Dec. 6, 1966 J. K. FRANZREB 3,289,592

WAVE OPERATED PUMP

Filed Feb. 16, 1965 3 Sheets-Sheet 1

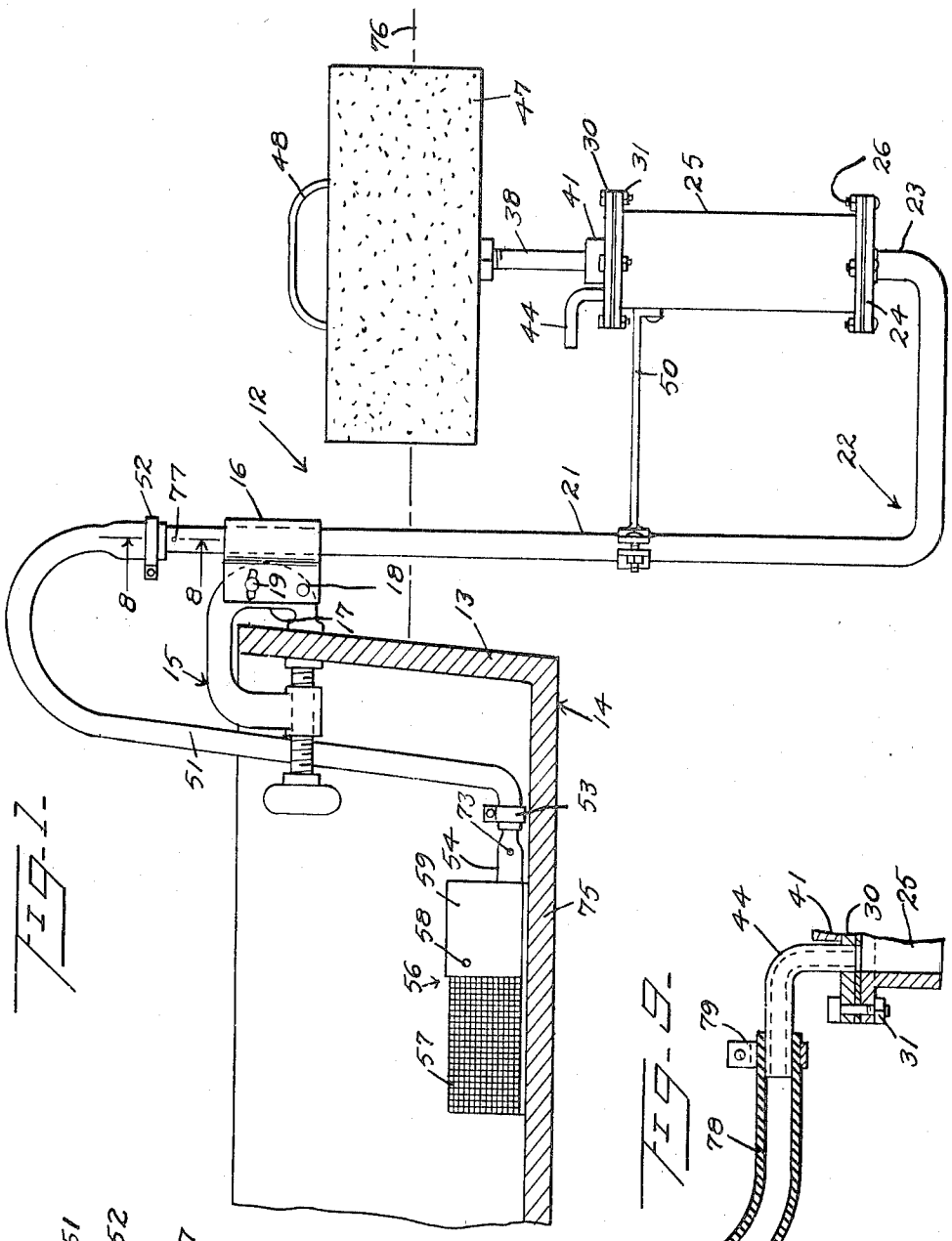


FIG. 1.

