

July 3, 1962

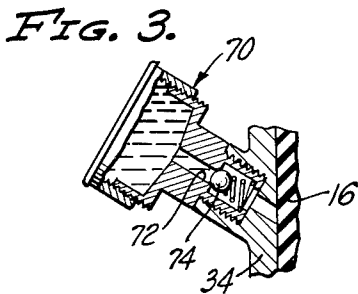
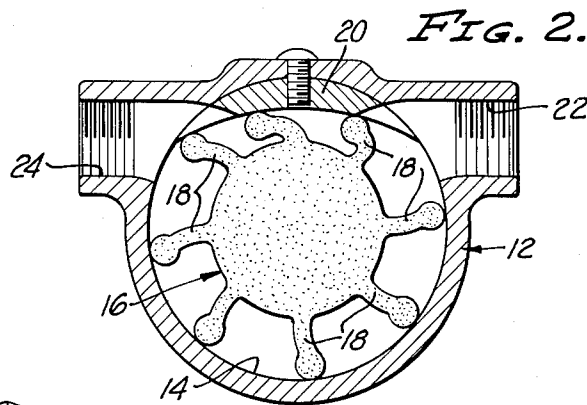
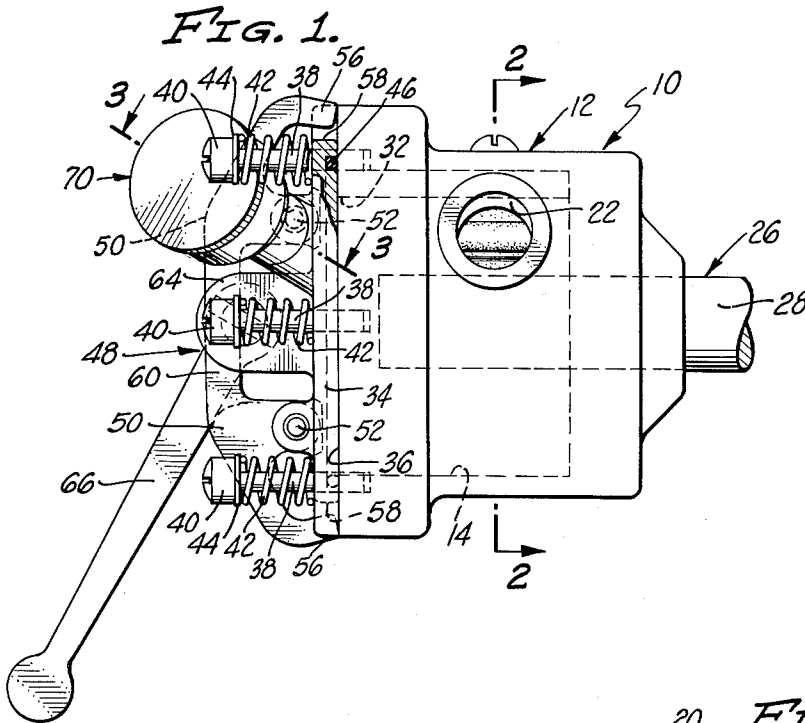
M. G. McLEAN ET AL

