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IMPELLER MOUNTING FOR LIQUID MIXER

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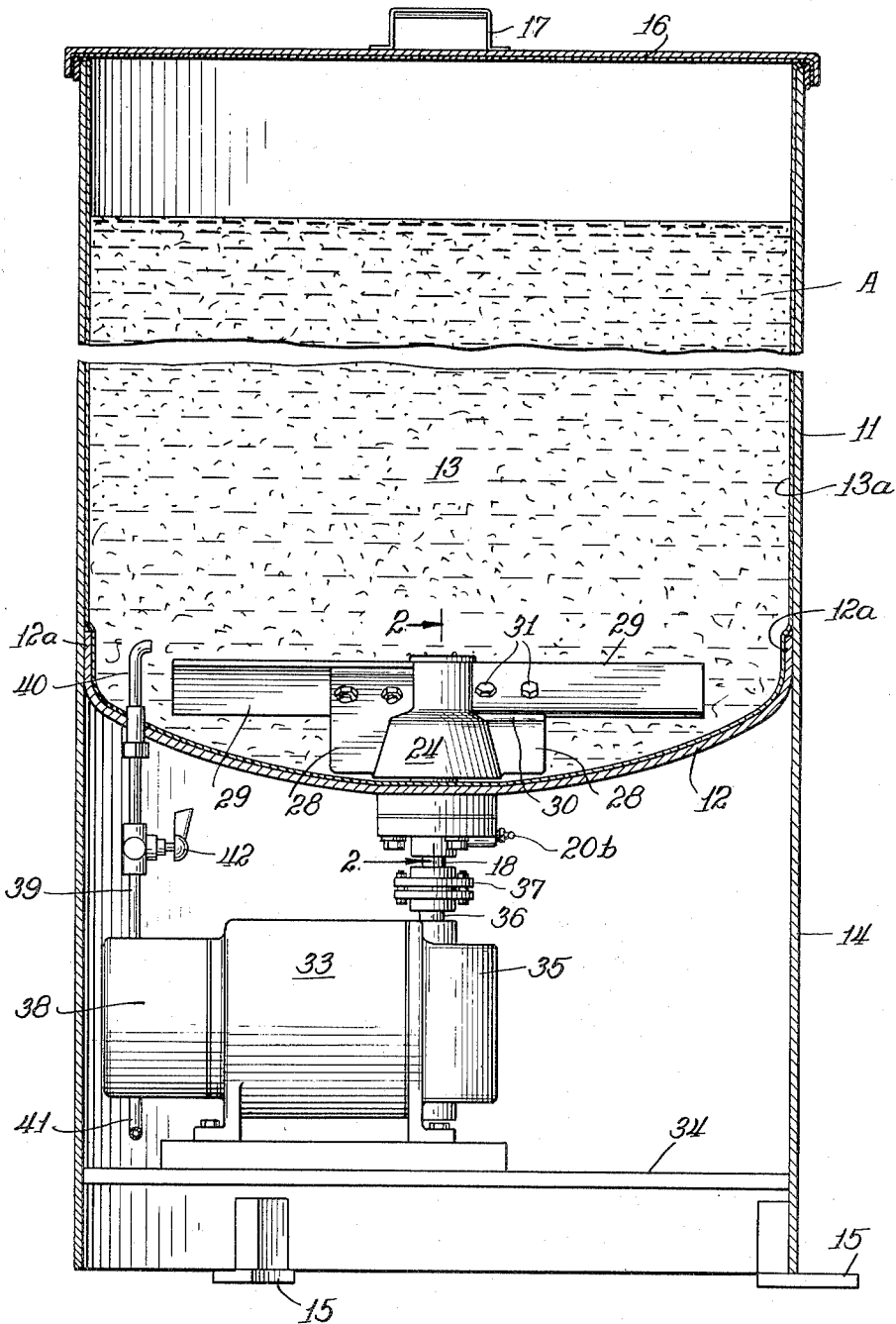


Fig. 1.