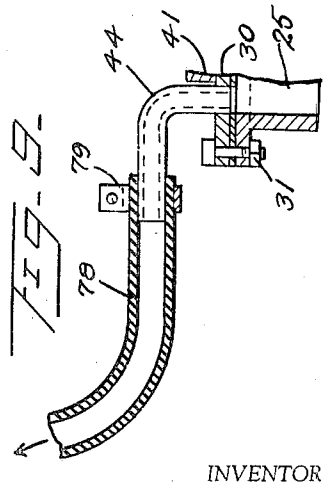


FIG. 5.

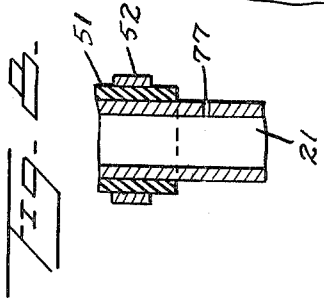


FIG. 8.

INVENTOR

JOHN K. FRANZREB

BY John M. Randolph

ATTORNEY

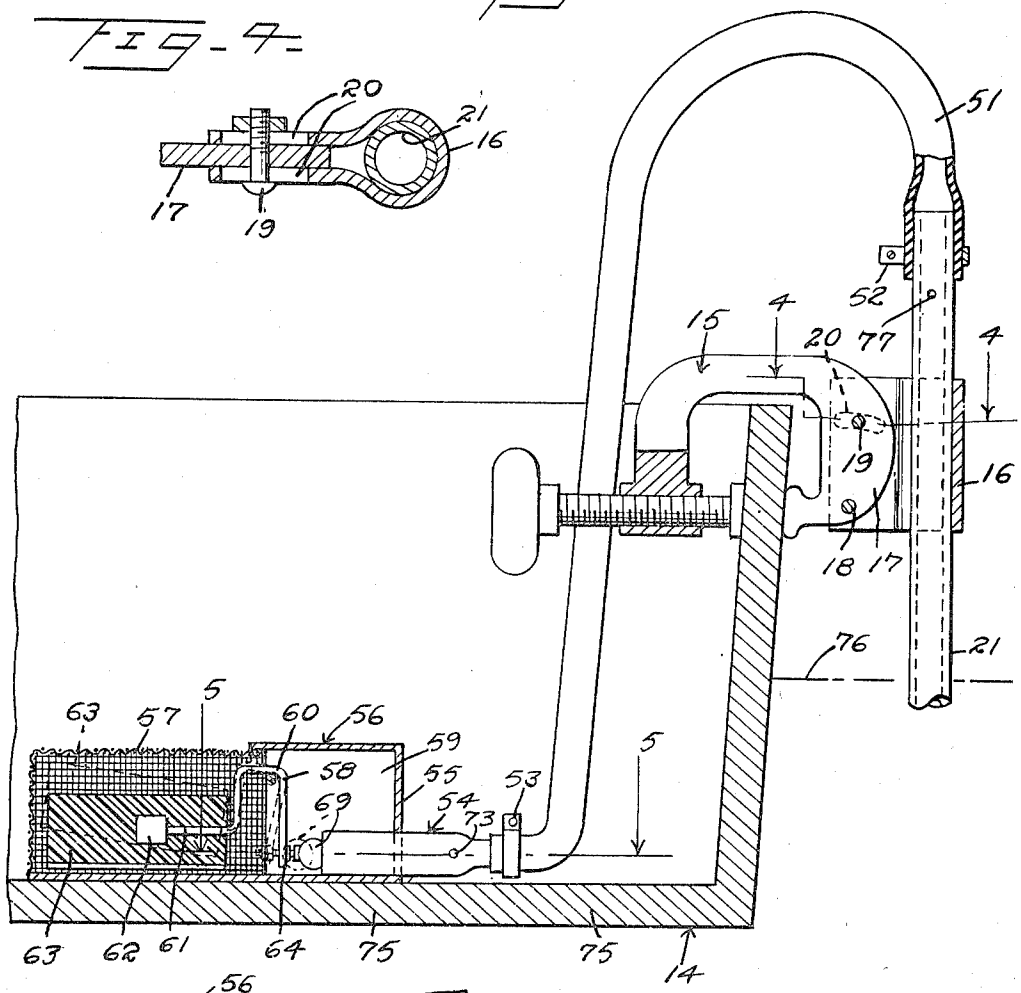
Dec. 6, 1966 J. K. FRANZREB 3,289,592

WAVE OPERATED PUMP

Filed Feb. 16, 1965 3 Sheets-Sheet 2

Fig. 2.

