second tubular shaft.

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