United States Patent

Wilkinson

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[54] BARGE PUMP

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[52] **U.S. Cl.**.....**417/410**, 222/385, 418/202, 417/424

[51] **Int. Cl.**.....**F04b 17/00**, B67d 5/40, F03c 3/00

[58] **Field of Search**.....417/360, 410, 424; 60/52 US; 222/333, 385; 418/216, 202

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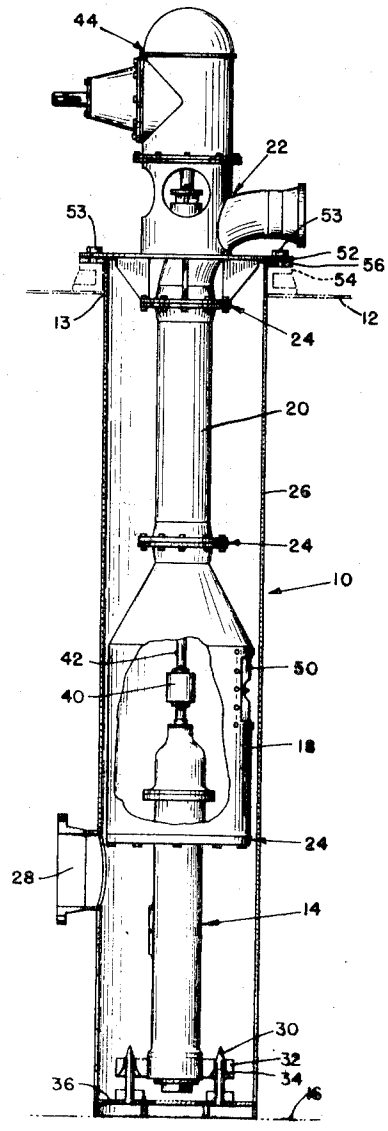
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[57] **ABSTRACT**

A pump unit is suspended from a barge deck and located within a large diameter sealed tube positioned on the bottom wall of the barge. Pin and flange members position the lower end of the pump unit against lateral movement while permitting the unit to be readily removed from the barge.