Fig. 4.



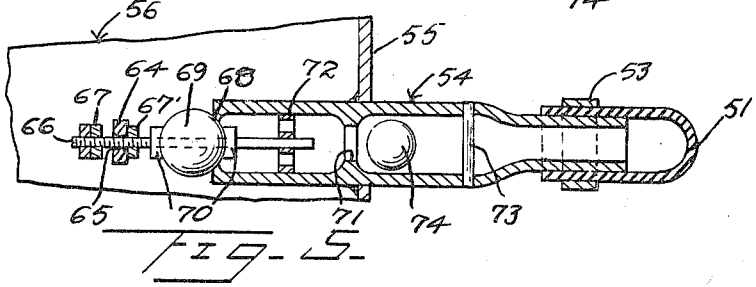


Fig. 5.

INVENTOR

JOHN K. FRANZREB

BY John N. Randolph

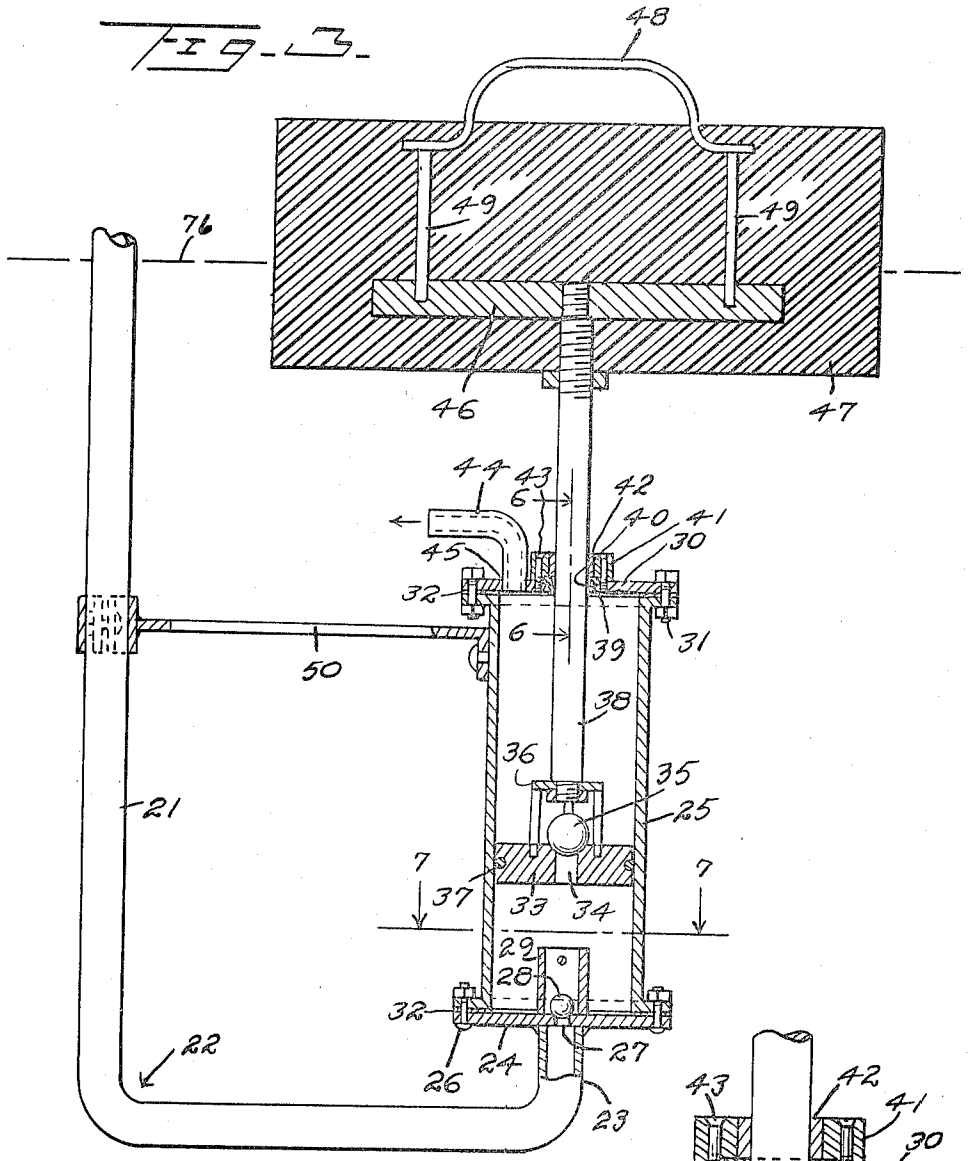
ATTORNEY

Dec. 6, 1966 J. K. FRANZREB 3,289,592

WAVE OPERATED PUMP

Filed Feb. 16, 1965 3 Sheets-Sheet 3

Fig. 3.



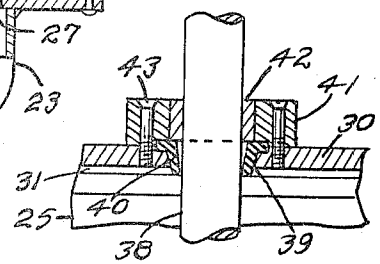


Fig. 6.

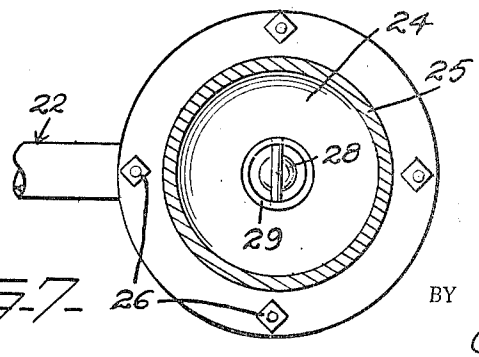


Fig. 7.

INVENTOR

JOHN K. FRANZREB

BY John N. Randolph

ATTORNEY

United States Patent Office

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WAVE OPERATED PUMP

John K. Franzreb, Rte. 2, Box 252, Kingston, Tenn.

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5 Claims. (Cl. 103—68)

This invention relates to a novel pump primarily adapted for use in pumping out boats and which is operated by waves producing alternate rising and falling of the water level around the boat for producing a pumping action for extracting water from the bilge of the boat.

Another object of the invention is to provide a pump which may be utilized for pumping water into a boat to facilitate the washing down of the interior of a boat; and which pump may be operated by hand or wave action to supply water for numerous other purposes.

A further object of the invention is to provide a boat pump which will function automatically to remove water from an unattended boat, and having means to prevent operation of the pump when there is insufficient water in the boat to enable the pumping operation to be accomplished.

