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Cyphelly

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[54] **DECANTING CENTRIFUGE**

[76] Inventor: **Ivan Jaroslav Cyphelly**, Forchstrasse 968, Hinteregg, Switzerland, 8128

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[51] **Int. Cl.²** **B04B 1/20**; B04B 9/00

[58] **Field of Search** ..... 233/1 R, 1 A, 7, 23 R, 233/24, 27, 28; 60/484, 485

[56] **References Cited**

UNITED STATES PATENTS

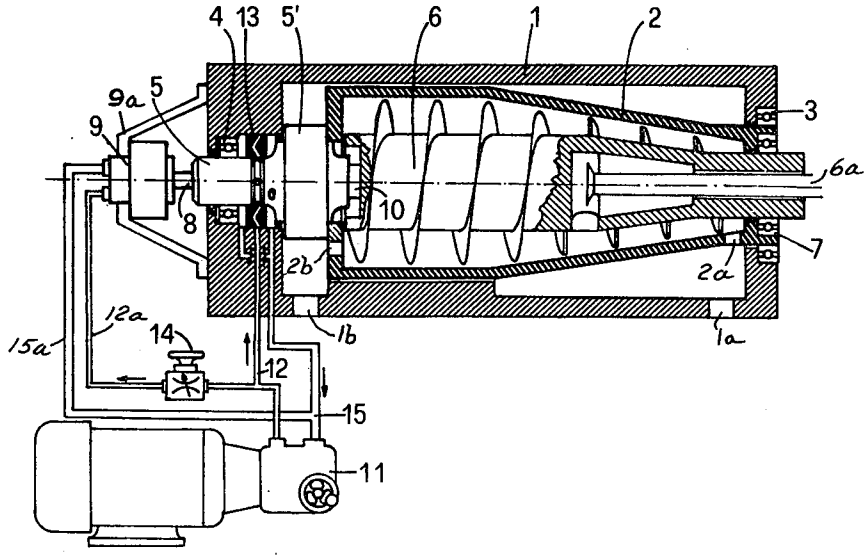
3,126,337	3/1964	Smith	233/7 X
3,734,399	5/1973	Oas	233/7

