

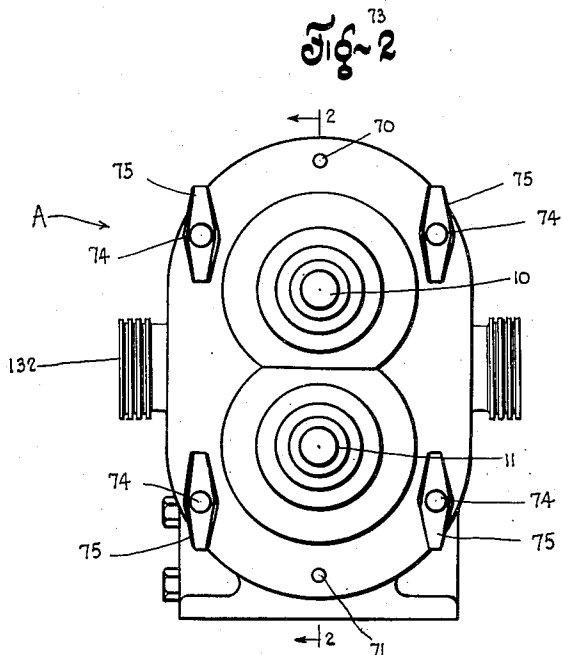
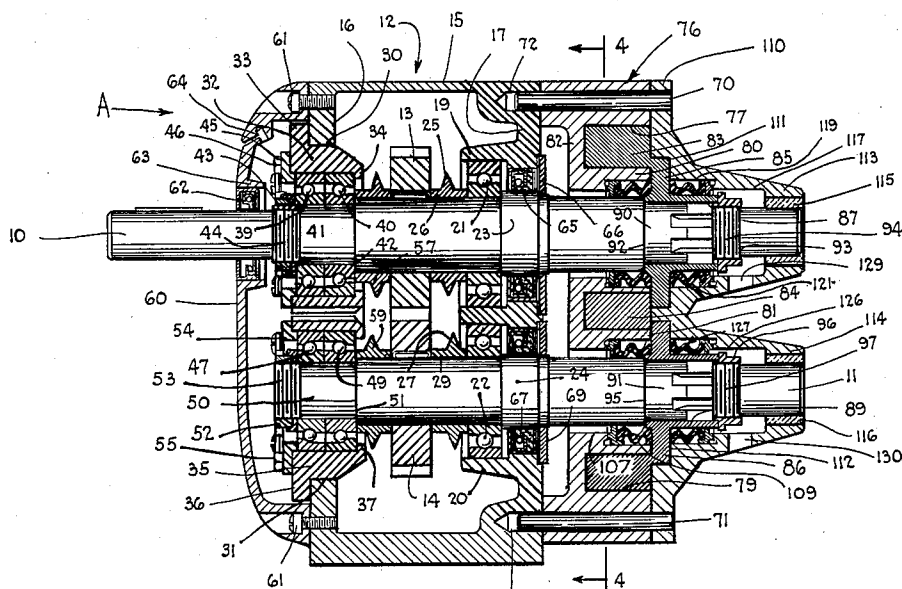
April 7, 1953

