

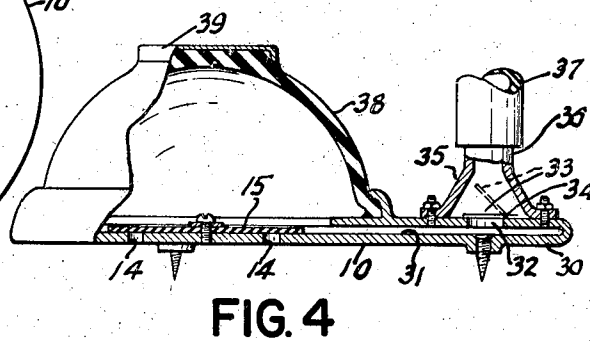
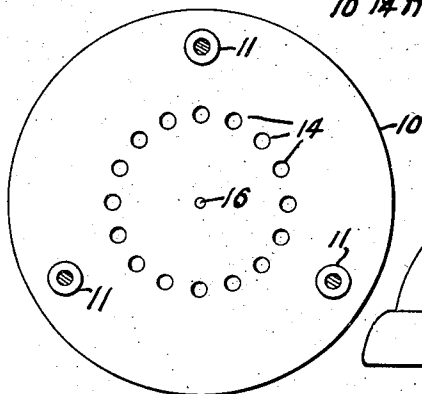
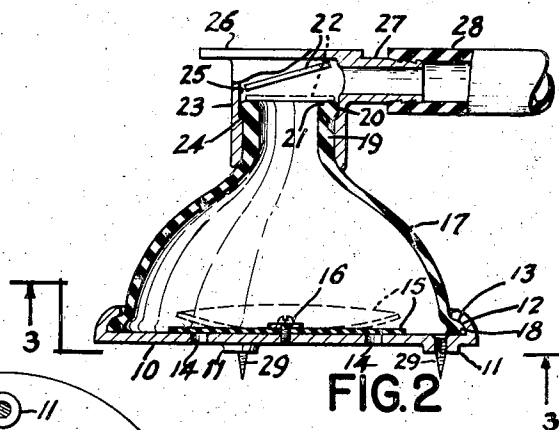
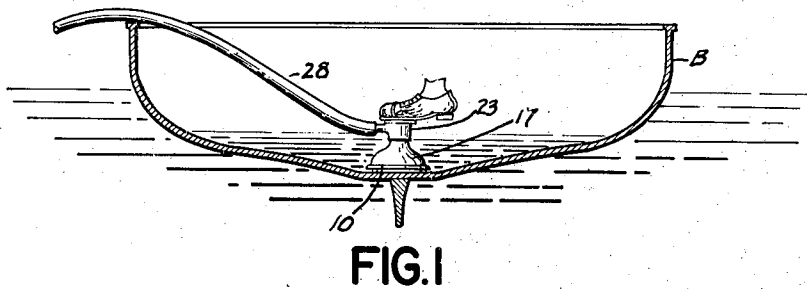
July 19, 1949.

J. T. HAYWARD

2,476,545

BILGE PUMP

Filed June 7, 1947



J. T. HAYWARD
INVENTOR.

BY

R. Werlin
ATTORNEY

UNITED STATES PATENT OFFICE

2,476,545

BILGE PUMP

John T. Hayward, Tulsa, Okla., assignor to Hunt-Miller Co., Rochester, N. Y., a partnership

Application June 7, 1947, Serial No. 753,148

1 Claim. (Cl. 103-148)

1

This invention relates to bilge pumps and particularly to a foot operated bilge pump.

Bailing of the bilges in small boats, particularly in small sail boats, skiffs, dingheys and the like, is normally necessary and desirable in order to maintain the sailing and operating efficiency of such small boats. Normally only one or two man crews operate these small types of boats and their operation normally requires the full use of the hands of the operator for sailing, navigation and other operational purposes with the result that when it is necessary to bail out any water, operational duties must be interrupted to allow a crew member to bail out the water by any one of several conventional methods. Such methods may and normally do include merely dipping out the accumulated water with a can or bucket, which is necessarily slow and inefficient, or the use of a conventional form of hand pump, generally of a plunger type; requiring the use of both hands for operation. In sail boat racing particularly, this type of interruption is very undesirable because it necessarily distracts the attention of the crew from the sailing operations which should at all times receive the closest attention of the crew, and which will normally require the uninterrupted use of all the hands available for these operations, particularly in rough water.

Furthermore, the commonly used plunger-type hand pumps frequently become fouled by vegetation and other trash which will accumulate in the bilges and ordinarily will require a kit of tools, generally not available on small boats, to dis-assemble them for cleaning. Such plunger pumps normally tend to corrode in sea water, and since they employ sliding surfaces, such corrosion tends to increase the rapidity of the wear.

Among the principal objects of this invention, therefore, is the provision of a novel and simple form of bilge pump which is adapted for operation by foot pressure; which is of very simple form, which can be assembled and dis-assembled substantially entirely with the hands, which has no machined or sliding surfaces, and which is not subject to corrosion by sea water.