A further object of the invention is to provide a boat pump having novel means to prevent back syphoning of water into the boat.

Still a further object of the invention is to provide a pump having means whereby the pump may be quickly attached to or detached from a boat and may be readily adjusted relative to the boat to maintain a reciprocating part of the pump, which is actuated by wave power, in an upright position.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating presently preferred embodiments thereof, and wherein:

FIGURE 1 is a side elevational view, partly in section, showing the pump in an operative position;

FIGURE 2 is an enlarged fragmentary side elevational view, partly in vertical section, of a portion of the pump;

FIGURE 3 is a view similar to FIGURE 2 illustrating the remaining portion of the pump;

FIGURE 4 is an enlarged fragmentary sectional view taken along the line 4—4 of FIGURE 2;

FIGURE 5 is an enlarged horizontal fragmentary sectional view taken substantially along a plane as indicated by the line 5—5 of FIGURE 2;

FIGURE 6 is an enlarged fragmentary vertical sectional view taken substantially along the line 6—6 of FIGURE 3;

FIGURE 7 is an enlarged fragmentary horizontal sectional view taken substantially along a plane as indicated by the line 7—7 of FIGURE 3;

FIGURE 8 is an enlarged fragmentary vertical sectional view taken substantially along a plane as indicated by the line 8—8 of FIGURE 1, and

FIGURE 9 is a fragmentary vertical sectional view of the part of the pump as shown in FIGURE 3 with an additional attachment.