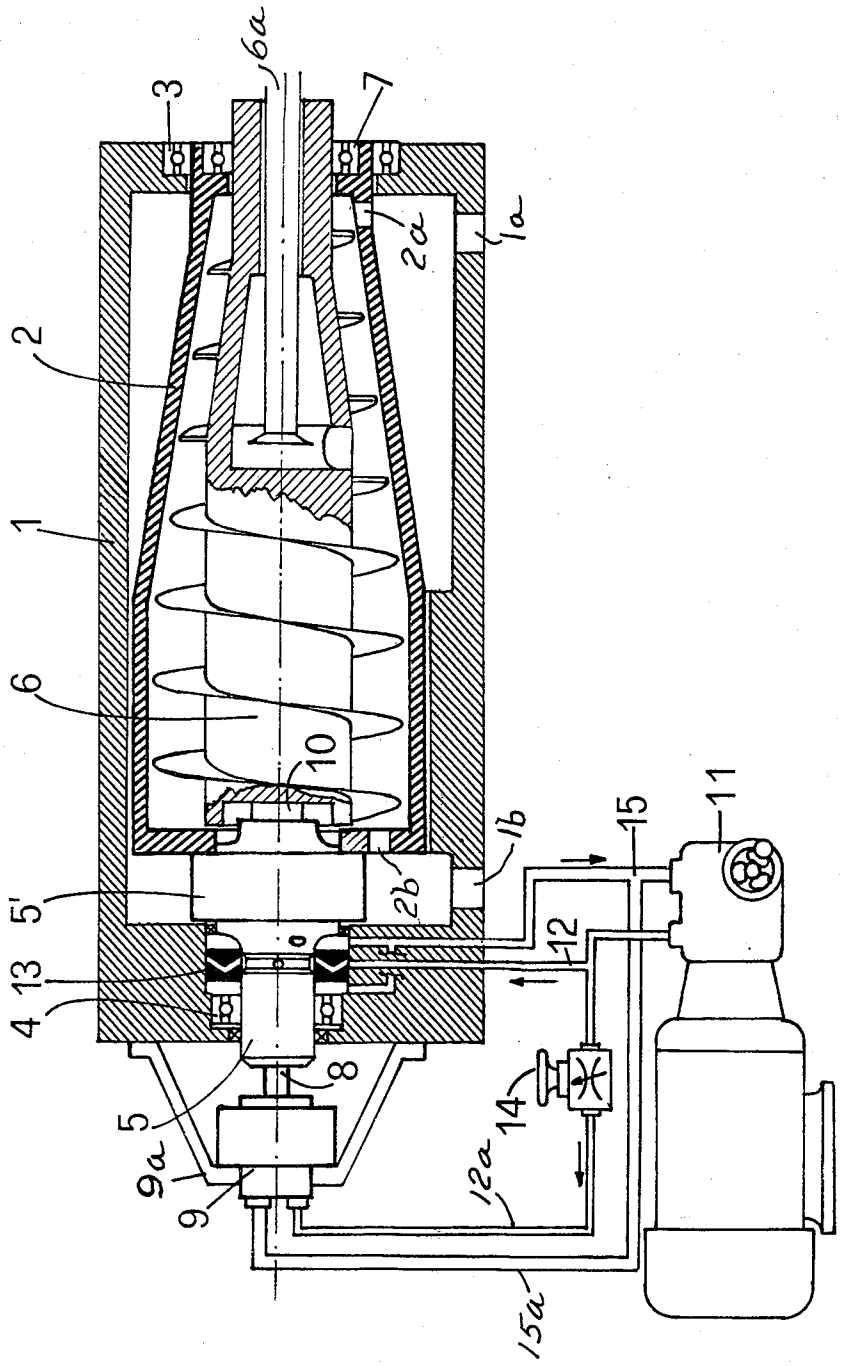
Primary Examiner—George H. Krizmanich
Attorney, Agent, or Firm—Toren, McGeady and Stanger

[57] **ABSTRACT**

In a decanting centrifuge a drum is rotatably mounted in a fixed casing and a worm is rotatably mounted in the drum. The drum is driven by a main motor and a hydraulic motor is arranged between the drum and the worm to provide a differential speed. The hydraulic motor includes a casing rigidly connected to the drum and a shaft rigidly connected to the worm. Further, the main motor can also be a hydraulic motor arranged to receive the hydraulic medium from the same source as the other hydraulic motor with the flow of the hydraulic medium being controlled by a regulating valve.

6 Claims, 1 Drawing Figure




6a
3
7
2a
1a
2
1
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10
1b
15
11
5'
2b
12
13
4
8
5
14
9a
12a
9
15a

DECANTING CENTRIFUGE

SUMMARY OF THE INVENTION

The present invention is directed to a decanting centrifuge including a drum driven by a main motor and a worm rotatably mounted within the drum, more particularly, it concerns the arrangement of a hydraulic motor between the drum and the worm for providing differential speed between the drum and the worm.

As is known, a decanting centrifuge consists of a drum and a worm coaxially mounted in the drum and with both the drum and worm mounted for rotation. Inlet and outlet openings are provided in the centrifuge for the material being processed. The device includes a drive member to provide a relatively high speed and to insure a speed differential between the drum and the worm so that the worm can move dry, heavy material out of the drum. In known decanting centrifuges the low differential speed is provided by a planetary or hobbing gear, but in such an arrangement the differential speed is rigidly coupled to the driving speed. Frequently, however, it is required that the differential speed be adjusted independently of the driving speed, especially when the material to be separated in clarification plants is irregular in its consistency.

Therefore, it is the primary object of the present invention to provide a decanting centrifuge in which the differential drive is freely adjustable independently of the driving speed of the drum. The present invention is based on the finding that the required high torques should be limited to the differential drive member and, therefore, should not load the main drive.

In accordance with the present invention, the decanting centrifuge produces the differential speed by the arrangement of a hydraulic motor between the drum and the worm with the hydraulic motor having a casing rigidly connected with the drum and having its shaft rigidly connected with the worm and, further, a rotary transmission arrangement is provided for supplying the hydraulic medium to the hydraulic motor.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a view partly in section of a decanting centrifuge embodying the present invention.

