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CONDITIONER AND AGITATOR

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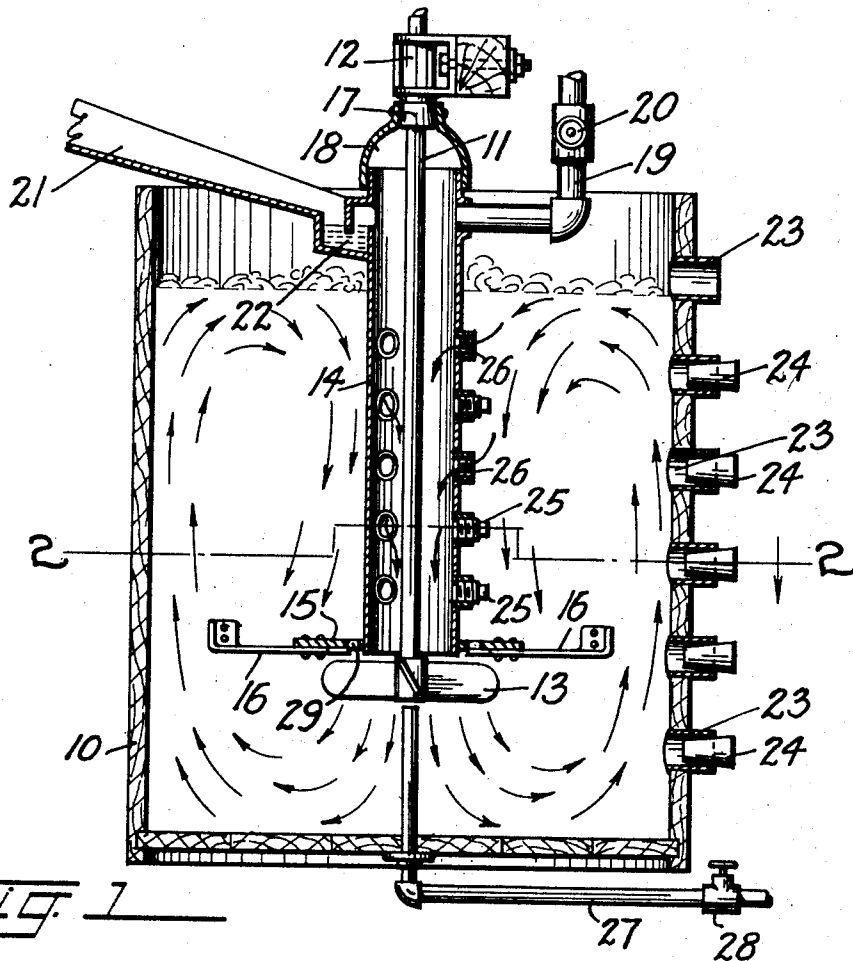


FIG. 1

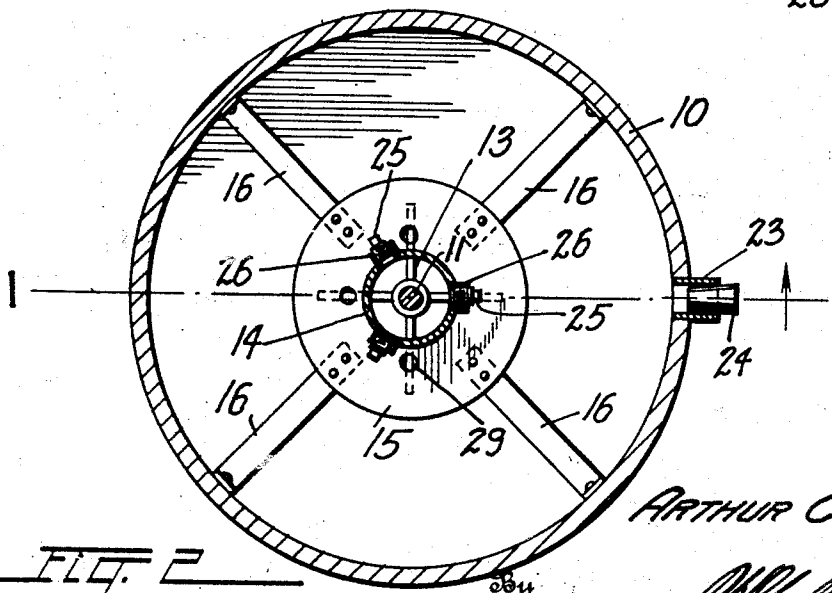


FIG. 2

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CONDITIONER AND AGITATOR

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6 Claims. (Cl. 261—93)

This invention relates to a conditioner and agitator designed to prepare the feed product or pulp solution for a flotation machine. The principal object of the invention is to provide a device which will accomplish the first agitation and mixing of the pulp and solution with air or gases so that the product received by the flotation machine will be immediately active, thus eliminating the use of expensive flotation cells for agitation.

Another object of the invention is to provide a conditioner which cannot be choked or clogged by the pulp.

Still another object of the invention is to provide a conditioner in which the air or gas will be introduced into the vortex of a whirling mass of pulp and in which the volume of air or gas may be accurately controlled.

A further object is to so construct the conditioner that it will handle a relatively large capacity for a minimum of horse power.

A still further object is to provide a conditioner which can be regulated so that the entire mixing action may be confined to a certain set volume or to a continuous flow.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 illustrates a vertical section through my improved conditioner, taken on the line 1—1, Fig. 2.

Fig. 2 is a horizontal section, taken on the line 2—2, Fig. 1.