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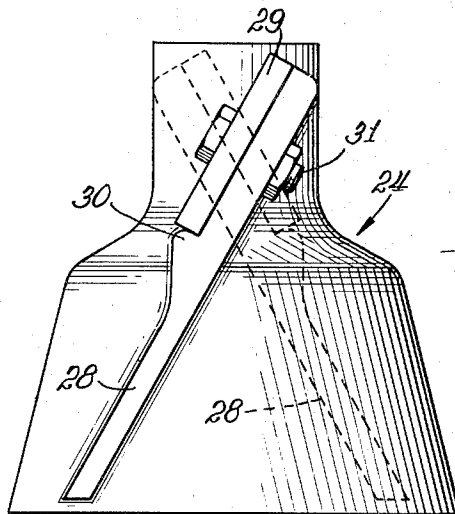
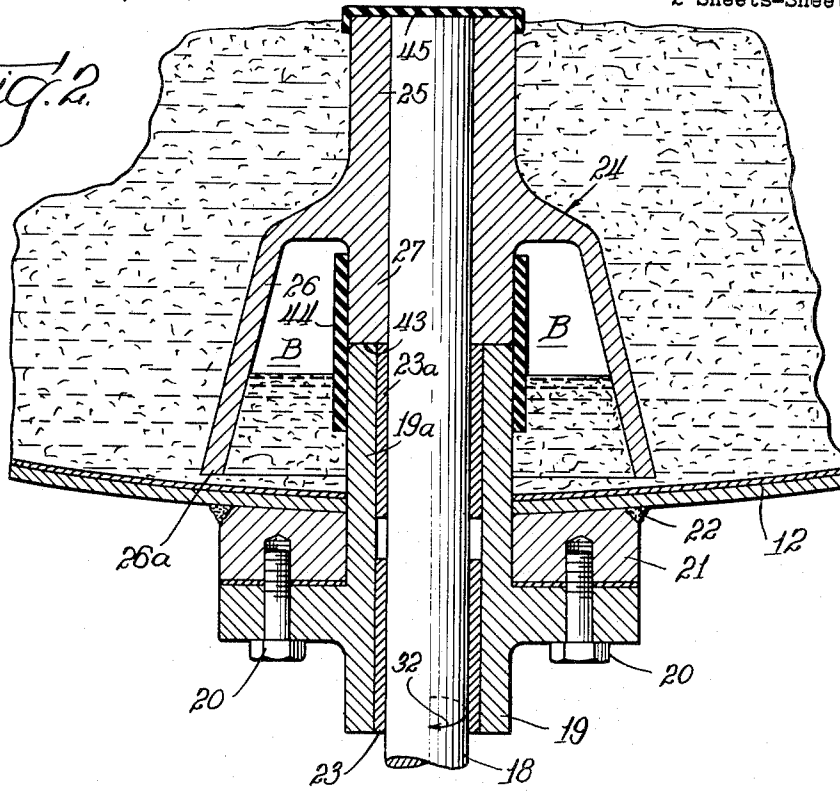
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*Fig. 2.*



*Fig. 3.*

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## IMPELLER MOUNTING FOR LIQUID MIXER

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3 Claims. (Cl. 259—134)

This invention relates to impeller mounting for liquid mixer and more particularly for impellers which rotate in a slurry tank for supplying a mixture of liquid and granular material for use in the industrial arts, one specific example of which is a suspension of diatomaceous earth in water which is formed into a slurry or the like in a tank provided with mixing means such as a rotating impeller and from which tank the mixture may be drawn off as desired, for use, for example, as a filter aid or medium for any contemplated industrial processing.

It has been known that difficulties have arisen in the use of liquid mixes such as slurry tanks by reason of the fact that the granular material incorporated in the slurry commonly has more or less abrasive properties, and the slurry coming in contact, as it heretofore has been permitted to do, with the impeller bearing, penetrates between the bearing surfaces and tends to markedly impair or even destroy the bearing, resulting in frequent breakdowns of the equipment and requiring repeated repairs which are time-consuming and expensive and undesirably enhance the cost of operation.

The present invention aims to provide an impeller mounting for this purpose which by its inherent construction keeps the slurry away from the relatively rotating bearing surfaces and prevents entry of the mixture thereinto, while at the same time affording a simple and efficient support for the impeller arms that facilitates quick and easy assembly or disassembly of the arms with respect to the mounting.