Referring more specifically to the drawings, the pump in its entirety and comprising the invention is designated generally 12 and is shown in FIGURE 1 attached to the transom 13 of a boat 14 by a C-clamp 15 which is detachably secured to an upper portion of the transom 13. A clamp 16 is secured to the outboard end 17 of the clamp 15 by an adjustable pivot fastening 18 and a nut-and-bolt clamping fastening 19. As seen in FIGURE 4 the clamping fastening 19 extends through slots 20 of the clamp 16 so that when said fastening is loosened the clamp 16 may be rocked about the pivot fastening 18 for angularly adjusting the clamp 16 relative to the clamp 15, after which the clamp 16 can be secured at a desired angle of adjustment by tightening the fastening 19, for a purpose which will hereinafter become apparent.

A long upright leg 21 of a rigid conduit 22 is clamped in a desired adjusted position in the clamp 16 and is thus supported by said clamp and the clamp 15 on the boat transom 13. The conduit 22 has a short opposite upturned end 23 the terminal of which is secured to the bottom cap 24 of a pump cylinder 25 by fastenings 26. Referring to FIGURE 3, cap 24 has a port 27 communicating with the conduit end 23 and which is normally closed by a non-buoyant upwardly opening ball valve 28 which is confined in a cage 29 which is fixed to and arises from the cap 24.

A top cap 30 is secured by fastenings 31 to the upper end of the cylinder 25. Gaskets 32 are interposed between the caps 24 and 30 and the cylinder ends to provide liquid-tight seals. A piston 33 is reciprocally mounted in the cylinder 25 and has a central port 34 extending therethrough which is normally closed by an upwardly opening non-buoyant ball valve 35, loosely confined in a cage 36 which is fixed to and arises from the piston. The piston 33 is preferably provided with a suitable sealing ring 37. A piston rod 38 is fixed to and extends upwardly from the cage 36 through a central opening 39 in the top cap 30. A liquid-tight seal is provided between the cap 30 and the rod 38 by a cup washer 40 which is clamped at its upper end in the opening 39 by a collar 41 having a central bushing 42 in which the rod 38 is slidably disposed, as best seen in FIGURE 6. The collar 41 is secured to the upper side of the cap 30 by screw fastenings 43. A short angular pipe 44 is disposed externally of the cap 30 and has one end fixed in and extending through an opening 45 thereof.

The upper end of the piston rod 38 is secured to a metal bar or plate 46, above and spaced from the cap 30. Bar 46 is embedded in a block 47 of a buoyant material, such as styrofoam. A handle 48 is disposed above the block 47 and is attached to the bar 46 by rods 49 which are also embedded in the block.

A rigid brace 50 is secured at one end to the exterior of the cylinder 25, beneath and adjacent the top cap 30, and has its opposite end secured to the conduit leg 21 for rigidly supporting said cylinder relative to the conduit 22.

Referring now to FIGURE 2, one end of a hose or flexible conduit 51 is secured by a clamp 52 to the upper end of the conduit leg 21. The hose 51 extends into the boat 14 and has its opposite end secured by a clamp 53 to the outer end of a rigid conduit or tube 54 which extends through and is secured in an end wall 55, constituting a rigid part of a box or housing 56, which is formed in part of mesh wire fabric 57.

A shaft 58 extends transversely through the housing 56 and is journaled in rigid side wall portions 59 thereof. An intermediate portion of a lever 60, which is disposed in the housing 56, is secured to the shaft 58, as seen in FIGURE 2. The lever 60 has an outer end 61 which is secured to a weight 62 which is embedded in a block 63 of a buoyant material, such as styrofoam. The float 63 is disposed for swinging movement about the pivot 58 in the screen portion 57 of the housing. A depending leg 64 which extends downwardly from the shaft 58 constitutes the other end of the lever 60 and has an opening 65 adjacent its terminal which is loosely confined on a stem 66 between the nuts 67 and 67', as seen in FIGURE 5.

The stem 66 extends through the other inner end of the tube 54, as seen in FIGURE 5, which is disposed within

the housing 56 and which is restricted to define an inlet port and valve seat 68 for a ball valve 69 which is disposed externally of said port 68 and confined on the stem 66 between nuts or stops 70. The tube 54 is provided with a restricted bore portion 71, intermediate of its ends. A spider 72 is disposed in the tube 54 between inlet port 68 and the bore portion 71 to slidably support the end of the stem 66 which extends into the tube 54. A pin 73 extends through the tube 54 to confine a ball valve 74 in said tube between the bore portion 71 and said pin, and which is disposed adjacent the first mentioned outer end of the tube 54.

