Aug. 1, 1950 L. R. PETERS 2,517,233

SINGLE CAVITY TYPE MOTOR-DRIVEN PUMP

Filed Jan. 19, 1946

FIG. 1

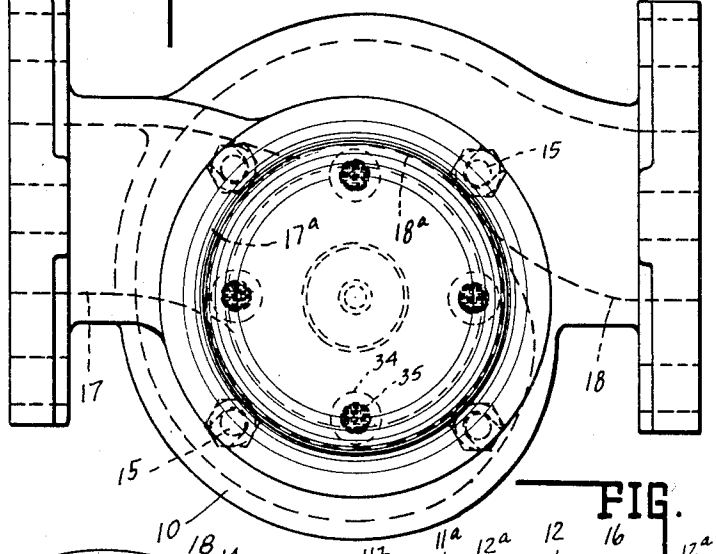


FIG. 2

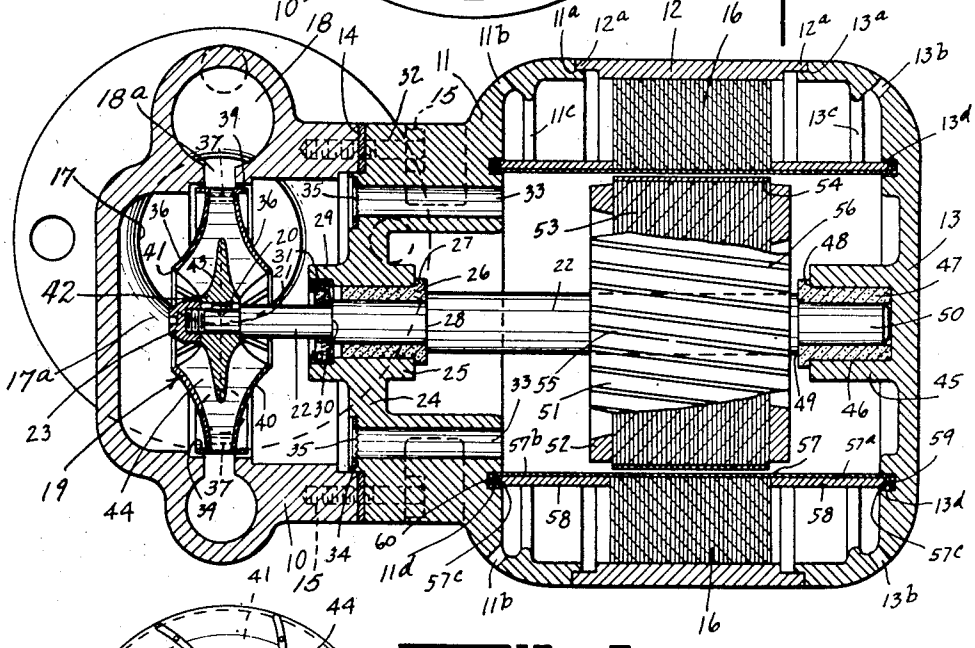
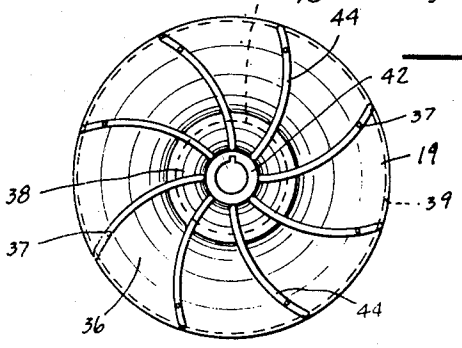


FIG. 3



INVENTOR.
LAYMAN R. PETERS.