3,041,979

PUMP WITH RELEASABLE END COVER

Filed June 6, 1960

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

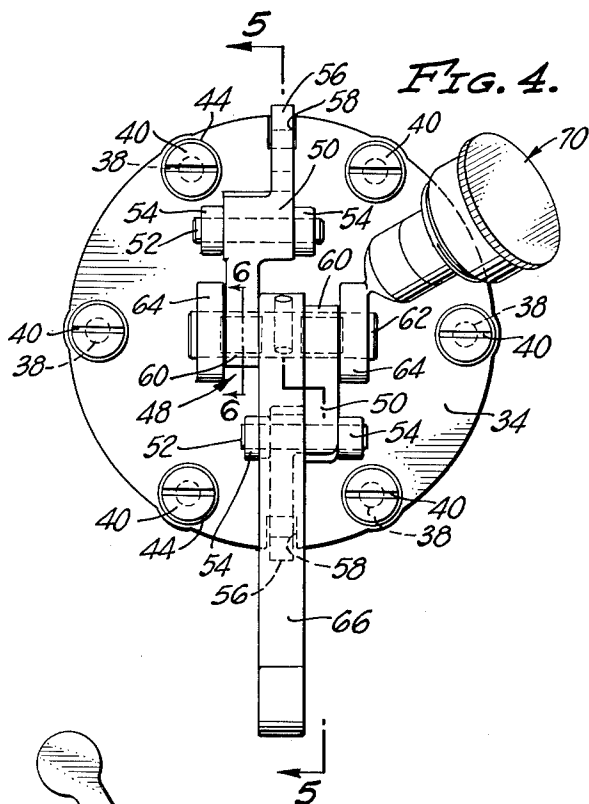


FIG. 6.

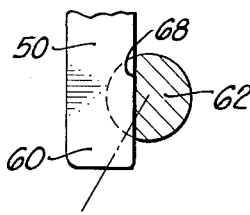


FIG. 7.

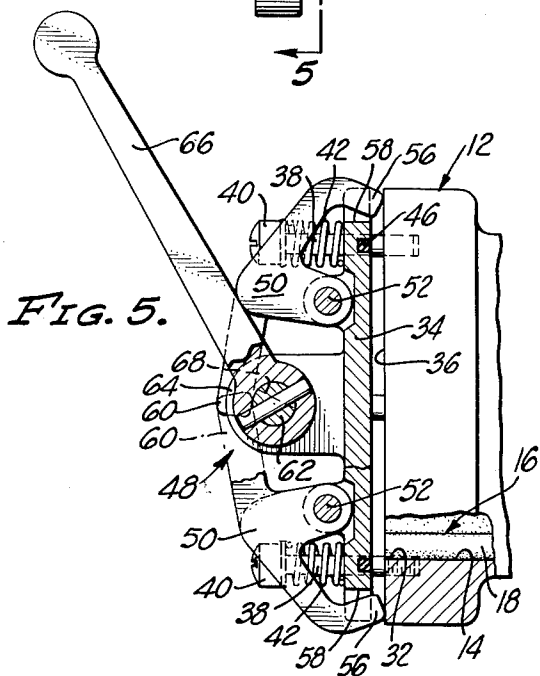
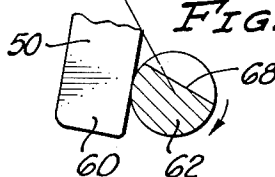


FIG. 8.

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PUMP WITH RELEASABLE END COVER

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Filed June 6, 1960, Ser. No. 34,314

5 Claims. (Cl. 103-117)

The present invention relates in general to pumps, and more particularly, to a pump which includes a housing provided therein with an impeller chamber which is open at one end, the open end of the impeller chamber normally being closed by an end cover seated against a corresponding end wall of the housing.

A primary object of the invention is to provide in a pump of the foregoing nature an end cover which is mounted on the housing for movement longitudinally thereof between a closed position in engagement with the end wall of the housing to close the open end of the impeller chamber and an open position wherein it is spaced from the end wall of the housing to open the open end of the impeller chamber.

Another object of the invention is to provide means for moving the end cover from its closed position to its open position to open the open end of the impeller chamber.

With the foregoing construction, the impeller chamber may be completely drained quickly and easily, which is an important advantage where the pump is a water pump and is used in regions subjected to temperatures below the freezing temperature of water.

Another object is to provide means for opening the end cover which includes cam means on the end cover and engaging the housing for moving the end cover from its closed position to its open position. A related object is to provide a cam means which includes rocker arms pivotally mounted on the end cover and having outer ends in engagement with the end wall of the housing at circumferentially spaced points, and which includes a rotatable cam carried by the end cover and engaging the inner ends of the rocker arms, rotation of the cam being adapted to rock the rocker arms to cause the outer ends thereof to displace the end cover longitudinally away from the end wall of the housing against which it is normally seated.