As seen in FIGURES 1 and 2, the housing 56 rests on the bottom 75 of the boat 14. The conduit 22 is adjusted by the clamp 16 so that the cylinder 25 and piston rod 38 will be disposed in upright position with the float 47 approximately one-half submerged in the water surrounding the boat, as indicated at 76, and so that the float 47 will thus support the piston 33 between and spaced from the caps 24 and 30.

If there is water in the bottom or the bilge portion of the boat 14, the float 63 will be raised thereby to swing upwardly about the shaft 58 for rocking the lever 60 clockwise, as seen in FIGURE 2, to cause the lever end 64 to bear against the nut 67 to move the stem 66 and parts carried thereby from right to left of FIGURES 2 and 5, to move the valve 69 to an open position spaced outwardly from the inlet port 68. Accordingly the bilge water will enter the port 68 after passing through the screen 57 which excludes foreign objects in the bilge which might clog the tube 54. The water will pass through the tube 54 around the check valve 74 which is moved to an open position to the right of its seat 71, and will fill the end of the tube or hose 51 which is attached to the tube 54, up to the level of the water in the bilge.

When the water level 76 rises relative to the boat transom 13 due to waves or pitching of the boat 14, the float 47 will rise therewith exerting an upward pull on the rod 38 and piston 33 for moving the piston toward the upper end of the cylinder 25. As the head valve 35 is closed, this will create a suction within the cylinder 25 below the piston 33 for unseating and raising the foot valve 28 to cause the bilge liquid to be drawn through the hose 51 and conduit 22 into the cylinder 25 beneath the piston 33. When the water level 76 thereafter moves downwardly relative to the boat 14, the weight 46 will drive the piston rod 38 and the piston 33 downwardly relative to the cylinder 25. The foot valve 28 will have closed after the piston 33 completed its upward travel and as the piston moves downwardly the head valve 35 is unseated to permit the water in the cylinder 25, below the piston 33, to pass to above the piston through the port 34. During each upstroke of the piston the water contained in the cylinder thereabove is expelled through the outlet port 44 which, being below the liquid level 76, permits the upper part of the cylinder 25 to be always filled with water so that the pump is self priming. It will thus be seen that the boat 14 will be pumped out automatically by the pump 12 when pumping of the boat is required.

By the time the water level in the boat bilge falls below the upper part of the inlet port 68, the weight 62 will have caused the float 63 to swing downwardly to its lowermost position of FIGURE 2, and the lever 60 will have been swung counterclockwise so that its end 64 will have exerted pressure against the nut 67' to move the stem 66 to the right so that the inlet port 68 is closed by the valve 69, as seen in FIGURES 2 and 5. This will result in a vacuum being created in the hose 51, the conduit 22 and the cylinder 25 below the piston 33, to prevent the piston from reciprocating. Thus, the pump is rendered inoperative to prevent wear on the moving parts thereof when there is insufficient liquid in the boat bilge to enable the pump to operate.

Should leakage occur around the valve 35 or around the piston 33 and also around the valve 28, when the pump is not in operation, the conduit 22 and the upper part of the hose 51 might be filled to produce a back-syphoning of water through the pump 12. This could cause the boat 14 to be filled with water if the check valve 74 were not provided. However, should this occur, the check valve 74 would close and prevent the water from entering the boat through port 68. It would also be apparent that the foot valve 28 may be omitted since its function can be performed by the check valve 74. In addition, the upper portion of the conduit leg 21, immediately below the hose 51, may be provided with a minute bleeder port 77 (FIGURE 8) to drain off water rising in the conduit leg 21 and thus additionally insure against a back-syphoning action. Bleeder port 77 is of insufficient capacity to interfere with normal operation of the pump 12 by dissipating suction in the conduit 22 and hose 51 when the piston 33 rises and the valve 69 is in an open position.

The pump 12 may also be used for pumping water into the boat 14 for washing down the boat or for supplying water for any other purpose, by positioning the tube 54 and housing 56 externally of the boat and submerged in the water 76. One end of a hose or flexible conduit 78, as seen in FIGURE 9, is then secured by a clamp 79 to the outer end of the conduit 44. The other end of the hose 78, not shown, can be positioned in the boat 14 or elsewhere where water is desired, so that operation of the piston 33, either by wave action or manually by grasping the handle 48 to reciprocate the piston, will result in water being pumped from the cylinder 25 through the conduit 44 and hose 78 to supply the water where needed.