F. COLLURA
SANITARY PUMP

2,633,807

Filed June 20, 1947

2 SHEETS—SHEET 1



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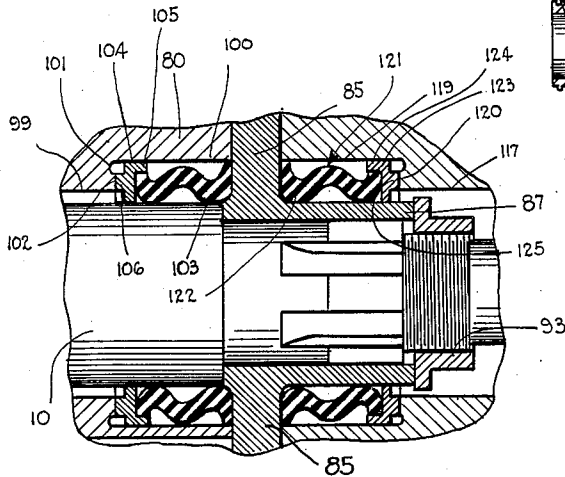
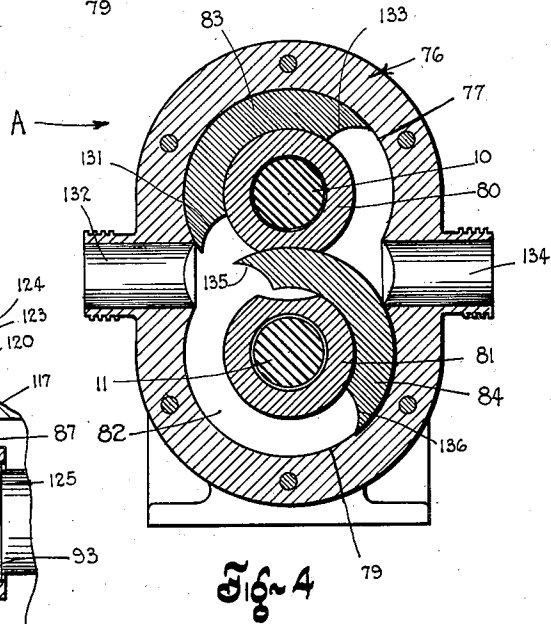
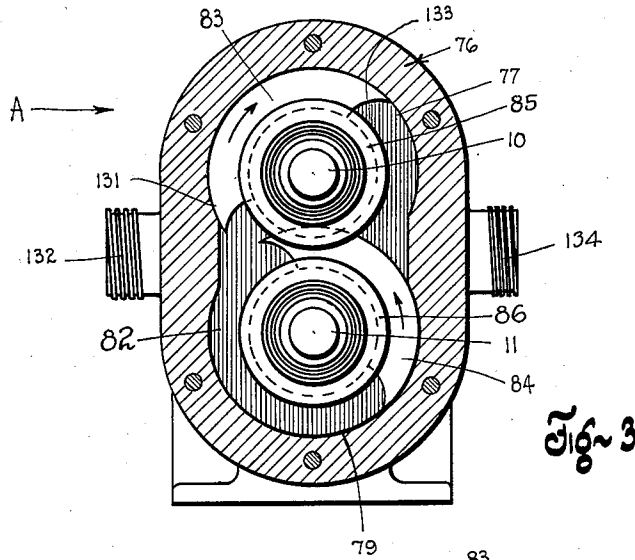
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

2,633,807

SANITARY PUMP

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tion of Minnesota

Application June 20, 1947, Serial No. 755,851

8 Claims. (Cl. 103—126)

1

The present invention relates to an improve-
ment in sanitary pump wherein it is desired to
provide a pump capable for use in pumping milk,
foodstuffs or the like.

Pumps designed for use for pumping foodstuffs
or similar materials must be so constructed that
they can be easily cleaned and sterilized. It is
also desirable that such pumps be so manufac-
tured that the parts of the pump in contact with
material pumped may be quickly removed for
cleaning and sterilizing purposes. It is also de-
sirable that such pumps be made with a mini-
mum number of parts to be removed so that the
task of cleaning and sterilizing the pump may
be simplified.

It is the object of the present invention to
provide a pump which may be used for pumping
foodstuffs or the like and which may be quickly
and easily taken apart for cleaning and steri-
lizing purposes. By removing an end closure
plate of the pump all of the parts which come
in contact with the material being pumped are
rendered readily accessible for easy removal and
for cleaning purposes.

A feature of the present invention resides in
the provision of a bearing structure which firmly
holds the impeller shafts during rotation thereof.
The pump is provided with two parallel shafts
which support rotating interacting impellers to
produce the pumping action. These shafts are
rotated in unison in opposite rotative directions
by meshing gears mounted on the two shafts.
Bearings are provided on each side of the gears
so as to firmly support the shafts during rotation
thereof.