Another object is to provide spring means acting on the end cover and the housing for biasing the end cover toward its closed position, such spring means automatically returning the end cover to its closed position when the cam means for moving it to its open position is returned to an inoperative position.

Another object of the invention is to provide an annular seal on the end cover which is engageable with the end wall of the housing around the open end of the impeller chamber when the end cover is in its closed position to prevent fluid leakage from the impeller chamber through the open end thereof.

An important object of the invention is to provide means on the end cover for injecting a lubricant into the impeller chamber through the open end thereof. This construction is particularly advantageous where the impeller in the impeller chamber is a flexible-vaned, elastomeric one. Such an impeller will overheat rapidly if the pump is operated dry, i.e., if the pump is operated without pumping any fluid capable of lubricating and/or cooling the impeller. Under such conditions, overheating of the impeller may be prevented by utilizing the lubricant injecting means mentioned to inject a lubricant into the impeller chamber.

The foregoing objects, advantages, features and results of the present invention, together with various other objects, advantages, features and results thereof which will

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be evident to those skilled in the pump art in the light of this disclosure, may be achieved with the exemplary embodiment of the invention described in detail herein-after and illustrated in the accompanying drawings, in which:

FIG. 1 is a view, primarily in side elevation, but partially in longitudinal section, of a pump which embodies the invention;

FIG. 2 is a view, partially in transverse section and partially in end elevation, which is taken generally along the arrowed line 2-2 of FIG. 1;

FIG. 3 is a fragmentary sectional view taken along the arrowed line 3-3 of FIG. 1;

FIG. 4 is an end elevational view of the pump illustrated in FIG. 1, being of the left end of the pump as it is viewed in FIG. 1;

FIG. 5 is a fragmentary view, partially in side elevation and partially in longitudinal section, which is taken generally along the arrowed line 5-5 of FIG. 4;

FIG. 6 is an enlarged fragmentary sectional view taken along the arrowed line 6-6 of FIG. 4;

FIG. 7 is a view identical to FIG. 6, but showing different operating positions of the components illustrated therein; and

FIG. 8 is a perspective view of a cam forming part of the pump of the invention.

Referring to the drawings, the pump illustrated therein is designated generally by the numeral 10 and includes a housing 12 provided therein with an impeller chamber 14 extending longitudinally of the housing. Rotatable in the impeller chamber 14 about an axis extending longitudinally of the housing 12 is an impeller 16 having elastomeric radial vanes 18 adapted to be flexed by a cam 20 on one side of the impeller chamber. When the impeller 16 is rotated in the clockwise direction, as viewed in FIG. 2 of the drawings, the flexing of the vanes 18 produced by the cam 20 causes the impeller 16 to draw fluid into the impeller chamber 14 through an inlet port 22 and to discharge it from the impeller chamber through an outlet port 24. The pump 10 includes means 26 for rotating the impeller 16 within the impeller chamber 14, such means being shown as including a shaft 28 extending longitudinally into the impeller chamber and suitably keyed to the impeller. The shaft 28 may be driven in any suitable manner.

The impeller chamber 14 is provided with an open end 32 which is adapted to be closed by an end cover 34 seatable against an end wall 36 of the housing 12, the open end 32 of the impeller chamber being formed in the end wall 36. As will be described, the end cover 34 is movable longitudinally of the housing 12 from a closed position wherein it closes the open end 32 of the impeller chamber 14, as shown in FIG. 1, to an open position wherein it is spaced from the end wall 36 of the housing to open the open end of the impeller chamber, as shown in FIG. 5 of the drawings. With this construction, complete drainage of the impeller chamber 14 is possible to prevent freezing of water, for example, therein.