A more specific object of the present invention is the provision of a form of bilge pump employing a compressible valve chamber having simple forms of intake and discharge valves, the chamber being compressible and expandible in response to foot pressure to effect the pumping operation.

Other and more specific objects and advantages of this invention will be apparent from the following detailed description when read in con-

2

junction with the accompanying drawings which illustrate two useful embodiments in accordance with this invention.

In the drawings:

Fig. 1 is a generally schematic view showing the bilge pump in accordance with this invention positioned in the bottom of a boat in operative position for pumping out the bilges;

Fig. 2 is a cross-sectional elevation through one embodiment of the pump in accordance with this invention;

Fig. 3 is a view looking upwardly toward the bottom of the pump along line 3-3 of Fig. 2; and

Fig. 4 is a generally cross-sectional elevation of another embodiment of a pump in accordance with this invention.

Referring to the drawings, the pump comprises a base plate 10 of generally circular form provided on its lower surface with a plurality of spacing feet 11 for spacing base plate 10 from the bottom of the boat or other surface on which bilge water collects. Base plate 10 is provided with a peripheral upwardly and inwardly turned flange 12, the inner face of which forms a generally annular curved seat 13 about the periphery of the upper surface of the base plate. A plurality of passageways 14-14 are provided in base plate 10 and are preferably arranged in a wide pitch circle concentric about the center of the base plate. Passageways 14-14 constitute the intake valve ports of the pump and may be provided in any suitable number and geometric arrangement and of any suitable diameter depending upon the pumping capacity desired. Mounted on the upper surface of base plate 10 and covering passageways 14 is a circular valve disk 15. A stud 16 extends through the center of valve disk 15 and fastens the center of the disk to base plate 10 at point in the center of the circle of intake passageways 14. Valve disk 15 is preferably constructed of rubber or other suitable flexible material, such that its peripheral portion may be flexed about center stud 16 to raise and lower relative to the upper surface of base plate 10 to open and close passageways 14. Valve disk 15 may, of course, be of the more conventional plate valve form in which the valve disk is constructed of a suitable thin metal which floats on center stud 16 or is held thereon in normally closed position by a light spring. A hollow generally dome-shaped cup member 17, constructed of rubber or other suitable resilient material, forms the valve chamber for the pump, and has its open mouth downwardly disposed on base plate 10 enclosing the intake valve of the pump.

The lower end of cup member 17 is provided with an integrally molded peripheral bead 18 having a cross-sectional configuration which is complementary to that of seat 13 and which, when inserted in seat 13, becomes frictionally engaged therewith through radial pressure exerted by the cup when in its fully expanded position and thereby forms a fluid-tight connection to base plate 10. The upper end of cup member 17 is molded to form an integral upwardly extending tubular neck 19, provided, preferably though not necessarily, with an outwardly protruding annular bead 20 about its upper end. The upper end surface of neck 19 forms an annular seat 21 on which is disposed a metal disk 22 forming the discharge valve for the pump. Disk 22 is of a diameter generally intermediate the internal and external diameters of neck 19 and is freely movable vertically relative to the upper end of neck 19. A tubular sleeve 23 encloses neck 19 and has an internal diameter such as to make a tight friction fit about neck 19 and may be provided with an internal shoulder 24 for engagement with bead 20 for firmly but removably holding sleeve 23 on neck 19. The upper end of sleeve 23 extends above the end of neck 19 and encloses the latter and valve disk 22 to form a discharge chamber 25 for the valve. The upper end of sleeve 23 is closed by a cap 26 which forms a horizontal surface on which the operator's foot may rest for operation of the pump in a manner to be hereinafter described. A discharge nozzle 27 extends laterally from discharge chamber 25 and is adapted for connection thereto of a rubber or other suitable discharge pipe 28.

The pump above described is operated in the following manner: The pump structure, assembled as shown in Fig. 2, is placed in the bottom of a boat B in a position as illustrated in Fig. 1, having base plate 10 closely adjacent to the lowest point in the bottom of the boat at which bilge water will normally collect. Feet 11 serve to space the base plate at a sufficient height above the bottom of the boat to allow the collected bilge water to cover and flow into intake passageways 14. This height may be made quite small. For example, one-sixteenth inch will generally be sufficient for this purpose, depending, of course, upon the total area of intake ports 14. The base plate may, if desired, be rigidly fastened to the bottom of the boat by suitable fastening means, such as screws 29, which extend through feet 11 into the bottom of the boat, but in many cases this is not necessary and the pump may be operated satisfactorily by simply placing it on the bottom of the boat.