A feature of the present invention lies in the
provision of an outboard bearing which is sup-
ported by the removable pump end and which
assists in supporting the free ends of the shafts
during rotation thereof. The rotatable pistons
are supported between an intermediate bearing
and this outboard bearing so as to provide a
minimum of strain upon the shafts.

A feature of the present invention resides in
the provision of a sealing means interposed be-
tween the gear casing enclosing the meshing
gears and the projecting ends of the shafts which
support the impellers. As a result none of the
oil or grease within the gear box is allowed to
enter the pumping area and none of the material
being pumped is allowed to enter the gear box.

A further feature of the invention lies in the
provision of outboard bearings which are sepa-
rated from the pump chambers by means of a
liquid tight seal. As a result the fluid being
pumped is held within the pump chambers and

2

is not allowed to enter the shaft supporting
bearings.

A further feature of the present invention
resides in the provision of a replaceable sealing
ring which may be replaced when worn without
the necessity of machining the portions of the
casing against which the sealing rings engage.
The seals are so devised that considerable wear
may take place before it will become necessary
to machine the wearing surfaces on the pump
housing.

A further feature of the present invention
resides in the elimination of any threads within
the liquid chamber of the pump. This is an
important feature as it eliminates the tendency
for food particles to become lodged in inaccessible
and hard to clean threads.

These and other objects and novel features
of the present invention will be more clearly
and fully set forth in the following specification
and claims.

In the drawings forming a part of my speci-
fication:

Figure 1 is an end elevational view of the pump
showing the construction thereof.

Figure 2 is a vertical sectional view through
the pump, the position of the section being indi-
cated by the line 2—2 of Figure 1.

Figure 3 is an end elevational view of the pump
with the end cover plate thereof removed.

Figure 4 is a cross sectional view through the
pump, the position of the section being indicated
by the line 4—4 of Fig. 2.

Figure 5 is an enlarged sectional view through
one of the seals between the shaft and the
housing showing the construction.

The pump A includes a drive shaft 10 and a
parallel shaft 11 supported in spaced parallel
relation by a gear casing or housing indicated
in general by the numeral 12. A pinion 13 on
the drive shaft 10 engages a similar pinion 14
on the shaft 11 so as to drive the shafts 10 and
11 in opposite rotative directions in unison. The
pump action is provided by interacting impellers
mounted on the shafts 10 and 11 as will be later
described in detail.

The gear casing 12 includes a peripheral wall
15 having an end wall 16 at one end thereof and
a second end wall 17 at the other end thereof.
A pair of sleeves 19 and 20 are supported by
the end wall 17 in coaxial relation with the shafts
10 and 11 respectively. A ball bearing 21 is
interposed between the sleeve 19 and the shaft
10. A similar ball bearing 22 is interposed be-
tween the sleeve 20 and the shaft 11. The inner

3

race of the bearing 21 engages against an enlarged diameter portion 23 of the shaft 10. The inner race of the bearing 22 is similarly engaged against an enlarged diameter portion 24 of the shaft 11. A flinger ring 25 is mounted upon a spacing sleeve 26 interposed between the inner race of the bearing 21 and the pinion 13. An off-set flinger ring 27 is mounted on a spacer sleeve 29 interposed between the inner race of the bearing 22 and the pinion 14.

The end wall 16 is provided with a pair of apertures 30 and 31 therein. The aperture 30 is coaxial with the shaft 10, while the aperture 31 is coaxial with the shaft 11. A bushing 32 is provided in the aperture 30. This bushing 32 is provided with a peripheral flange 33 which overlies a portion of the outer surface of the end wall 16 throughout most of the circumference of the bushing 32. An inwardly extending flange 34 is provided at the other end of the bushing 32 for a purpose which will be later described.

A bushing 35 is provided in the aperture 31. This bushing 35 is provided with a marginal flange 36 extending about most of the periphery of the bushing. An inwardly extending flange 37 is provided at the opposite end of the bushing.