The invention comprises a cylindrical tank 10 of wood or metal. Concentrically placed within the tank 10 is a vertical shaft 11 supported from suitable bearings 12 above the tank. On the lower extremity of the shaft 11, an impeller 13 is carried. This impeller is preferably of the propeller type. It, however, may be simply a straight vane impeller, if desired. Surrounding and spaced from the shaft 11 is a vortex pipe 14 which terminates at its lower extremity through a horizontal disc 15 immediately above the impeller 13.

The disc 15 and the vortex pipe 14 are maintained concentric with the shaft 11 by means of

brace bars 16 attached to the walls of the tank 11. The vortex pipe is supported in the tank from an extension 17 on the bearing 12, a cap 18 being provided between the bearing extension 17 and the vortex pipe.

Communicating with the vortex pipe 14 is a gas pipe 19 controlled by means of a suitable valve 20. The pulp and solution is fed into the conditioner from any suitable launder 21 through a gas trap 22 into the vortex pipe 14. The height of the solution in the tank 10 may be controlled through a series of over-flow sleeves 23 closed by means of suitable plugs 24. The pulp overflowing through the open sleeve 23 is conducted by a launder or any suitable means to the flotation cells. In the vortex pipe 14 a series of nipples 26 are placed which may be closed by means of screw plugs 25.

In operation, the tank 10 is kept filled to the desired height (which is determined by means of the plugs 24) and the impeller 13 is rapidly rotated. This sets up a violent agitation within the solution and causes a current to flow downwardly and outwardly from the impeller 13 to the sides of the tank, thence upwardly along the sides and again downwardly along the exterior of the vortex pipe 14, as shown by the arrows, Fig. 1.

Should it be desired to create additional agitation in the contained solution in the tank, certain of the plugs 25 are unscrewed from the nipples 26 in the vortex pipe 14. This allows a portion of the tank solution to flow into the vortex pipe and downwardly therein to the impeller 13. Additional pulp is constantly added to the vortex pipe through the launder 21. This material is drawn into the vortex created by the impeller 13 and projected into the current of the solution in the tank. The plugs 25 should be so adjusted in relation to the feed from the launder 21 that sufficient tank material is returned to the vortex pipe to make up any deficiency in the feed.

For some classes of work, it is desired to aerate the pulp in the conditioner or to add reagent gases thereto. This may be readily accomplished through the gas pipe 19 since the action of the impeller 13 acts to cause a partial vacuum in the vortex pipe. This vacuum will draw on the gas pipe 19 as the valve 20 is opened to draw the gas into the vortex so that it will be beaten into the pulp.

Leakage of air into the vortex pipe is prevented by the gas trap 22 which constantly contains liquid which closes the launder 21. In

some instances, it may be desirable to add additional air or gas to the pulp. This additional air or gas may be added through a second gas pipe 27 controlled by means of a suitable valve

28. The gas pipe 27 passes through the bottom of the tank 10 and terminates immediately under the center of the impeller 13, thereby delivering its gas at the point of greatest suction of the impeller.

10 The conditioner can, if desired, be used for a preliminary flotation cell by providing any of the usual means for removing the froth formed therein.

15 Openings 29 are formed in the disc 15 adjacent the collar 14 to allow a current to flow into the disc at this point and prevent piling of the pulp thereon.

The disk 15 acts to direct the current from the impeller toward the outside of the tank so that

20 a constant uninterrupted current is maintained downwardly into the vortex and upwardly at the outside. The principal function of the disk 15, however, is to protect the impeller from becoming packed in settled material. Should the feed become too heavy or should the machine be shut down the sands will settle upon the disk 15 and not interfere with again starting the impeller.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

35 Having thus described the invention, what I claim and desire to secure by Letters Patent is:—

1. A pulp agitator comprising a tank; a shaft suspended within said tank; an impeller carried by said shaft; a disc arranged above said impeller; a sleeve spaced from and surrounding said shaft, said sleeve extending from and opening through said disc; a cap supported on and closing the upper extremity of said sleeve; and means for introducing liquid into said sleeve

45 between said cap and said impeller.

2. A pulp agitator comprising a tank; a shaft suspended within said tank; an impeller carried by said shaft; a disc arranged above said impeller; a sleeve spaced from and surrounding said shaft, said sleeve extending from and open-

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ing through said disc; a cap supported on and closing the upper extremity of said sleeve; means for introducing liquid into said sleeve between said cap and said impeller; and a gas conduit for introducing gas into said sleeve between said cap and said impeller.

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3. A pulp agitator comprising a tank; a shaft suspended within said tank; an impeller carried by said shaft; a disc arranged above said impeller; a sleeve spaced from and surrounding said shaft, said sleeve extending from and opening through said disc; a cap arranged to close the upper extremity of said sleeve; means for introducing liquid into said sleeve between said cap and said impeller; and means for introducing air or gas from the exterior of said tank to a point below said impeller.

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4. A pulp agitator comprising a tank; a shaft suspended within said tank; an impeller carried by said shaft; a disc arranged above said impeller; and a sleeve spaced from and surrounding said shaft, said sleeve extending from and opening through said disc, said sleeve having controllable passages between it and said tank at differing elevations therein to allow pulp to return from said tank to said sleeve, when desired.

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5. A pulp agitator comprising a tank; a shaft suspended within said tank; an impeller carried by said shaft; a disc arranged above said impeller; a sleeve spaced from and surrounding said shaft, said sleeve extending from and opening through said disc immediately over said impeller; means for introducing pulp into said sleeve, said means comprising a channel; and a liquid containing gas trap between said channel and said sleeve.

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6. An agitating device comprising, a tank; a vertical shaft suspended in said tank above the bottom thereof; an impeller carried on the lower extremity of said shaft; a disc having a central opening; supporting means for maintaining said disc immediately above said impeller; a conduit extending from said central opening; means for introducing the material to be agitated into said conduit; and a pipe communicating with said conduit for introducing air into the latter.

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