Various other modifications and changes are contemplated and may obviously be resorted to, without departing from the function or scope of the invention, as hereinafter defined by the appended claims.

I claim as my invention:

1. A boat pump comprising a pump cylinder, a pump piston reciprocatory mounted in said cylinder, means supporting one of said pump parts on a boat, a float adapted to be supported in water surrounding the boat and supporting the other pump part, an outlet port opening through the upper end of said cylinder, an inlet port opening through the lower end of the cylinder, a conduit having an outlet end connected to said inlet port and an inlet end adapted to be disposed in the bilge of the boat, said piston having a passage extending therethrough, an upwardly opening check valve for closing the piston passage during movement of the piston toward the upper end of the cylinder, a check valve for closing said conduit when the piston is moving toward the lower end of the cylinder, and float actuated means connected to the inlet end of the conduit for closing the inlet end of the conduit when the liquid level in the boat bilge falls below a predetermined point to prevent operation of the pump.

2. A boat pump comprising a pump cylinder, an outlet means adjacent the upper end of the cylinder, a rigid conduit having a lower end secured to and opening through a lower end of said cylinder, a clamp secured to an upper part of the conduit and adapted to be secured to a part of a boat for supporting the cylinder submerged in the water surrounding the boat, a piston, containing a head valve, reciprocably mounted in the cylinder, a piston rod connected to the piston and extending reciprocably through the upper end of the cylinder, a float secured to the upper end of said piston rod and adapted to be supported in the water for supporting the piston rod and piston, a tube having an inlet end and an outlet end, and a flexible conduit connected to the outlet end of said tube and to an upper end of said rigid conduit, said inlet end of the tube being adapted to be disposed in the bilge of the boat, said clamp including means for adjustably positioning said rigid conduit relative to the boat for raising or lowering the pump cylinder and for maintaining the pump cylinder and piston rod in upright positions.

3. A boat pump as in claim 2, said rigid conduit having a bleeder port adjacent its upper end disposed above the level of the liquid supporting said float to prevent back-syphoning through said rigid conduit and flexible conduit from the pump cylinder.

4. A boat pump comprising a pump cylinder, an outlet means adjacent the upper end of the cylinder, a rigid conduit having a lower end secured to and opening through a lower end of said cylinder, a clamp secured to an upper part of the conduit and adapted to be secured to a part of a boat for supporting the cylinder submerged in the water surrounding the boat, a piston, containing a head valve, reciprocably mounted in the cylinder, a piston rod connected to the piston and extending reciprocably through the upper end of the cylinder, a float secured to the upper end of said piston rod and adapted to be supported in the water for supporting the piston rod and piston, a tube having an inlet end and an outlet end, and a flexible conduit connected to the outlet end of said tube and to an upper end of said rigid conduit, said inlet end of the tube being adapted to be disposed in the bilge of the boat, a float controlled valve disposed in said tube inlet and responsive to the liquid level in the bilge for closing said tube inlet when the liquid level in the bilge falls below a predetermined point to prevent operation of the pump.

5. A boat pump comprising a pump cylinder, an outlet means adjacent the upper end of the cylinder, a rigid conduit having a lower end secured to and opening through a lower end of said cylinder, a clamp secured to an upper part of the conduit and adapted to be secured to a part of a boat for supporting the cylinder submerged in the water surrounding the boat, a piston, containing a head valve, reciprocably mounted in the cylinder, a piston rod connected to the piston and extending reciprocably through the upper end of the cylinder, a float secured to the upper end of said piston rod and adapted to be supported in the water for supporting the piston rod and piston, a tube having an inlet end and an outlet end, and a flexible conduit connected to the outlet end of said tube and to an upper end of said rigid conduit, said flexible conduit permitting positioning of said tube inlet in the water surrounding the boat, and a hose detachably connected at one end to the outlet means of the pump cylinder so that water may be pumped from the cylinder through the hose.

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ROBERT M. WALKER, *Primary Examiner.*