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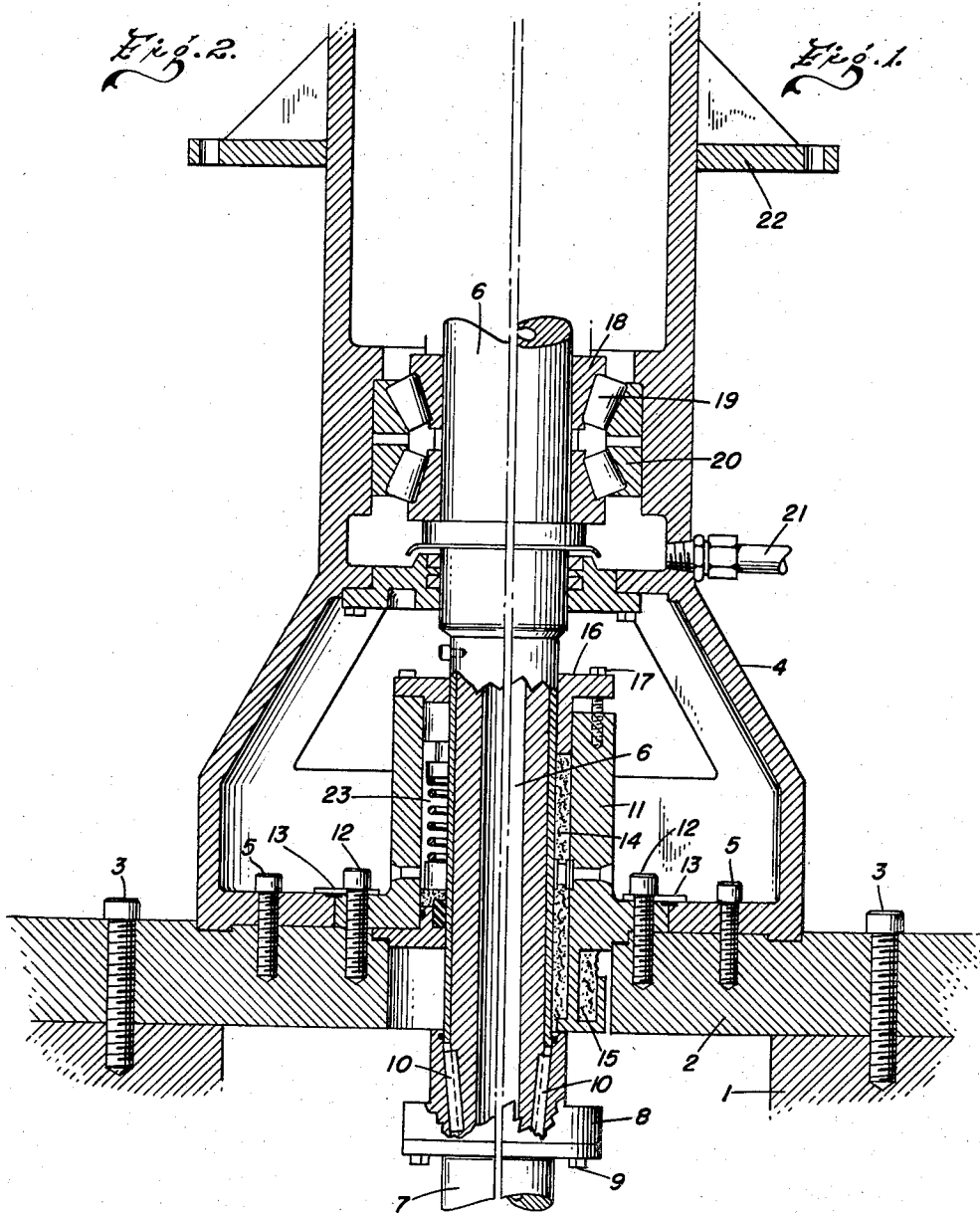
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AGITATOR SHAFT ASSEMBLY