These and other objects and advantages will be apparent from and the invention will be understood by reference to the accompanying drawings, showing an illustrative embodiment of the invention, and in which drawings—

Figure 1 is an elevational view showing my improved mounting associated with a slurry tank and base therefor, the tank and the base being shown in section, and operating parts therefor;

Figure 2 is an enlarged axial-sectional view of the mounting taken on the line 2—2 of Fig. 1; and

Figure 3 is an elevational view, on the scale of Figure 2, of the mounting member with the impeller arms.

Referring in detail to the illustrative construction shown in the drawings, the numeral 11 indicates a cylindrical tank, suitably of sheet metal, having a downwardly concave receptacle bottom 12 that has a flanged cylindrical periphery 12a that may be secured as by welding to the inner wall of the tank 11 intermediately of the height thereof to provide a receptacle 13 to receive the slurry A or the like. The slurry may be, for example, a suspension of diatomaceous earth in water that does not naturally form a stable suspension and which must be remixed or agitated each time before portions thereof are drawn for use, as later more particularly described. The receptacle 13 may be lined as at 13a, the lining continuously covering the sides and bottom 12 thereof.

The walls of the tank 11 may be conveniently continued downwardly as at 14 to provide a stand or base for the

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receptacle 13. Adjacent the lower end of the downward wall extension 14 are angular feet 15 by which the tank may be bolted to a floor, table or the like. The usual cover 16 having a bail-like handle 17 may be provided for the receptacle 13.

Adverting to Fig. 2, a central driven shaft 18 is shown which is journaled in a fixed bearing member 19 that is secured as by machine screws 20 to a collar casting 21 that is welded as at 22 to the under conved face of the receptacle bottom 12 centrally thereof to pass the bearing 19 therethrough, the wall 12 being correspondingly apertured for the purpose. Bushings 23 and 23a at each end of the bearing 19 respectively contact the shaft 18 and provide a suitable surface in which the shaft rotates.

In accordance with the present invention, the shaft 18 is extended upwardly beyond the bearing 19 and at its upper end has fixed thereon to rotate therewith the impeller mounting member 24, the bearing 19 being extended upwardly as at 19a and there axially confronting the impeller mounting member 24 interiorly of the mounting member. The mounting member 24 has a hub portion 25 to which the shaft 18 may be keyed or otherwise fixed to rotate therewith, as by means of a press fit in the bore of the hub. Depending from the hub 25, the mounting member exteriorly has an integral annular bell-like skirt portion 26 that flares outwardly away from the lower portion 27 of the hub and upper part 19a of the bearing 19 and extends downwardly almost to the receptacle bottom 12 allowing just enough space for running clearance with the bottom 12. Thus, the bell-like member 26 forms, together with hub 27, an airtight canopy completely covering over the adjoining bearing and hub elements, the juncture of these relatively rotating parts being well up into the interior of the bell-like member a substantial distance above the lower edge 26a of this member.

Still following the present invention, the mounting or bell member 24 has cast integrally therewith a pair of projecting wings 28 that provide supports for the impeller arms 29. The wings 28 are diametrically arranged on opposite sides of the skirt 26 of the bell member 24, and as best seen in Fig. 3 are tilted in opposite directions so that their lower margins, which extend below the impeller arms, act as supplementary impellers and by their inclination prevent accumulation of sediment in the lower central portion of the receptacle 13. The mounting member hub 25 also provides a neck that cooperates with the wings 28 for mounting the impeller arms. The lower edges of the wings 28 are spaced above the lower edges of the skirt for clearance. Adjacent its upper margin each wing 28 is ribbed as at 30 to provide a locating rest for the impeller arm 29 which is secured thereto along said upper margin as by through bolts 31. Thus the impellers also are tilted at an angle so as to face upwardly in the direction in which the center shaft 18 rotates as indicated by the arrow 32. So arranged the wings 28 and impellers 29 serve not only to agitate the mixture but also to circulate it somewhat vertically in the receptacle 13.

