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DIRECT COUPLED MAGNETIC DRIVE CENTRIFUGAL PUMPS

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My invention relates to improvements in direct coupled magnetic drive centrifugal pumps.

The objects of the invention are to produce a magnetically driven centrifugal pump of extreme simplicity, in which the pump element can be quickly dismantled and the impeller structure withdrawn to facilitate cleansing and sterilizing, if desired.

Further objects are to provide a simple pump which can be carried from one location and connected up to a flexible hose line at any other location, and further to provide a pump wherein no lubrication of parts is necessary, so that the pump may be safely used in pumping milk, or other fluid, which must be kept in a pure state.

Other advantages will appear as the specification proceeds.

The drawing is a longitudinal sectional view of the invention, showing the motor to which it is directly connected in elevation.

The numeral 10 indicates generally an electric motor mounted upon a baseboard 11. The motor has the usual drive shaft 12 extending from one end cover 14. Mounted upon the cover 14 is a housing 15 which is divided transversely to provide a drive rotor casing 16 and a pump casing 18. A dome-shaped diaphragm 19, preferably formed of stainless steel, is interposed between the two casings 16 and 18 and is provided with a flange 21 which bears upon the flange 22 of the casing 16 and has a cylindrical rim 24 engaging the periphery of said flange and which is secured thereto by screws 25.

Keyed to the free end of the shaft 12 is a drive rotor 26 consisting of a flange 27 having a plurality of pockets 28 around its periphery in each of which a permanent magnet 29 is placed, with its pole pieces 30 in proximity to the periphery of the diaphragm 19 on its concave face.

A recess 54 is formed in the centre of the concave side of the impeller flange 49 and a thrust bearing 55 is fitted therein which bears upon the centre of the diaphragm 19. An annular ring 57 of high electrical conductivity and preferably copper is secured to the periphery of the flange 49 to form, with the flange, a bimetallic band 58 in opposition to the pole pieces 30 of the magnets 29 of the drive rotor. The annular ring 57 is fitted to conform to the shape of the diaphragm 19 and is secured non-rotatably to the flange 49 by rivets 59.

With the motor 10 running, the drive rotor 26 imparts a non-positive drive by eddy currents between the magnet rotor and the bimetallic rotor to the impeller flange 49 and its blades 50 to draw liquid through the inlet 40 and discharge it through the outlet openings 42 in the usual way. At the end of a run or when it is deemed necessary to clean the pump parts, the nuts 36 are removed and the pump casing 18 is detached from the casing 16. The diaphragm 19 being secured to the flange 22 of the casing 16, is not disturbed in any way. With the casing 18 removed, the impeller 51 with its sleeve 48 may be removed and cleaned by any appropriate means and by simply replacing said sleeve into its bearings 45 and replacing the flange 18 and the nuts 36, the pump is again ready for use.

It will be noticed that since the impeller is journalled in one sleeve bearing only, slight axial displacement of the impeller and the drive rotor would not create any frictional drag in the operation of the pump, the thrust bearing 55 being free to move about the centre of the diaphragm if necessary.

What I claim as my invention is:

1. A magnetic drive centrifugal pump having a drive rotor casing and an aligned pump casing separated by a thin dome shaped diaphragm of substantially non-magnetically permeable material, a drive rotor having a plurality of angularly disposed magnets arranged in an annulus around the rotor with their pole pieces facing the periphery of the pump casing and the concave surface of the diaphragm adjacent its periphery, said pump casing having an axial elongated cylindrical bearing support terminating in an axial inlet opening at one end, a tangential outlet opening communicating with said pump casing, a driven rotor having a bearing sleeve at its outer end, said bearing sleeve being journalled within the cylindrical support, said driven rotor having a substantially concave flange of magnetic permeability and a band parallel with the annulus of magnets, said band being of a metal of high electrical conductivity and forming with the flange a bimetallic element, said flange having a plurality of impeller blades on its convex side and a thrust member carried axially of the flange adapted to bear upon the centre of the diaphragm on its convex side, the peripheral marginal edge of the diaphragm extending between the magnet pole pieces and the band of the driven rotor.

2. A magnetic drive centrifugal pump as claimed in claim 1, wherein the inlet opening is of the same diameter as the bore of the bearing sleeve.

3. A magnetic drive centrifugal pump as claimed in claim 1, said cylindrical bearing support forming the sole journal for the bimetallic rotor.

4. A magnetic drive centrifugal pump having a drive rotor casing and an aligned pump casing separated by a thin dome shaped diaphragm of substantially non-magnetically permeable material, a drive rotor having a plurality of angularly disposed magnets arranged in an annulus around the rotor with their pole pieces facing the periphery of the pump casing and the concave surface of the diaphragm adjacent its periphery, said pump casing having an axial elongated cylindrical bearing support terminating in an axial inlet opening at one end, a
tangential outlet opening communicating with said pump casing, a driven rotor having a bearing sleeve at its outer end, said bearing sleeve being journalled within the cylindrical support, said driven rotor having a substantially concave flange of magnetic permeability constituting an armature, said flange having a plurality of impeller blades on its convex side and a thrust member carried axially of the flange adapted to bear on the centre of the diaphragm on its convex side, the peripheral marginal edge of the diaphragm extending between the magnetic pole pieces and the armature.

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