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2 Sheets-Sheet 1



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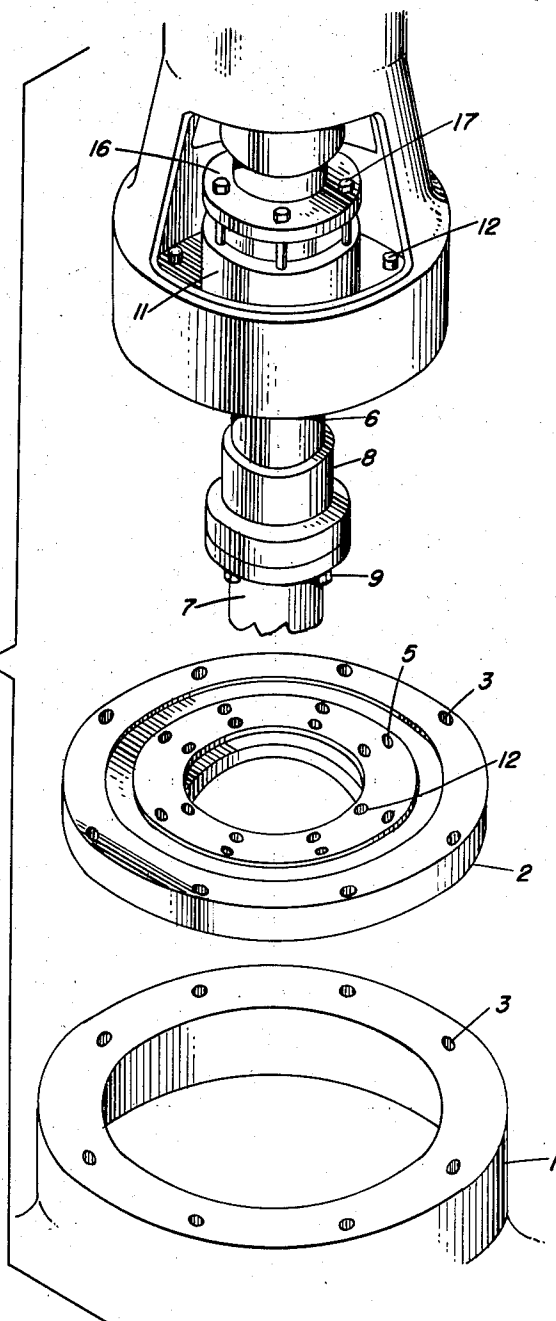
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2 Sheets-Sheet 2

Fig. 3.



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1

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AGITATOR SHAFT ASSEMBLY

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4 Claims. (Cl. 64—1)

This invention relates to agitator drive assemblies. More particularly, it is concerned with an agitator drive assembly for pressure vessels, such as autoclaves, commonly used in the chemical industry. The agitator drive assembly of this invention is especially suitable for use in an apparatus in which acid or ammoniacal oxidation leaching of non-ferrous metals from their ores, concentrates and alloys, is carried out.

Heretofore, agitator drive assemblies of this type have been provided in which the agitator shaft passes through an opening in the pressure vessel and is driven from the outside of the vessel. The vessel itself is generally under superatmospheric pressure. Suitable sealing means are provided to prevent pressure losses through the shaft opening. At the same time, thrust-bearing means are included to keep the agitator shaft in proper alignment and to prevent end-wise movement of the shaft. Unfortunately, such agitator drive assemblies are not wholly satisfactory, for the reason that shaft sealing means are generally too difficult to replace without extensive servicing operations. Usually when defective sealing means are serviced, simultaneously thrust-bearings become misaligned and require expensive and time-consuming realignment procedures. A serious need exists in agitator drive assembly equipment to construct one such assembly in which the sealing means are readily accessible while concomitantly avoiding any disturbance of the thrust-bearing means. Such construction should alleviate any shaft realignment problem.

It is therefore a principal object of the present invention to provide an agitator drive assembly of the type hereinafter described wherein means are provided for making a drive shaft assembly readily accessible for repair and replacement. It is a further object of the invention to provide an agitator drive assembly whereby thrust-bearing means are not disturbed as is necessary in heretofore constructed agitator drive assemblies.

These, and other objects, are attained in a simple and expeditiously surprising manner by providing an apparatus comprising a base member integral with the pressure vessel to which the agitator drive assembly is mounted. Additionally, the base member has an opening therethrough and a cover plate removably attached to said member of the pressure vessel. A shaft housing member is next removably attached to the cover plate. The shaft housing member encloses thrust-bearing means and sealing means contiguous with a driven agitator shaft which passes through the thrust-bearing and sealing means. The driven agitator shaft extends through the cover plate and the base member. The driven agitator shaft is attached below said base member to a removably attached shafting on which fixed blades are integrally mounted.

The apparatus of the present invention, however, will be understood more readily from the more detailed description of an embodiment thereof and from the accompanying drawing in which:

Fig. 1 is a vertical elevation, partly in section of the right-hand half of an agitator drive shaft, thrust-bearing,

2

stuffing-box and housing assembly constituting one embodiment of the invention;

Fig. 2 is a view similar to Fig. 1 showing the left-hand half of a similar assembly but modified to the extent of providing a mechanical shaft-sealing means; and

Fig. 3 is an exploded, perspective view of the drive shaft assembly.

Referring to the drawings, and particularly to Fig. 1 and Fig. 2 thereof, an open top base member 1 is shown, to which cover plate 2 is attached and secured by bolts 3. Removably mounted on cover plate 2 is drive assembly housing 4 which is secured to cover plate 2 by means of machine bolts 5. A centrally and vertically aligned hollow composite drive shaft 6 is dependent from some conventional direct or indirect drive means (not shown). Shaft 6 extends down through housing 4 and both cover plate 2 and base 1. To the lower end of shaft 6 a flanged shaft 7 is secured by flanged coupling 8 and bolts 9. Fixed agitator blades of conventional design (not shown) are mounted on shaft 7. Coupling 8 is removably keyed to shaft 6 by means of a metal key 10 or other suitable securing means.