A pair of opposed thrust bearings 39 and 40 are provided between the bushing 32 and the reduced diameter portion 41 of the shaft 10. The inner races of the bearings 39 and 40 are clamped between a shoulder 42 at the end of the reduced diameter portion 41 and a clamping nut 43 engaged upon the threaded portion 44 of the shaft 10. The outer races of the bearings 39 and 40 are engaged between the flange 34 and a clamping ring 45 secured to the bushing 32 by bolts 46 or similar means. Thus the bearings 39 and 40 are held fixed from longitudinal movement relative to the gear casing and are also fixed from longitudinal movement on the shaft 10, thus holding the shaft from appreciable end movement.

A similar means is provided to hold the shaft 11 from longitudinal movement relative to the gear casing. A pair of opposed thrust bearings 47 and 49 are mounted upon a reduced diameter portion 50 of the shaft 11. The inner races of these bearings 47 and 49 are clamped between the shoulder 51 at the end of the reduced diameter shaft portion 50 and a clamping nut 52 supported on the threaded portion 53 of the shaft. The outer races of these bearings 47 and 49 are clamped between the flange 37 and a clamping ring 54 secured to the bushing 35 by clamping nuts 55 or other suitable means.

A flinger ring 57 is mounted upon the shaft 10 between the pinion 13 and the inner race of the bearing 40. Thus the flinger rings 25 and 57, the pinion 13 and the inner race of the bearing 21 are held from longitudinal movement on the shaft 10. A flinger ring 59 is supported between the inner race of the bearing 49 and the pinion 14, thus holding the flinger rings 29 and 59, the pinion 14 and the inner race of the bearing 52 from longitudinal movement upon the shaft 11.

An outer casing enclosure is provided on the gear casing 12 to prevent the leakage of oil from the gear casing and to enclose one end of the pump. This casing cover 60 is secured to the end wall 16 by cap screws 61 or other suitable means. One end of the shaft 10 projects through the casing cover 60 and an oil seal 62 is provided between a hub 63 encircling the shaft 10 and the surface of the shaft. A vent opening 64 comprising two angularly extending passages extends through the cover 60 near the upper extremity

4

thereof. The vent 64 is designed as illustrated to permit pressure to equalize on opposite sides of the cover plate 60 without permitting water or the like to flow into the pump casing.

An oil seal 65 encircles the enlarged diameter portion 23 of the shaft 10 and is interposed between the shaft 10 and the sleeve 19 externally of the bearing 21. The oil seal 65 is to prevent oil from leaking through the end wall 17 from the gear chamber 12. A sealing disc 66 encircles the shaft 10 externally of the oil seal 65 to further enclose the seal and to prevent the escape of oil from the gear casing.

An oil seal 67 is interposed between the shaft 11 and the sleeve 20. The disc 69 is mounted on the shaft 11 adjacent this seal 67. The seal 67 and disc 69 prevent oil from leaking from the gear chamber and into the pump chamber. The discs 66 and 69 also prevent liquid from the pump chamber from leaking into the gear chamber. As will be noted the inner surface of the discs 66 and 69 are enclosed in recesses in the end wall 17, while the opposite surfaces of these discs are externally of the recesses.

A pair of dowel pins 70 and 71 are mounted in apertures 72 and 73 at the top and bottom ends of the end wall 17 of the gear casing. These dowel pins act to guide the pump chamber casting and the cover member therefor into proper position relative to the gear housing. Studs 74 extend from the gear casing end wall 17 at peripherally spaced points. The outer ends of these studs 74 are threaded to accommodate wing nuts 75 to hold the pump parts assembled as will be later described in detail.

The pump casing 76 is formed as best illustrated in Figures 2, 3, and 4 of the drawings. The pump casing 76 is wider at its periphery than throughout the remainder of its body so as to peripherally engage against the end wall 17 of the gear housing. A pair of substantially cylindrical impeller apertures 77 and 79 are formed within the pump casing 76 concentric with the shafts 10 and 11 respectively. Tubular bosses 80 and 81 which are concentric with the shafts 10 and 11 project forwardly from the body wall 82 of the pump housing. As a result the pump housing includes a pair of intersecting ring shaped chambers in which the crescent shaped impellers 83 and 84 may rotate. The inner surface of the impellers 83 and 84 rotate about the bosses 80 and 81 respectively. The outer surfaces of these crescent shaped impellers 83 and 84 contact the inner surfaces of the impeller chambers 77 and 79. A portion of each boss 80 and 81 is cut away to permit the shafts 10 and 11 to be closer together than would otherwise be possible.

