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(56) Documents cited

None

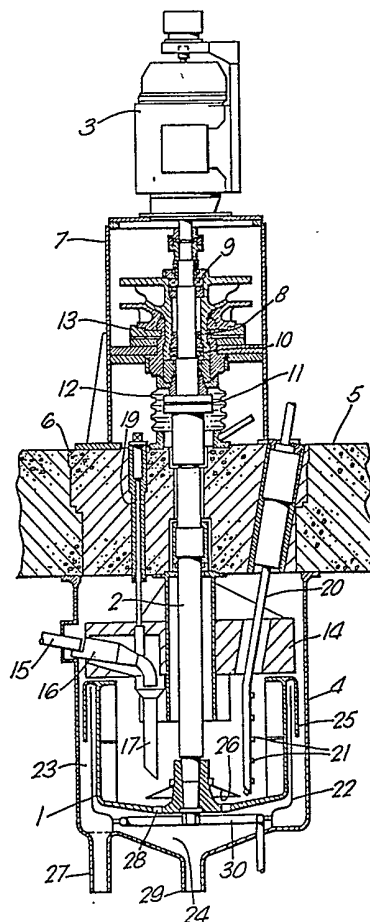
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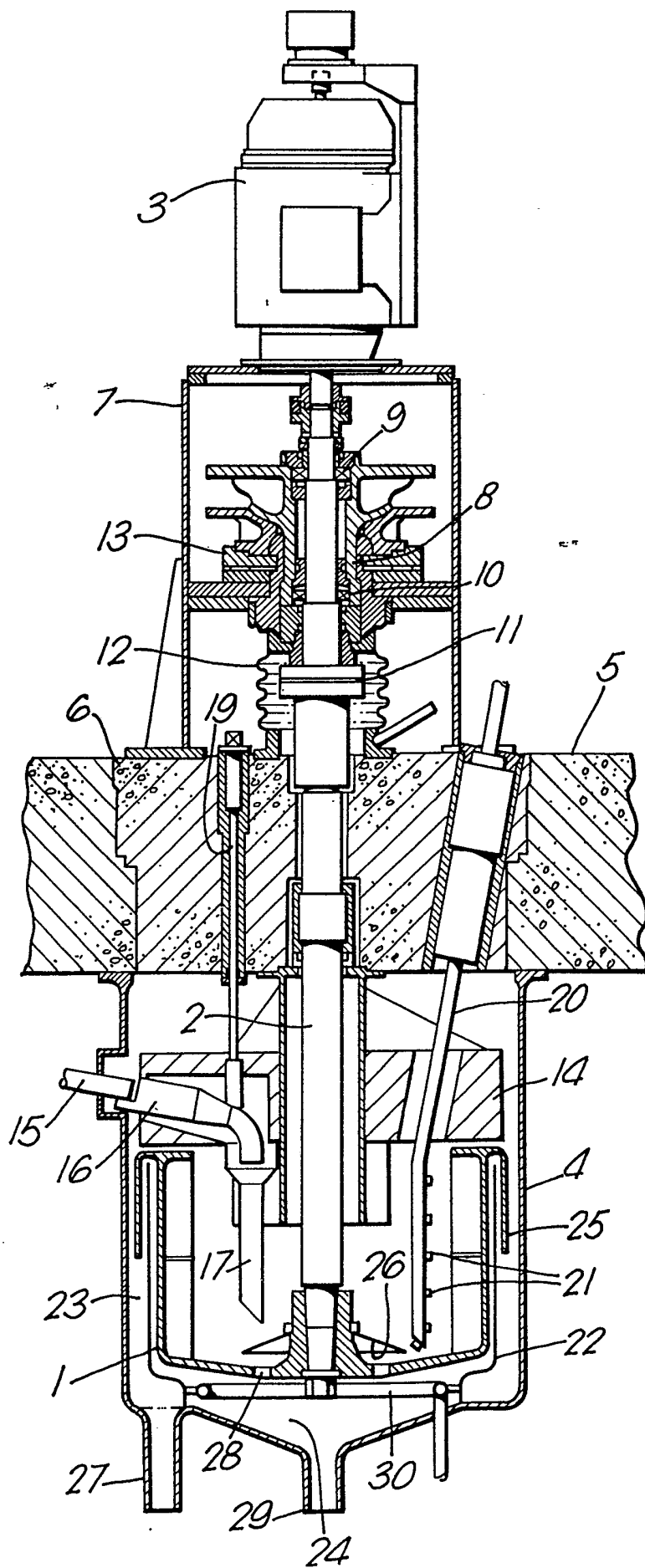
B2P