DETAILED DESCRIPTION OF THE INVENTION

In the drawing a decanting centrifuge is illustrated consisting of a fixed machine casing **1** in which a drum **2** is rotatably mounted at one end by a bearing **3** located in the casing and at its other end by a casing support **4** of a cumulative compound hydromotor **5** which is connected to the drum. A worm **6** is coaxially mounted in the drum and is supported at one end by a bearing **7** positioned in the drum and at its other end by the shaft bearing of the hydromotor **5** whose shaft is connected to the worm. The drum is driven through the casing **5'** of the cumulative compound hydromotor **5** by a shaft **8** of a main driving motor **9** which is also a hydromotor. However, the great torque load between the worm and the drum is confined to the cumulative compound hydromotor **5** which rotates the worm **6** through a shaft **10** to the desired cumulative compound speed as compared to that of the drum **2.**

Hydromotor **5** is supplied with a hydraulic medium from a variable displacement pump **11** via a supply line **12** and rotary transmissions or transfer seals **13.** Intermediate the pump **11** and the transmissions **13,** the supply line **12** branches off for supplying the hydraulic medium to the main driving motor **9.** The flow through the branch line is controlled by a regulating valve **14.** A return line **15** conducts the return flow of the hydraulic medium from the cumulative compound motor **5** and the main driving motor **9** to the pump **11.**

It is also possible to supply the two motors each from a separate pump. Only a balanced slow-moving motor can be used as the cumulative compound hydromotor **5,** since it rotates as a whole at a high-driving speed.

As a rotary transmission a hydrostatic shaft transfer seal of the type disclosed in U.S. Pat. No. **3,685,842** or **3,767,213** could be used advantageously.

As referred to in the description, the hydromotor is a fluid drive motor, specifically a hydrostatic motor, that is, where the driving means is a static pressurized fluid. Such motor is also designated as a positive displacement motor.

I claim:

1. A decanting centrifuge for separating solids and liquids from a mixture comprising a drum supported for rotation about an axis, a worm mounted within said drum for roation about said axis, a main drive motor coupled to said drum means for driving said drum at a first rotational speed, and drive means for driving said worm at a second speed different from said first speed, said drive means comprising a hydraulic motor mounted coaxially with said drum and said worm, said hydraulic motor being connected to said main drive motor and rotated thereby and coupling said main drive motor to said drum, said hydraulic motor having a casing rigidly connected to said drum and a shaft rigidly connected to said worm so that said hydraulic motor casing rotates at the same speed as said drum and said worm rotates at a speed different from the speed of said drum by the speed differential between said casing and said shaft, and rotary transmission means engaging said casing for supplying a hydraulic drive medium to said hydraulic motor.

2. A decanting centrifuge, as set forth in claim **1,** including a fixed machine casing enclosing said drum, and said rotary transmission means comprises a hydrostatic transfer seal disposed between said hydraulic motor casing and said fixed machine casing.

3. A decanting centrifuge, as set forth in claim **1,** wherein said rotary transmission means comprises an adjustable displacement pump for supplying said hydraulic motor with a hydraulic drive medium.

4. A decanting centrifuge, as set forth in claim **3,** wherein said rotary transmission means comprises means mounted about said hydraulic motor that drives said hydraulic motor in response to the drive medium, a hydraulic medium supply pipe connecting said pump with said means mounted about said hydraulic motor, a branch line connecting said supply pipe with said main motor, and a flow regulating valve mounted in said branch line.

5. A decanting centrifuge, as set forth in claim 2, wherein said fixed machine casing comprises first means for rotatably supporting one end of said drum, and said hydraulic motor casing comprises second means for rotatably supporting the other end of said drum, said hydraulic motor casing being supported in said fixed machine casing.

6. A decanting centrifuge, as set forth in claim 5, wherein said drum comprises a bearing in said drum at said one end for rotatably supporting said worm at one end, and said hydraulic motor shaft rotatably supports said worm at the other end.

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