The impellers 83 and 84 are mounted upon supporting discs 85 and 86, respectively, which in turn are provided with elongated hubs 87 and 89. The hubs 87 and 89 are spline connected to the reduced diameter portions 90 and 91 of the shafts 10 and 11 respectively. The hub 87 is held clamped between the shoulder 92 at the end of the reduced diameter portion 90 of the shaft 10, and a clamping nut 93 mounted on the threaded portion 94 of the shaft 10. The hub 89 of the impeller 84 is clamped between the shoulder 95 at the end of the reduced diameter portion 91 of the shaft 11 and a clamping nut 96 on the threaded portion 97 of the shaft 11. Thus the impellers are held supported by the shafts 10 and 11 and are prevented from longitudinal movement. A sealing means is interposed between each impeller support and the sleeve about which the impeller rotates. This sealing ring construction is

5

best illustrated in Figure 5 of the drawings. The internal diameter of the boss 80 is of proper size to fit freely about the portion of the shaft 10 which it embraces. Thus the aperture 99 within the boss 80 is somewhat spaced from the outer surface of the shaft 10. An aperture 100 of somewhat larger diameter than the aperture 99 extends a portion of the way through the boss 80 from the free end thereof. The boss 80 is undercut at 101 to provide a shoulder 102 against which an effective seal may be produced.

The seal includes a flexible washer 103 of neoprene which is corrugated between its ends so as to be compressible longitudinally. At one end this washer 103 seals against the disc-like impeller support 85. The other end of the washer 103 is provided with a ring-shaped bearing member 104 having a peripheral flange 105 of a diameter to fit within the aperture 100. The washer 104 is likewise provided with a projecting shoulder 106 designed to bear against the projecting portion 102 of the boss 80. The washer 104 rotates with the flexible washer 103, which of course rotates in unison with the shaft 10 and the impeller support 85. The bearing ring 104 rotates relative to the fixed shoulder 102 and assists in the formation of an effective fluid seal.

The boss 81 is likewise provided with a two diameter aperture 107 therethrough in which is positioned a seal 109 similar to the seal previously disclosed and illustrated in Figure 5 of the drawings.

A closure plate 110 is provided adjacent the pump housing 76 to close the forward ends of the impeller chambers and to provide an additional bearing for the shafts 10 and 11. This closure plate 110 abuts against the forward edge of the pump housing 76 and acts as a closure for the chambers 77 and 79. A pair of cylindrical recesses 111 and 112 are provided in the cover plate concentric with the shafts 10 and 11 to accommodate the disc shaped impeller supports 85 and 86. The plate 110 is also provided with outwardly projecting tapered tubular projections 113 and 114 which are concentric with the shafts 10 and 11. Bearing sleeves 115 and 116 are mounted within the ends of the tubular projections 113 and 114 to form a support for the forward extremities of the shafts 10 and 11.

The tubular projection 113 is provided with an aperture 117 concentric with the shaft 10 and of sufficiently large internal diameter to enclose the locking nut 93. A larger diameter aligned bore 119 is provided in the tubular projection 113, thus forming a shoulder 120 between the two diameter portions. A bearing seal 121 is provided within the larger diameter bore 119 as best illustrated in Figure 5 of the drawings.

The seal 121 includes a resilient compressible washer 122 of neoprene or similar material which is corrugated and is compressible longitudinally. A sealing ring 123 is supported on the end of the flexible washer 122. This sealing ring 123 is provided with a flange 124 of an external diameter to slide within the bore 119 and is provided with a shoulder 125 which seals against the fixed shoulder 120. The flexible washer 122 and the sealing ring 123 rotate in unison with the shaft 10 and with the impeller support 85 and hub 87 thereon.