10 Claims, 3 Drawing Figures



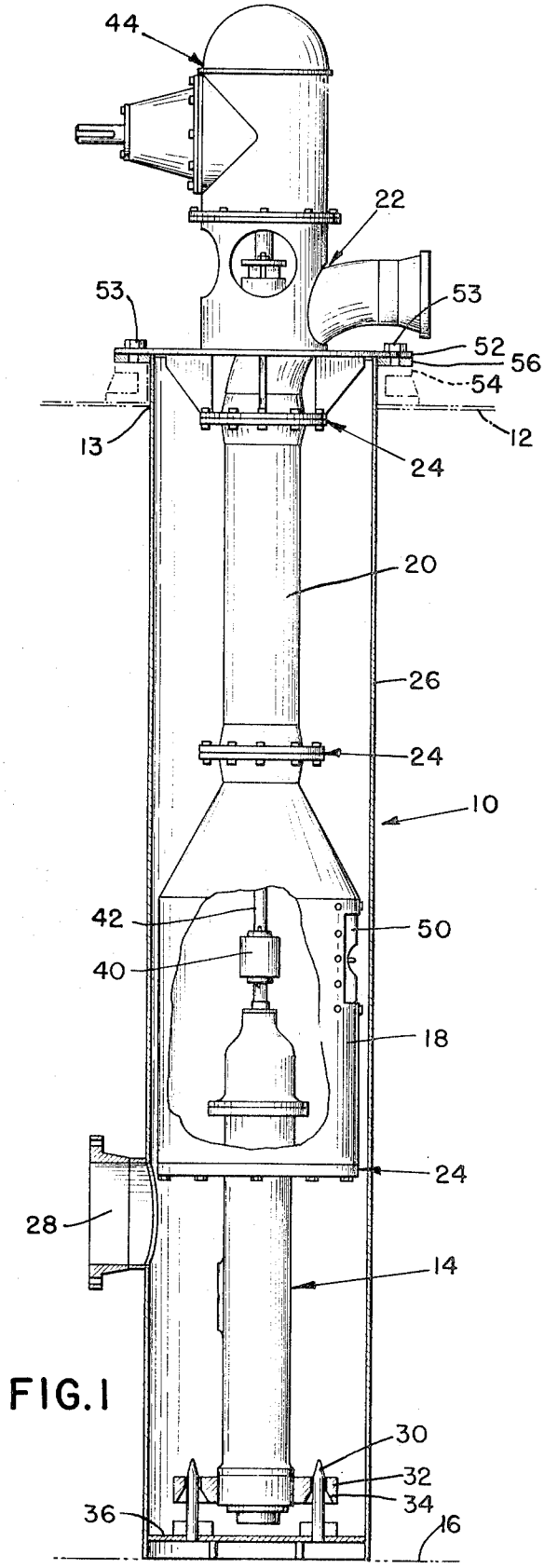


FIG. 1

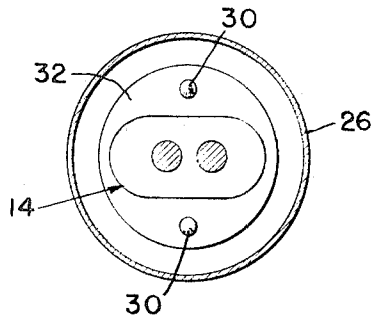


FIG. 3

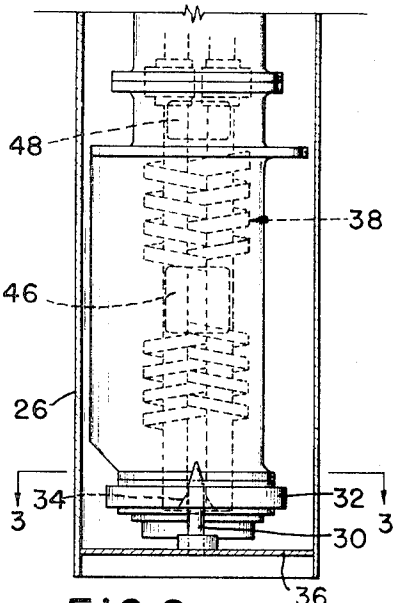


FIG. 2

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BARGE PUMP

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

The present invention relates to new and useful improvements in pumps, and more particularly to pumping units adapted to be suspended from a barge deck or other fluid storage tank.

The pump assembly is suspended adjacent the upper end thereof from a barge deck and located at the lower end by a positioning mechanism mounted adjacent the bottom of the barge. The locking mechanism allows vertical movement of the pumping assembly while positioning the lower end thereof against lateral displacement. This design permits ease of removal of the assembly from the barge and permits substantial flexing movement between the deck and bottom wall of the barge.

Briefly, the pumping assembly includes a pumping unit suspended by a hollow piping unit within a vertically disposed, sealed deep well or suction tube near the bottom wall of a barge. The driver for the pumping unit is mounted on the barge deck thus eliminating the need for a pump room. The self-priming pumping unit, connected to the barge suction piping, displaces the fluid vertically through the piping unit to a discharge head mounted on the deck which is adapted to be connected to discharge piping. Tapered pins or lugs secured adjacent the lowermost end of the pumping unit extend vertically above the barge bottom wall to cooperate with a flanged member having tapered pin receiving openings therein.

One of the primary objects of the invention is an improved high capacity, self-priming pumping assembly capable of pumping high-viscosity fluids.

Another object of the invention is the provision of a pumping unit suspended within a tank from a support which is adapted for quick removal even from a filled tank.

A further object of the invention is a pump assembly suspended from a barge deck permitting substantial flexing movement between the deck and the barge suction piping.

Still another object of the invention is the provision of a pumping assembly which eliminates the requirement for a pump room and utilizes a minimum amount of cargo space.

Other objects and advantages of the invention will become apparent to those skilled in the art from the consideration of the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a fragmentary side sectional view of the pumping unit suspended from a barge deck and positioned within a suction well secured to the barge;

FIG. 2 is a fragmentary side sectional view of the pumping unit rotated approximately 90° from the position of FIG. 1; and

FIG. 3 is a sectional view of the pumping unit taken along line 3—3 of FIG. 2 and illustrating the mechanism for positioning the lowermost end of the pump unit against lateral movement.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawing which illustrates a preferred embodiment of the present invention, there is illustrated a pumping assembly 10 for pumping out the contents of barges. The pumping assembly 10 is suspended from the barge deck 12 and extends through opening 13 such that the pump unit 14 is positioned just above the bottom wall 16 of the barge. The pump unit 14 is suspended below the deck 12 by a tube 18 and a spool section 20 which are secured to the pumping assembly discharge head 22. The pump unit 14, tube 18, spool section 20 and discharge head 22 are maintained in assembled relation by suitable flanged connections 24.

A large diameter tube or deep well 26 is mounted vertically within a barge compartment on the barge bottom wall 16 by suitable means, not shown, and extends to a height adjacent the pumping assembly discharge head 22. The deep well 26 is sealed except for a flanged opening 28 on one side, adjacent the pump unit 14, for connection to the barge suction piping, not shown, that is valved to each compartment of the barge.