Any suitable means may be provided for rotating the center shaft 18 such as in this instance the electric motor 33 carried on a platform 34 secured within the tank wall 14 just above the feet 15. At one end the motor 33 may drive a speed reducer mechanism indicated generally by the numeral 35 which has a driving shaft 36 that is connected by a flexible coupling 37 with the center shaft 18 of the mixer. At its other end the motor 33 may drive pump means 38 that is interposed in a delivery pipe 39 for the slurry. At its upper end the pipe 39 may enter the receptacle 13 as at 40 and at its lower end, after passing through the pump 38, may have an outlet 41. A valve mechanism 42 may be interposed between the receptacle 13 and the pump to control delivery of the slurry to the outlet 41. Well mixed slurry may thus be drawn from the

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outlet 41 when the pump mechanism is running and the valve 42 is open. At this time also the impeller will be operating to keep the slurry well agitated and with the diatomaceous earth in suspension and well mixed with the water of the slurry. It will be understood that the motor, pump and speed reducer are shown somewhat diagrammatically since they form no part of the present invention.

Reverting to Fig. 2, it will be seen that the mounting or bell member 24 by its skirt portion 26 provides an annular element about the bearing 19 that functions somewhat like the familiar device known as a diving bell or like the device known as a cloche and keeps the slurry from access to the shaft bearing. In other words, when, upon removal of the cover 16, slurry is poured into the receptacle 13, it will find its way around the exterior of and underneath the bell member 24, but, because of air which will be entrapped in the upper region B of the interior of the bell member 24 within the bell skirt 26, the slurry will be unable to rise except by compression of this entrapped air in this air chamber. The pressure head is limited by the height of the receptacle 13 as here indicated. By reason of the upwardly extended portion 19a of the bearing member 19 that extends above the level to which the slurry could rise within the bell member under the influence of such pressure head and against the pressure of the air in the chamber B, the interface 43 between the rotating hub 27 of the bell member and the upper end 19a of the bearing member 19 is out of reach of access of the slurry and the bearing will thus be kept free of abrasive elements.

If desired, as a further safeguard, a sleeve 44 of elastomeric material may be placed on and about the upper end 19a of the bearing member in tight resilient engagement therewith before the bell member 24 and shaft 18 are located in position, the elastomeric sleeve 44 being upwardly extended to cover the interface 43 and extending into the upper regions of the air chamber within the bell member, the hub 27 of the bell member having running engagement with the sleeve 44. If desired also an elastomeric cap 45 can be placed over the top of the bell member hub 25 and shaft 18 as a further seal.

An illustrative embodiment of the invention having been described in accordance with the statute, such adaptations including modifications or additions may be made as incorporate what is defined in the appended claims without departing from the invention.

Invention is claimed as follows:

1. An impeller mounting of the class described having an interior hub portion for receiving a shaft vertically

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therein and an exterior bell-shape skirt portion formed integrally with the hub portion and surrounding the hub and spaced therefrom and depending therebelow whereby to provide an air chamber in the upper interior of the skirt portion, when the mounting is immersed in a liquid, limiting entry of the liquid into the skirt portion and preventing access of the liquid to the shaft bearing, said skirt portion having a plurality of impeller wings formed integrally therewith, each said wing being ribbed to provide a locating rest for an impeller arm adapted to be bolted to said wing.

2. In an impeller mounting of the class described for use with a rotating shaft extending vertically thereinto, a member having a hub portion for receiving the shaft therein to turn therewith, said member having an annular bell-like skirt portion extending from the hub portion and depending therebelow, a fixed bearing member for the shaft extending upwardly into the member to axially confront said hub portion above the lower edge of the skirt portion, said skirt portion being radially spaced from the bearing and extending below the upper end of the bearing, and an elastomeric sleeve resiliently engaging said bearing member and extending upwardly over at least a part of said hub portion to a point substantially above the lower edge of said skirt portion whereby to seal off adjoining portions of said hub portion and said bearing member from the interior of said skirt portion.

3. In an impeller mounting of the class described for use with a rotating shaft extending vertically thereinto, a member having a hub portion for receiving the shaft therein to turn therewith, said member having an annular bell-like skirt portion depending from said hub portion, a fixed bearing member for the shaft extending upwardly into the member to axially confront said hub portion, said skirt portion being radially spaced from the bearing and extending below the upper end of the bearing, and an elastomeric sleeve resiliently engaging said bearing member and extending upwardly over at least a part of said hub portion to a point substantially above the lower edge of said skirt portion whereby to seal off adjoining portions of said hub portion and said bearing member from the interior of said skirt portion.

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