Considering the manner in which the end cover 34 is mounted on the housing 12 for longitudinal movement toward and away from the end wall 36 thereof, threaded into the end wall 36 of the housing and projecting longitudinally therefrom are circumferentially spaced studs 38. These studs extend through holes in the end cover 34 and are provided thereon with heads 40 outwardly of the end cover. With this construction, the end cover 34 is slidable on the studs 38 between its open and closed positions.

The end cover 34 is biased toward its closed position, wherein it is seated against the end wall 36 of the hous-

ing 12, by compression coil springs 42 seated against the end cover and against washers 44 abutting the heads 40 on the studs 38, the springs 42 encircling the respective studs. As will be apparent, the springs 42 normally maintain the end cover 34 in its closed position wherein it is seated against the end wall 36 of the housing 12. Under such conditions, an annular seal, such as an O-ring 46, carried by the end cover 34 engages the end wall 36 of the housing 12 to prevent fluid leakage from the impeller chamber 14 through the open end 32 thereof. In the construction illustrated, the O-ring 46 is disposed in an annular groove in the side of the end cover 34 which engages the end wall 36 of the housing 12.

The pump 10 includes cam means 48 carried by the end cover 34 and engaging the housing 12 for moving the end cover longitudinally from its closed position to its open position. More particularly, the cam means 48 includes rocker arms 50 which are pivotally mounted intermediate their ends on the end cover 34 by transverse pivot pins 32. Each pivot pin 52 extends through the corresponding rocker arm 50 and through lugs 54 disposed on opposite sides of the corresponding rocker arm and formed integrally with the end cover 34.

The rocker arms 50 have outer ends 56 which extend longitudinally through peripheral notches 58 in the end cover 34 into engagement with the end wall 36 of the housing 12 at circumferentially spaced points. The notches 58 are located radially outwardly of the O-ring 46 to preserve the sealing function of the latter.

The rocker arms 50 have inner ends 60 which are engaged by a rotatable cam 62 journaled in lugs 64 integral with the end cover 34. The cam 62 is adapted to be rotated by a handle 66 pinned, or otherwise keyed, to the cam intermediate the inner ends 60 of the rocker arms 50.

In the construction illustrated, the cam 62 is merely a cylindrical shaft provided therein with notches 68 adapted to receive the inner ends 60 of the rocker arms 50. As will be apparent, when the cam 62 is in a position such that the inner ends 60 of the rocker arms 50 lie flat against the bottoms of the notches 68, as shown in FIG. 6, the cam is ineffective to displace the end cover 34 out of its closed position. However, by swinging the handle 66 to rotate the cam 62 so that cylindrical portions thereof engage the inner ends 60 of the rocker arms 50, as shown in FIG. 7, the end cover 34 is displaced longitudinally of the housing 12 into its open position. Under such conditions, the impeller chamber 14 may be completely drained.

It will be apparent that the construction disclosed provides means for quickly and easily draining the impeller chamber 14, it merely being necessary to swing the handle 66 to rotate the cam 62 from its inoperative position to its operative position, whereupon the cam displaces the end cover 34 from its closed position to its open position. Upon returning the cam 62 to its inoperative position, the springs 42 maintain the end cover 34 in its closed position.

The pump 10 includes means 70 for injecting a lubricant into the impeller chamber 14 when it is desired to operate the pump dry, i.e., with no fluid passing therethrough which is capable of cooling and/of lubricating the impeller 16 to prevent overheating thereof. This is particularly advantageous where the pump 10 normally pumps water from a surrounding body of water to cool the engine of a boat, or the like. If it is desired to warm up the engine of the boat with the boat out of the water, a lubricant may be injected into the impeller chamber 14 with the lubricant injecting means 70 to lubricate the impeller 16.

In the construction illustrated, the lubricant injecting means 70 is carried by the end cover 34 and is simply a grease cup which communicates with the interior of the impeller chamber 14 by way of a passage 72 through the end cover. Such passage is equipped with a ball

check valve 74 which prevents flow of lubricant into the impeller chamber 14 except when the cap of the grease cup is screwed down.