Selected US specifications from IPC sub-class B04B

(54) **Centrifuges**

(57) A centrifuge for the removal of solids from liquids, for example, the removal of solid fission products from dissolved nuclear fuel, comprises a rotatable bowl 1 mounted behind a solid wall 5 and is provided with a pivotable catch tray 16 which cooperates with a feed inlet 15 extending through the wall of a casing 4 about the bowl. The catch tray is pivotable between a first position at which it cooperates with the feed inlet to introduce feed liquid into the bowl and a second position at which it is removed out of cooperation with the feed inlet to permit withdrawal of the bowl from the casing through a removable plug 6 in the wall 5.





SPECIFICATION

Improvements in centrifuges

- 5 The present invention relates to centrifuges for removing solids from fluids. In particular the invention concerns centrifuges for use in the nuclear industry for the removal of solids, such as insoluble fission products, from dissolved nuclear fuels.
- 10 According to the present invention a centrifuge comprises a rotatable bowl suspended within a fixed casing, the bowl being carried on a shaft which is supported for rotation adjacent its end remote from the bowl by a bearing assembly and in which a feed
- 15 inlet in the casing cooperates with a catch tray arranged above the bowl within the casing, the catch tray being pivotable between a first position at which it cooperates with the feed inlet and a second position at which it permits withdrawal of the bowl from the
- 20 casing.
- The invention will be described further, by way of example, with reference to the accompanying drawing which is a section through a centrifuge assembly for removing solids from a liquid.
- 25 A centrifuge assembly, as illustrated, comprises a bowl 1 secured to an end of a shaft 2 which is driven by a motor 3. The bowl 1 is contained within a casing 4 which is secured to a mounting slab 5 with the shaft 2 passing through a plug 6 located in the slab 5. The
- 30 plug sits in an opening through the slab with the plug and slab having complementary stepped surfaces. Further, the plug can only be located in the slab in one position as determined by cooperating key and keyway provided on the slab and the plug. In a preferred
- 35 arrangement the plug is formed with two diametrically opposite keyways of different width which cooperate with corresponding keys in the slab. The slab and plug constitute a shield or barrier.
- The motor 3 is carried on a support 7 mounted on
- 40 the plug 6, the support 7 also carrying a bearing unit 8 for the rotor. The bearing unit 8 comprises upper and lower angular contact bearing assemblies 9 and 10 respectively which form a pendulum support for the shaft 2 and the centrifuge bowl 1. The shaft is formed
- 45 in two parts which are coupled together at their abutting flanged ends 11. A bellows or flexible curtain 12 is disposed about the coupling 11 and extends between the bearing unit 8 and the plug 6. The bellows 12 provides a seal about the bore in the plug 6 for the
- 50 shaft 2 and is removable to provide access to the coupling 11. A load cell arrangement 13 is provided making it possible to weigh the bowl and its contents during operation of the centrifuge.
- A feedtray 14 is supported by the plug 6 and dis-
- 55 posed within the casing 4 above the centrifuge bowl 1. An inlet feed pipe 15 extends through the wall of the casing to cooperate with a catch tray 16 whereby a feed liquid from the pipe 15 is directed by the catch tray 16 into an outlet 17 from the feedtray 14. The
- 60 outlet 17 extends into the bowl 1 of the centrifuge. The catch tray 16 is pivotable through an arc of approximately 50° between a first position at which its outer end lies below the inlet feed pipe 15 and as shown in the drawing and a second position at which its outer
- 65 end lies within the perimeter of the feedtray 14. The

- catch tray 16 is pivoted into the second position when it is required to lift the centrifuge assembly out of the casing 4. The feedtray 14 and the bowl 1 are dimensioned to pass through the opening in the slab 5 for the plug 6 to enable installation or withdrawal of the centrifuge with the catch tray 16 in its second position. The catch tray 16 is pivotable about the axis of a spindle 19 rotatably journaled in the plug 6, the head of the spindle 19 being accessible at the end of the plug 6 remote from the casing 4.