The pump unit 14 is located within the deep well 26 near the bottom wall 16 by means of large steel pins 30 tapered at the upper ends thereof for insertion into tabs 32 secured to the lower end of the pump unit 14. The openings 34 provided in the tabs 32 are drilled to form a relatively tight fit with the pins 30, and are tapered gradually adjacent the entrance to facilitate insertion of the pins 30 within the openings 34 even when slightly misaligned. The pins 30 and the tabs 32 defining openings 34 preferably are coated with nylon or other suitable material to dampen vibrations between the pins and the tabs. Alternatively, bushings may be provided within the tab openings to dampen vibrations. The pins 30 are attached to a plate 36 which may be secured to the deep well 26 or to the barge bottom wall 16.

The pin and tab arrangement limits the pump unit 14 against lateral movement and still permits displacement of the pump assembly 10 for ease of removal from the deep well 26. Since the pumping assembly 10, secured to the barge deck 12, is not fixed at its lowermost end to the bottom wall 16, maximum flexing movement is permitted between the deck 12 and the barge bottom 16 and suction piping.

While various types of pumping units 14 may be employed, preferably the unit comprises a positive displacement, high-capacity, intermeshing twin screw pumping element 38 driven through a coupling 40 by a drive shaft 42 extending through the spool section 20 and the tube 18. Power is supplied to the drive shaft 42 from a suitable source, not shown, through a right-angle speed reducer 44 mounted upon the discharge head 22. Alternatively, the shaft 42 may be driven from a vertically mounted drive means such as a vertical diesel. The self-priming pump unit 14 takes suction through an opening 46 located near the center of the screw element 38. The suction opening 46 of the pump 14 is mounted well below the flanged opening 28 which is adapted to be connected to the barge suction piping. In the event suction is lost in the piping, the pump unit 14 continues to pump lowering the pressure in the sealed deep well 26 drawing fluid into the piping and effectively priming the pump. Fluid is pumped within a passage and the unit 14 toward the upper end thereof and discharges through an opening 48 into the tube 18 supporting the pump unit. The discharged fluid is displaced vertically around the drive shaft 42 through the tube 18 and spool section 20 to the flanged discharge head 22 which is adapted to be connected to discharge piping. A stuffing box, not shown, prevents leakage along the drive shaft. A door 50 is provided on the tube 18 to furnish access to the upper end of the pump unit 14 and coupling 40 for maintenance functions.

As can be observed from FIG. 1, a plate 52, secured to the discharge head 22, rests upon a block 54 welded to the deck 12 encircling the opening 13 for mounting the pumping assembly 10. The plate 52 is secured to the block 54 by a series of bolts 53 and is sealed by a gasket, "O"-ring or other large diameter removable seal.

While the pumping assembly has been described as pumping out the contents of barges, it is equally applicable to pumping out various types of storage tanks. Furthermore, being mounted at the bottom of the deep well 26, the pump assembly is not limited in capacity by its suction head. The positive displacement pump is not limited to low-viscosity fluids but is highly efficient with high-viscosity fluids. Of course, flow lines and drivers for the pumping assembly must be sized for the expected flow conditions.

I claim:

1. A pumping assembly for displacing fluid comprising: a pumping unit adapted to be disposed within a storage tank having top and bottom walls, means secured to said pumping unit for suspending said unit from a support, means positioned at the end of said pumping unit remote to said support means for restricting lateral movement thereof while permitting longitudinal movement of the pumping unit, vertically disposed

means encompassing said pumping unit and said pumping unit restricting means, said vertically disposed means extending to said bottom wall.

2. A pump assembly as defined in claim 1, said pumping unit restricting means comprising first and second interengaging means, one of said first and second interengaging means being secured to said pump unit, and the other of said first and second interengaging means being fixedly positioned below said pump unit.

3. A pump assembly as defined in claim 1, said encompassing means comprising a vertically disposed tube positioned within the fluid storage tank and having a flanged opening.

4. A pump assembly as defined in claim 3, wherein said pumping unit comprises a twin screw unit having a center suction opening, said suction opening being positioned below said flanged opening.

5. A pump assembly as defined in claim 1, said pumping unit restricting means comprising a first means fixedly positioned below said pump unit, and a second means provided on said pump unit for cooperatively engaging said first means.

6. A pump assembly as defined in claim 1, said means for suspending said pumping unit including a hollow piping unit through which the pumped fluid is vertically displaced.

7. A pump assembly as defined in claim 1, wherein said pumping unit comprises a high-capacity, twin screw, center suction unit.

8. A pump assembly as defined in claim 1, further including means for driving said pump unit, said drive means extending through said means for suspending said pump unit for connection to a prime mover mounted on the support.

9. A pump assembly as defined in claim 1, said means restricting lateral movement of said pump unit including vertically disposed pins fixedly secured below said member, and a member secured to said pump unit having openings provided therein for receiving said pins.

10. A pump assembly as defined in claim 9, said pins being plastic coated to dampen vibrations between said pins and said member.

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