With the pump so positioned, the foot of the operator may be employed to operate the pump by alternately pressing down and releasing the pressure on cap 26. Downward pressure of the foot will compress chamber 17 creating a pressure within the chamber which serves to lift valve disk 22 off of seat 21 and discharge any water within the valve chamber through discharge chamber 25, nozzle 27 and pipe 28. Relieving the foot pressure will allow chamber 17 to expand to its normal position and create a suction within the chamber and this suction will operate to pull valve disk 22 back on seat 21 and close the discharge outlet from the pump. At the same time the suction will lift the edges of flexible valve disk 15 to a position, as indicated in broken lines in Fig. 2, opening intake passageways 14 and drawing bilge water through the intake ports into the interior of the chamber. Reapplication of the

foot pressure will again close the intake valve and re-open the discharge valve to discharge the water previously sucked into chamber 17. This operation will be repeated as often as necessary in order to completely remove the bilge water. In order, therefore, to keep the bilges pumped out it is only necessary for the operator to work the pump with his foot, in the manner described, as often and as rapidly as he may wish in order to accomplish this purpose.

It will be seen that the pump above described is of very simple construction such that it may be made at very low cost and at the same time is highly efficient for the purpose of which it is designed. By the use of the friction type connections between chamber 17 and base plate 10 and between neck 19 and sleeve 23, the entire structure can be dis-assembled and re-assembled without the use of any tools, but merely by manipulation with the hands. This is a very advantageous arrangement because, as noted, small boats are not normally equipped with such tools as would be required for the taking apart and assembling of the more conventional forms of pumps when necessary in order to remove vegetation and other forms of trash and foreign matter which frequently accumulate in the bottom of the boat and are sucked into the pump. To dis-assemble the parts of the described pump, sleeve 23 and its connected parts are simply pulled off of neck 19. Chamber 17 may be pulled out of engagement with flange 12 merely by the use of sufficient force applied with the hands, the resilience of the rubber material permitting sufficient stretching and deformation to accomplish this very easily. Re-assembly of the parts is effected by reversing this procedure.

Fig. 4 illustrates an alternative embodiment in accordance with this invention in which base plate 10 is provided with a lateral extension 30 which is provided with a hollow passageway 31 communicating with the interior of the valve chamber outside the periphery of valve disk 15. A discharge passageway 32 communicates with passageway 31 and extends to the upper surface of lateral extension 30. Discharge passageway 31 is fitted with a suitable flapper type valve 33 which may be hinged at one side at 34 for opening and closing discharge passageway 32. A discharge valve chamber 35 encloses the discharge valve and is mounted on the upper surface of extension 30. Discharge chamber 35 is fitted with a discharge nozzle 36 to which may be attached a hose or other pipe 37. A compressible valve chamber 38 constructed of material similar to chamber 17 and of a hollow dome shape is employed in this embodiment and is connected to base plate 10 in the same manner as described above. However, the upper end of chamber 38 is closed and is provided with a metal cap 39 or other suitable working surface, corresponding to cap 26 in the earlier embodiment, for the application of the foot of the operator in working the pump. Intake passageways 14 and intake valve disk 15 are identical in form with those employed in the embodiment previously described.

In the embodiment of Fig. 4, alternate application and relief of foot pressure to cap 39 will cause bilge water to be sucked in through intake passageways 14 and discharged through passageway 31, discharge passageway 32, and out through discharge chamber 35 and connections 36 and 37.

In the latter embodiment, as in the earlier one, the intake valve is readily accessible without the use of any special tools and both embodiments

5

may be constructed without the use of any carefully machined parts, all of which is of great convenience and advantage to boat operators. By constructing the metal parts of bronze or admiralty metal and the other parts of rubber, as described, the entire pump will be resistant to salt water corrosion.

It will be understood the various alterations and changes may be made in the details of the pump in accordance with this invention without departing from the scope of the appended claim but within the spirit of this invention.

What I claim and desire to secure by Letters Patent is:

A bilge pump, comprising, a circular base plate having an upwardly and inwardly turned peripheral lip, a plurality of intake ports through said base plate circularly arranged about the axis thereof, a circular valve disk constructed of flexible material covering said intake ports and attached at its center to the center of said base plate, a hollow dome-shaped elastic rubber casing disposed in inverted position on said base plate and enclosing said valve, said casing having its open lower end frictionally gripped by and beneath said lip to form a releasable fluid-tight connection therewith and held in position solely by said gripping action, the upper portion of said

6

casing having an integral tubular upward extension forming a discharge port therefor, a discharge valve operable by internal pressure within said casing to control said discharge port and seating on said extension, a tubular housing enclosing said discharge valve and frictionally engaged with said extension, a cap element closing the upper end of said housing, and a discharge nozzle communicating with the interior of said housing, said casing being responsive to alternate application and release of deforming pressure applied to said cap element to pump fluid into and out of said casing.

JOHN T. HAYWARD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
212,898	Class	Mar. 4, 1879
854,670	Schiodt	May 21, 1907
1,219,714	Eberly	Mar. 20, 1917
2,267,280	Kuhnel	Dec. 23, 1941
2,368,091	Andersen	Jan. 30, 1945