- A washpipe 20 extends through the plug 6 and into the bowl 1. The arrangement is such that the opening in the plug 6 to receive the washpipe 20 lies outside the support 7 mounted on the plug. It is thus possible
- 80 to gain immediate access to the washpipe 20. The end of the washpipe 20 within the bowl 1 can be provided with jets or nozzles 21.

- The bowl 1 is located within a cylindrical wall 22 which divides the lower portion of the casing 4 into an outer annular region 23 and a central region 24. A skirt 25 which extends over the wall 22 and into the annular region 23 is welded to the bowl 1.

- In use, with the bowl 1 rotating at speed, a liquid feed is introduced through the inlet 15 and the catch
- 90 tray 16. The liquid falls on to a deflector plate 26 at the bottom of the bowl 1 and is thrown against the wall of the bowl. Any solids in the liquid feed collect on the wall. Clean liquid flows up the wall and over the skirt 25 into the annular region 23 from which it is removed
- 95 through an outlet 27. Solids collect as a cake on the wall of the bowl. The cake can be removed periodically by reversing the direction of the bowl alternatively clockwise and anticlockwise at a slow speed, for example 10 revolutions per minute, while supplying an
- 100 acid wash at pressure through the washpipe 20. The acid issuing from the jets or nozzles 21 cuts the cake from the wall. The cake and acid flow out through apertures 28 in the bottom of the bowl 1 to drain
- 105 through an outlet 29 in the bottom of the casing 4, the bottom being inclined preferably at an angle of about 20°. A spray ring 30 can be provided beneath the bowl 1 to wash out deposits.

- As an alternative to weighing using the load cell 13 it is possible to determine the quantity of solids deposited in the bowl by operating the centrifuge at a
- 110 given speed and then switching off the power to the drive motor and noting the time required for deceleration to a lower speed. The measurements are obtained for an empty bowl and with the bowl containing solids. The difference in readings is related to the quantity of solids in the bowl.

CLAIMS

- 120 1. A centrifuge for removing solids from liquids comprising a rotatable bowl suspended within a fixed casing, the bowl being carried on a shaft which is supported for rotation adjacent its end remote from the bowl by a bearing assembly and in which a feed
- 125 inlet in the casing cooperates with a catch tray arranged above the bowl within the casing, the catch tray being pivotable between a first position at which it cooperates with the feed inlet and a second position at which it permits withdrawal of the bowl from the
- 130 casing.

2. A centrifuge as claimed in claim 1 in which the shaft extends through a plug in a mounting slab, the plug carrying a support for the bearing assembly and the casing being secured to the opposite side of the slab.
3. A centrifuge as claimed in claim 2 in which the shaft is formed in two parts releasably interconnected by a coupling disposed on the side of the plug remote from the casing.
4. A centrifuge as claimed in claim 3 in which the coupling is enclosed by a removable seal.
5. A centrifuge as claimed in any preceding claim including a washpipe extending through the plug into the bowl.
6. A centrifuge as claimed in any preceding claim including a cylindrical wall about the bowl in the casing and dividing the casing into inner and outer compartments.
7. A centrifuge as claimed in claim 6 including spray wash means within the inner compartment and disposed beneath the bowl.
8. A centrifuge as claimed in any preceding claim including means for determining the quantity of solid deposited in the bowl.
9. A centrifuge as claimed in claim 8 comprising a load cell for determining the quantity of solids.
10. A centrifuge for removing solid from liquids substantially as herein described with reference to and as illustrated in the accompanying drawing.