BY
Lockwood, Goldsmith & Galt.
ATTORNEYS.

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SINGLE CAVITY TYPE MOTOR-DRIVEN PUMP

Layman R. Peters, Peru, Ind.

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2 Claims. (Cl. 103—87)

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This invention relates to a motor driven pump unit.

The chief object of this invention is to provide such a unit wherein simplicity is of the highest order, operational wear is materially reduced, and operational failure is substantially eliminated, and such a unit furthermore can be easily and economically produced, readily lending itself to mass production and facilitating inspection and repairs when necessary.

One chief feature of this invention resides in what might be termed a "single" cavity type unit, that is, one wherein the motor rotor is exposed to the fluid handled by the pump.

Another chief feature of the invention resides in arrangement of the rotating parts so that all are enclosed, thereby eliminating the necessity for exterior glands and the like.

Another feature of the invention resides in the internal communication of the so-called "single" cavity unit whereby, regardless of unit positioning, the cavity is always exposed to the fluid handled by the pump.

Still a further feature of the invention resides in the protection provided to prevent scale jamming of the rotor etc. Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings

Fig. 1 is an end elevation of the unit embodying the invention and of the pump end thereof.

Fig. 2 is a central sectional view through the unit, a portion of the rotor being shown in elevation.

Fig. 3 is a slightly enlarged side elevation of the impeller member with one fan removed to show other parts of that member in greater detail.

In Fig. 2 of the drawings, 10 indicates the pump housing, 11 the connector housing, 12 the spanning housing and 13 the motor end housing. Same may be of suitable material. Housings 11 and 10 are secured together, with gasket 14 therebetween, by screw bolts 15, see Fig. 1.

Housing 11 at its opposite end is grooved at 11a and end housing 13 is similarly grooved on its adjacent end as at 13a and drain holes 11b and 13b may be included in housings 11 and 13 if desired. Adjacent thereto are the annular internal ridges 11c and 13c respectively.

Housings 11 and 13 have interposed therebetween housing 12 aforesaid same having complementary tongue portions 12a for seating in grooves 11a and 13a.

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Carried by the housing 12 are the field coils 16 of a single phase induction type motor. The leads thereto are omitted for clearness. Elongated screw bolts, not shown, bear upon and pass through housing 13, pass between the field coils and screw into housing 11.

In the aforesaid manner by means of screw bolts 15 and those last mentioned, the several housings are rigidly secured together and the only openings are vent and drain holes 11b and 13b for inlet 17 and outlet 18 of pump housing 10, are connected respectively by suitable piping to a source of liquid and a liquid receiving device. The inlet discharges to the impeller at throat 17a and liquid is discharged from the impeller at throat 18a and these are juxtapositioned to each other whereby the impeller subjected liquid traverses approximately 300° or so through the pump.

In this housing 10 is the impeller 19 keyed as at 20 to the shouldered and threaded end 21 of shaft 22 and retained on the latter by nut 23. Housing 11 at the impeller adjacent end thereof, includes a partition 24 terminating in an elongated bearing 25 which supports a carbon sleeve 26 shouldered at 27 that rotatably supports shaft 22 shouldered at 28. Bearing 25 is enlarged in the pump end thereof as at 29 and seated therein, and associated with shoulder 30 of said shaft is a seal 31.

This seal for reasons apparent hereinafter, need not be of fluid type character but only of a character to prevent scale, grit, etc. working from the pump chamber to bearing 25, and injuring same or the shaft 22. Housing 11 includes bosses 32 and same have included therein bores 33 parallel to the shaft. These bores are open at opposite ends. The pump ends are enlarged as at 34 to provide seats for screens 35. Thus the rotor chamber, except for screen protection, is in free communication with the pump chamber at all times. Thus scale, grit etc. cannot gain access to the rotor chamber but the liquid 35 is free to circulate in and to and through the rotor chamber.