Although an exemplary embodiment of the invention has been disclosed herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined by the claims which follow.

We claim:

1. In a pump, the combination of: a housing having an end wall and provided therein with an impeller chamber which has an open end in said end wall of said housing and which extends longitudinally of said housing away from said end wall thereof; an impeller in said impeller chamber and rotatable therein about an axis which extends longitudinally of said housing; means for rotating said impeller about said axis; an end cover mounted on said housing for movement longitudinally thereof between a closed position wherein it engages said end wall of said housing and closes said open end of said impeller chamber and an open position wherein it disengages said housing and opens said open end of said impeller chamber; and cam means on said end cover and engaging said housing for moving said cover from said closed position to said open position.

2. In a pump, the combination of: a housing having an end wall and provided therein with an impeller chamber which has an open end in said end wall of said housing and which extends longitudinally of said housing away from said end wall thereof; an impeller in said impeller chamber and rotatable therein about an axis which extends longitudinally of said housing; means for rotating said impeller about said axis; an end cover mounted on said housing for movement longitudinally thereof between a closed position wherein it engages said end wall of said housing and closes said open end of said impeller chamber and an open position wherein it disengages said housing and opens said open end of said impeller chamber; cam means on said end cover and engaging said housing for moving said cover from said closed position to said open position; and spring means acting on said end cover and said housing for biasing said end cover toward said closed position.

3. In a pump, the combination of: a housing having an end wall and provided therein with an impeller chamber which has an open end in said end wall of said housing and which extends longitudinally of said housing away from said end wall thereof; an impeller in said impeller chamber and rotatable therein about an axis which extends longitudinally of said housing; means for rotating said impeller about said axis; an end cover mounted on said housing for movement longitudinally thereof between a closed position wherein it engages said end wall of said housing and closes said open end of said impeller chamber and an open position wherein it disengages said housing and opens said open end of said impeller chamber; cam means on said end cover and engaging said housing for moving said cover from said closed position to said open position; spring means acting on said end cover and said housing for biasing said end cover toward said closed position; and an annular seal engageable with said end cover and said end wall of said housing around said open end of said impeller chamber.

4. In a pump, the combination of: a housing having an end wall and provided therein with an impeller chamber which has an open end in said end wall of said housing and which extends longitudinally of said housing away from said end wall thereof; an impeller in said impeller chamber and rotatable therein about an axis which extends longitudinally of said housing; means for rotating said impeller about said axis; an end cover mounted on said housing for movement longitudinally thereof between a closed position wherein it engages said end wall of said housing and closes said open end of said impeller chamber and an

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open position wherein it disengages said housing and opens said open end of said impeller chamber; cam means on said end cover and engaging said housing for moving said cover from said closed position to said open position, said cam means including rocker arms pivotally mounted on said end cover and having outer ends in engagement with said end wall of said housing at circumferentially spaced points and having inner ends, said cam means further including a rotatable cam carried by said end cover and engaging said inner ends of said rocker arms; and spring means acting on said end cover and said housing for biasing said end cover toward said closed position.

5. In a pump, the combination of: a housing having an end wall and provided therein with an impeller chamber which has an open end in said end wall of said housing and which extends longitudinally of said housing away from said end wall thereof; an impeller in said impeller chamber and rotatable therein about an axis which extends longitudinally of said housing; means for rotating said impeller about said axis; studs projecting longitudinally from said end wall of said housing and circumferentially spaced about said open end of said impeller chamber; an end cover longitudinally slidable on said studs between a closed position wherein it engages said end wall of said housing and closes said open end of said impeller chamber and an open position wherein it disengages said housing and opens said open end of said impeller chamber, said studs extending through said end

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cover and having heads thereon longitudinally outwardly of said end cover; cam means on said end cover and engaging said housing for moving said end cover from said closed position to said open position; and springs on said studs and engaging said end cover and said heads on said studs for biasing said end cover toward said closed position.

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