The tubular projection 114 is likewise provided with a two diameter aperture 126 which accommodates a sealing element 127 similar to the sealing element 121 just described. The sealing elements 121 and 127 serve to prevent the leakage of liquid from the impeller chambers about the

6

shafts 10 and 11. Drain apertures 129 and 130 are provided in the tubular projections 113 and 114 to permit the escape of any liquid which might pass the seals and to prevent pressure from building up within the sleeves.

In operation the impeller 83 rotates in a clockwise direction while the impeller 84 rotates in a counter-clockwise direction. With the impeller 83 in the position illustrated in Figure 3 of the drawings the trailing edge 131 of the impeller is in communication with the inlet passage 132, best illustrated in Figure 4 of the drawings. As the impeller 83 continues to rotate a partial vacuum is formed behind the trailing edge 131 within the chamber 77 drawing liquid from the inlet 132. This operation continues until the leading edge 133 of the impeller 83 passes the inlet port 132. The leading edge 133 of the impeller continues to force fluid forwardly toward the outlet passage 134 until this leading edge passes the outlet port 134.

During the time of the intake stroke of the impeller 83, the impeller 84 is sealed so that there is no return passage from the outlet port 134 to the inlet port 132. As illustrated in Figure 4 of the drawings the impeller 84 is sealed with respect to both the boss 80 and the boss 81 at the start of the intake stroke of the impeller 83 illustrated. As the impeller 84 rotates in a counter-clockwise position from the position shown in Figure 4, the leading edge 135 thereof passes the inlet port 132 and this leading edge forces fluid in a counter-clockwise direction through the chamber 79 toward the outlet port 134. Shortly after the leading edge 135 of the impeller passes the inlet port 132, the trailing edge 136 of the impeller 84 moves into communication with the outlet port 134 allowing the liquid forwardly of the impeller leading edge 135 to be forced through the outlet port 134.

The construction illustrated has many advantages. In the first place the parallel shafts 10 and 11 are held from longitudinal movement by their bearing supports and a bearing support is provided on either side of the pinions 13 and 14, thus firmly supporting these shafts for rotation. The gear housing is entirely sealed from the pump housing and no grease or oil can leak from the gear housing into the pump housing. Similarly no fluid may leak from the impeller housing into the gear chamber.

In addition to the spaced bearings within the gear casing I provide additional outboard bearings 115 and 116 which support the free ends of the impeller shafts and prevents any tendency for these shafts to flex or whip. The bearings 115 and 116 are sealed from the pumping chamber and the construction is such that the force against the shafts tending to move the same longitudinally is equalized. As a result the pump may operate with a minimum of friction.

Sanitary pumps must be designed so that the pumping chamber may be entirely disassembled and cleaned at the end of each pumping operation. In order to take the pump apart, it is only necessary to unscrew the wing nuts 75 from the studs 74, whereupon the cover plate 110 may be removed. Once the cover plate 110 has been removed the nuts 93 and 96 holding the impellers in place are accessible. These nuts may be removed for cleaning purposes. Once the nuts 93 and 96 have been removed the seals 121 and 127 may be removed. The impellers 83 and 84 may be removed, the inner seals 103 and 109 may be removed, and the entire impeller housing

76 may be taken off the studs 70, 71 and 74. All of the parts removed may be scalded or otherwise cleaned and replaced.

It is important to note that there is extremely small number of removable parts which must be removed for cleaning. The wing nuts 75 may be easily removed and need no special cleaning as they are on the exterior of the pump. The cover plate is readily removable and may be easily cleaned as the apertures within the tubular projections 113 and 114 are sufficiently large to permit ready accessibility therinto. The sealing rings, the two impellers, and the impeller housing comprise all of the remaining parts which need be removed for cleaning purposes.