Stuffing box housing 11 is attached to cover plate 2 through assembly housing 4 by means of bolt 12 and split ring 13. Packing 14 fills the space between housing 11 and shaft 6. The stuffing-box assembly is insulated by a heat-resistant material in the area defined by 15. Gland follower 16 is unitarily attached to stuffing-box housing 11 by machine bolts 17.

As shown in Figs. 1 and 2, a thrust-bearing means comprising an inner race 18, a tapered bearing 19 and an outer race 20 are located immediately above the sealing means. Suitable lubricant for the thrust-bearing is fed to the latter bearing through line 21. As is further shown in the referred-to drawing, a lug is provided at 22 for purposes of lifting the drive assembly housing 4 when required.

To illustrate the mounting of the several elements comprising the agitator drive assembly of the invention, reference to Fig. 3 is made. It will become readily apparent that cover plate 2 can be placed directly over the opening in base member 1. Assembly housing 4 can be next mounted directly on cover plate 2. The remaining numeral references in Fig. 3 correspond to those of Figs. 1 and 2.

In order to replace a defective seal in the apparatus defined hereinbefore, the following procedure is employed. Referring to Fig. 1, bolts 5 and 12 are removed and the drive assembly housing 4 is lifted from the cover plate 2 by means of lug 22 until the flanged coupling 8 clears said cover plate 2. At this point, a holding means such as a fork is inserted below the flanged section of shaft 7. Thereafter, bolt 9 is removed to permit the housing 4 to be lifted farther above cover plate 2. Housing 4 is then mechanically lifted while shaft 7 is maintained in a fixed position by the fork or other similar conventional holding means. The fork, for example, is inserted between the flanged section of shaft 7 and rests upon the top of the cover plate 2. Key 10 is next driven out from its key recesses so as to permit flanged coupling 8 to be readily detached from shaft 6. The coupling 8 is then removed by downwardly withdrawing said coupling to free it from shaft 6. The sealing means 11 is then accessible by unloosening gland follower bolt 17. Then the sealing means housing 11 is eased off shaft 6. The packing in of the sealing means is now exposed. It is a simple and well understood procedure how to replace and otherwise service the defective seal.

It will be apparent to those skilled in the art of the many practical advantages achieved by the ready accessibility to the sealing means by the construction of the apparatus described above. Hence, without disturbing the

thrust-bearing means, one is able to readily replace or substitute the sealing means. For example, a mechanical sealing means can be readily substituted for a stuffing-box sealing means. Such mechanical sealing means is shown in Fig. 2 at 23. Hence, interchangeability of the sealing means is readily afforded by the present invention.

Reversing the procedural steps as outlined above for replacing a defective seal will readily effect easy reassembly of the apparatus herein defined. To recapitulate then, after the sealing means and the housing therefor are in place about shaft 6 by means of key 10, the drive assembly housing 4 is lowered in place to meet the flanged shaft 7. Said housing 4 is rebolted by means of bolt 9. The holding means is next withdrawn. The entire assembly is lowered onto the cover plate 2 and rebolted at 5. Sealing means housing is also rebolted at 12. In this fashion, repair and reassembly of the sealing means are attained without disturbing any thrust-bearing means so that problems relative to realignment of the shaft are not met. This is extremely advantageous for the reason that to dislocate a thrust-bearing introduces an alignment problem. Further, dislocation exposes a bearing to an atmosphere of dust, grit and other foreign impurities frequently present in chemical plants. As is known, any dust or grit which attaches itself to thrust-bearing means will cause misalignment. To realign a shaft is indeed time consuming and costly.

It is a further advantage of the present invention that the inner surfaces of the agitator drive assembly can be conveniently coated and otherwise protected by a corrosion-resistant material, such as titanium or titanium alloys. So-protected pressure vessels of the type described can be advantageously used for oxidation leaching operations in which a highly corrosive liquid is obtained as a result of that operation.

I claim:

1. An improved drive shaft assembly adapted for pressure vessels and the like which consists essentially of: (1) a cover plate having a centrally located opening therethrough and being removably attached to a base member; (2) interchangeably fixed sealing means housed in an enclosure directly and removably attached to said cover plate; (3) fixed thrust bearing means located above and independent from said sealing means enclosure; (4) a drive shaft housing member removably attached to said cover plate adapted to enclose and separately contain the sealing and thrust bearing means; (5) a driven axially aligned drive shaft centrally extending through the thrust bearing means, sealing means and cover plate, respectively; and (6) a depending shafting detachably mounted to the axially aligned drive shaft at a point beneath the cover plate.

2. An apparatus according to claim 1 in which the driven axially aligned agitator shaft is coupled by means of a key to a flanged coupling means directly attached to said depending shafting.

3. An apparatus according to claim 1 in which the sealing means comprises stuffing-box means.

4. An apparatus according to claim 1 in which the sealing means is a mechanical seal.

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