The pump impeller 19, see Figs. 2 and 3, includes two end plates 36 pinned as at 37 or the like to a central casting 38. Each plate has an outwardly directed rim or flange 39 and the body portion is dished outwardly as at 40 and has a central opening 41 therein. The casting 38 has a short hub portion 42 and the same from opposite ends is flared and outwardly directed toward

a median plane as at 43. Integral therewith and projecting endwise therefrom and outwardly with reference to the impeller periphery are he arcuately arranged curved vanes 44 which, at their side edges, bear against the plates 19 aforesaid. This pump, obviously, is of balanced type so that axial thrust in any one direction is eliminated which obviously reduces to a minimum or eliminates shaft end play.

Reference will now be had more particularly to Fig. 2 with reference to additional motor disclosure. Therein end casting 13 includes the inwardly directed boss 45 socketed as at 46 to take a carbon sleeve 47 flanged at 48. Shaft 22 is shouldered at 49 to bear on flange 48 and end 50 is rotatably supported in sleeve 47.

The rotor 51 carried by the shaft in the housing provided rotor chamber includes end plate portions 52 and laminations 53 suitably secured together. As illustrated the periphery of the laminations are notched as at 54 and same are progressively offset annularly, such producing inclined grooves 55 which are metal filled as at 56. This rotor is suitably secured to the shaft 22 and same constitutes one piece, as it were.

Enveloping this rotor and in close proximity thereto is metallic sleeve 57 which preferably is of substantially non-magnetic stainless steel. This tube or sleeve is extended as at 57^a and 57^b and the respective ends are turned outwardly as at 57^c. Interposed between the field or stator and such flanges 57^c are the sleeves 58 which stiffen and reinforce the sleeve 57 and assist in location of the field structure for satisfactory motor operation.

The motor end housing 13 is annular grooved at 13^d to take gasket 59 and the adjacent ends of sleeves 57 and 58. Similarly the housing 11 is grooved at 11^d to take gasket 60 and the adjacent ends of sleeves 57 and 58. When the elongated screw bolts are suitably screwed home the rotor chamber is fluid sealed from the stator chamber portion. Thus the electrical connections are all protected from the fluid.

Should any liquid work through the sleeve sealed connections last mentioned it will, no matter how the unit be mounted, flow toward the ridge or ridges 11^c and/or 13^c and waste through opening or openings 11^b and/or 13^b before it can affect the stator windings or electrical connections.

Preferably the motor will be of cast copper and chrome plated to prevent rusting or corrosion and consequent operational failure. The motor stator preferably is of cast copper. The shaft may be of hardened, ground and polished steel and if desired metal plated at the bearing portions thereof.

The foregoing structure obviously lends itself to mass production methods of fabrication, ease of assembly and ease of disassembly for inspection and repair purposes. Observe in Fig. 2 that when the pump housing 10 is uncoupled from the housing 11 at bolts 15, the entire motor unit and impeller 19 can be detached for impeller replacement if necessary. If motor repair is necessary

either the operation previously described can be effected for rotor repair etc. plus the following or only that to be described when stator repair only is required. This operation is to remove the motor housing screw bolts and then pull axially on the motor end housing 13 and then on housing 12. The rotor can be completely removed or disassembled by finally removing impeller 19 from the shaft.

While the invention has been illustrated and described in great detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein, as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In an electric motor driven pump of the single cavity effect type having in spaced relation a rotor and an impeller, a common shaft, an open end housing for the motor and an open end housing for the impeller, the housing open ends confronting each other the combination therewith of a single partition between said housings and forming a closure for the open end of each of the housings, said partition having a central bore therethrough, bearing means in the bore for rotatably supporting the shaft between the rotor and impeller thereon, the partition being elongated concentrically with respect to and spaced from said shaft and having spaced exterior flanges disposed contiguous to the housings, and means rigidly securing each flange to its contiguous housing, the elongated portion of the partition having ports therethrough contiguous to the flanges and communicating at opposite ends with the pump and rotor chambers in said housings.

2. A pump as defined by claim 1 wherein opposite ends of the partition bore terminate in annular flanges extending toward the housings, the pump housing directed flange extending into the pump housing.

LAYMAN R. PETERS.

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