In accordance with the patent statutes, I have described the principles of construction and operation of my sanitary pump, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that this is only illustrative thereof, and that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A sanitary pump including a gear housing, a pair of shafts supported thereby in substantially parallel relation, an impeller housing connected to said gear housing, a pair of tubular bosses on said impeller housing, each of said bosses being concentric with a respective shaft, said bosses and said impeller housing forming a pair of intersecting ring-shaped impeller chambers, an impeller support positioned adjacent the free end of each of said bosses, impellers mounted upon said impeller supports for rotation in said intersecting impeller chambers, a cover plate enclosing said impeller housing and enclosing said impellers and their supports, said cover plate having a pair of cover plate tubular projections thereon encircling the respective shafts, and bearing means within said cover plate projections supporting ends of said shafts, and a pair of seals on opposite sides of each impeller support, one of said seals forming a seal between its respective impeller support and the corresponding boss, and the other of said seals forming a seal between its respective impeller support and said cover plate internally of said bearings, and clamping nut means between said bearings and said other seals.

2. A sanitary pump including a gear housing, a pair of shafts supported thereby in substantially parallel relation, an impeller housing connected to said gear housing, a pair of tubular bosses on said impeller housing, each of said bosses being concentric with a respective shaft, said bosses and said impeller housing forming a pair of intersecting ring shaped impeller chambers, an impeller support positioned adjacent the free end of each of said bosses, impellers mounted upon said impeller supports for rotation in said intersecting impeller chambers, a cover plate enclosing said impeller housing and enclosing said impellers and their supports, a hub on each said impeller support encircling its respective shaft, clamping nut means on said shaft for holding said hub in place thereupon, cover plate tubular projections projecting from said cover plate coaxially with said shafts, and bearing means within said projections for supporting said shafts, and a pair of seals on opposite sides of each impeller support, one of said seals forming a seal between its respective impeller support and the corresponding boss, and the

other of said seals forming a seal between its respective impeller hub and said cover plate.

3. A sanitary pump including a gear housing, a pair of shafts supported thereby in substantially parallel relation, an impeller housing connected to said gear housing, a pair of tubular bosses on said impeller housing, each of said bosses being concentric with a respective shaft, said bosses and said impeller housing forming a pair of intersecting ring shaped impeller chambers, an impeller support positioned adjacent the free end of each of said bosses, impellers mounted upon said impeller supports for rotation in said intersecting impeller chambers, a cover plate carried by said impeller housing and together with said housing enclosing said impellers and their supports, projecting tubular projections on said cover plate concentric with said shafts, a hub on each impeller supporting means encircling its respective shaft, clamping nut means on each shaft holding said hubs in place thereupon, sealing means interposed between said hubs and the encircling cover plate projections, and bearing means on said cover plate projections exteriorly of said sealing means, and a seal on opposite sides of each impeller support, one of said seals forming a sealing between its respective impeller support and the corresponding boss and the other of said seals forming a seal between its respective impeller support and said cover plate.

4. A sanitary pump including a gear housing, a pair of shafts supported thereby in substantially parallel relation, an impeller housing connected to said gear housing, a pair of tubular bosses on said impeller housing, each of said bosses being concentric with a respective shaft, said bosses and said impeller housing forming a pair of intersecting ring shaped impeller chambers, an impeller support positioned adjacent the free end of each of said bosses, impellers mounted upon said impeller supports for rotation in said intersecting impeller chambers, a cover plate carried by said impeller housing and together with said housing enclosing said impellers and their supports, projecting tubular projections on said cover plate concentric with said shafts, a hub on each impeller supporting means encircling its respective shaft, clamping nut means on each shaft holding said hubs in place thereupon, sealing means interposed between said hubs and the encircling cover plate projections, bearing means on said cover plate projections exteriorly of said sealing means, a seal on opposite sides of each impeller support, one of said seals forming a sealing between its respective impeller support and the corresponding boss, the other of said seals forming a seal between its respective impeller support and said cover plate, and drain apertures through said cover plate projections between said other of said seals and said bearing means.

5. A sanitary pump including a gear housing, a pair of substantially parallel shafts projecting therefrom, an impeller housing encircling said projecting shafts, tubular bosses on said impeller housing encircling each shaft, said impeller housing and said tubular bosses forming intersecting ring shaped impeller chambers, impeller supports encircling each shaft adjacent the end of said tubular bosses, impellers on said impeller supports rotatable in said ring shaped impeller chambers, a two diameter passage through each of said tubular bosses forming a shoulder between the ends thereof, a sealing ring rotatably sup-

ported against said shoulder, a longitudinally compressible gasket interposed between said sealing ring and said impeller support, a cover plate carried by said impeller housing and together with said housing enclosing said impellers, and said impeller supports, a two diameter aperture through said cover plate axially aligned with, and encircling, each shaft, the two diameter portions forming a shoulder between the ends of the aperture, a sealing ring rotatably engageable against each said last named shoulder, and a longitudinally compressible gasket interposed between each said last named sealing ring and said impeller support.

6. A sanitary pump including a gear housing, a pair of substantially parallel shafts projecting therefrom, an impeller housing encircling said projecting shafts, tubular bosses on said impeller housing encircling each shaft, said impeller housing and said tubular bosses forming intersecting ring shaped impeller chambers, impeller supports encircling each shaft adjacent the end of said tubular bosses, impellers on said impeller supports rotatable in said ring shaped impeller chambers, a two diameter passage through said tubular bosses forming a shoulder between the ends thereof, a sealing ring rotatably supported against said shoulder, a longitudinally compressible gasket interposed between said sealing ring and said impeller support, a cover plate carried by said impeller housing and together with said housing enclosing said impeller supports, and said impellers, a pair of tubular projections on said cover plate concentric with said shafts, a two diameter passage through each of said projections forming shoulders intermediate the ends of the projections, a sealing ring engageable with each said last named shoulder, and a longitudinally compressible sealing gasket between each last named sealing ring and said impeller support.

7. A sanitary pump including a gear housing, a pair of substantially parallel shafts projecting therefrom, an impeller housing encircling said projecting shafts, tubular bosses on said impeller housing encircling each shaft, said impeller housing and said tubular bosses forming intersecting ring shaped impeller chambers, impeller supports encircling each shaft adjacent the end of said tubular bosses, impellers on said impeller supports rotatable in said ring shaped impeller chambers, a two diameter passage through said tubular bosses forming a shoulder between the ends thereof, a sealing ring rotatably supported against said shoulder, a longitudinally compressible gasket interposed between said sealing ring and said impeller support, a cover plate carried by said impeller housing and together with said housing enclosing said impeller supports, and said impellers, a pair of tubular projections on

said cover plate concentric with said shafts, a two diameter passage through each of said projections forming shoulders intermediate the ends of the projections, a sealing ring engageable with each said last named shoulder, a longitudinally compressible sealing gasket between each last named sealing ring and said impeller support, and bearing means in each of said projections encircling the respective shafts for supporting the adjacent ends of said shafts.

8. A sanitary pump including a gear housing, a pair of substantially parallel shafts projecting therefrom, an impeller housing encircling said projecting shafts, tubular bosses on said impeller housing encircling each shaft, said impeller housing and said tubular bosses forming intersecting ring shaped impeller chambers, impeller supports encircling each shaft adjacent the end of said tubular bosses, impellers on said impeller supports rotatable in said ring shaped impeller chambers, a two diameter passage through said tubular bosses forming a shoulder between the ends thereof, a sealing ring rotatably supported against said shoulder, a longitudinally compressible gasket interposed between said sealing ring and said impeller support, a cover plate carried by said impeller housing and together with said housing enclosing said impeller supports, and said impellers, a pair of tubular projections on said cover plate concentric with said shafts, a two diameter passage through each of said projections forming shoulders intermediate the ends of the projections, a sealing ring engageable with each said last named shoulder, a longitudinally compressible sealing gasket between each last named sealing ring and said impeller support, bearing means in each of said projections encircling the respective shafts for supporting the adjacent ends of said shafts, and aperture means through said projections between said bearing means and said shoulders therein.

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