

[54] **VACUUM PUMPING UNIT**
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33312
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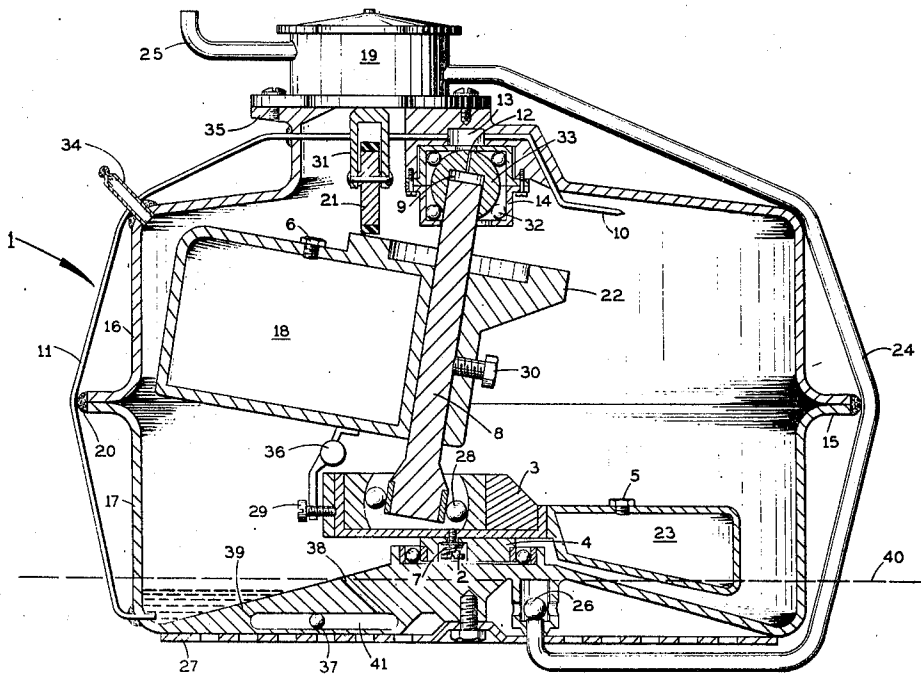
[57] **ABSTRACT**

A pumping unit having two swinging unbalanced weights rotating into a vacuum body around a vertical axle. The both unbalanced weights being working together to actuate a pump through a special high frequency device.
Also provided is a lubricating pump actuated by the motion of the axes of the said unbalanced weights.

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8 Claims, 2 Drawing Figures



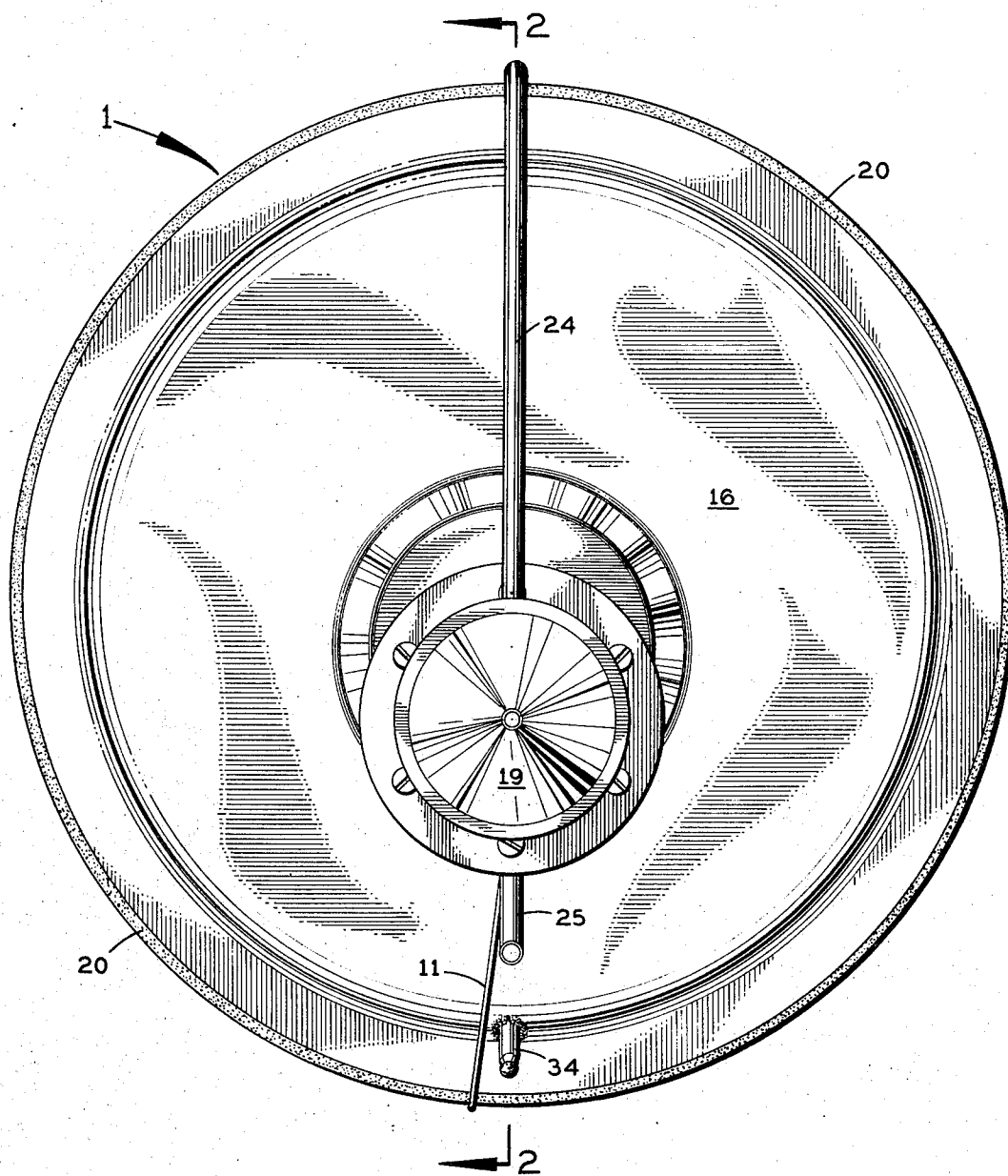
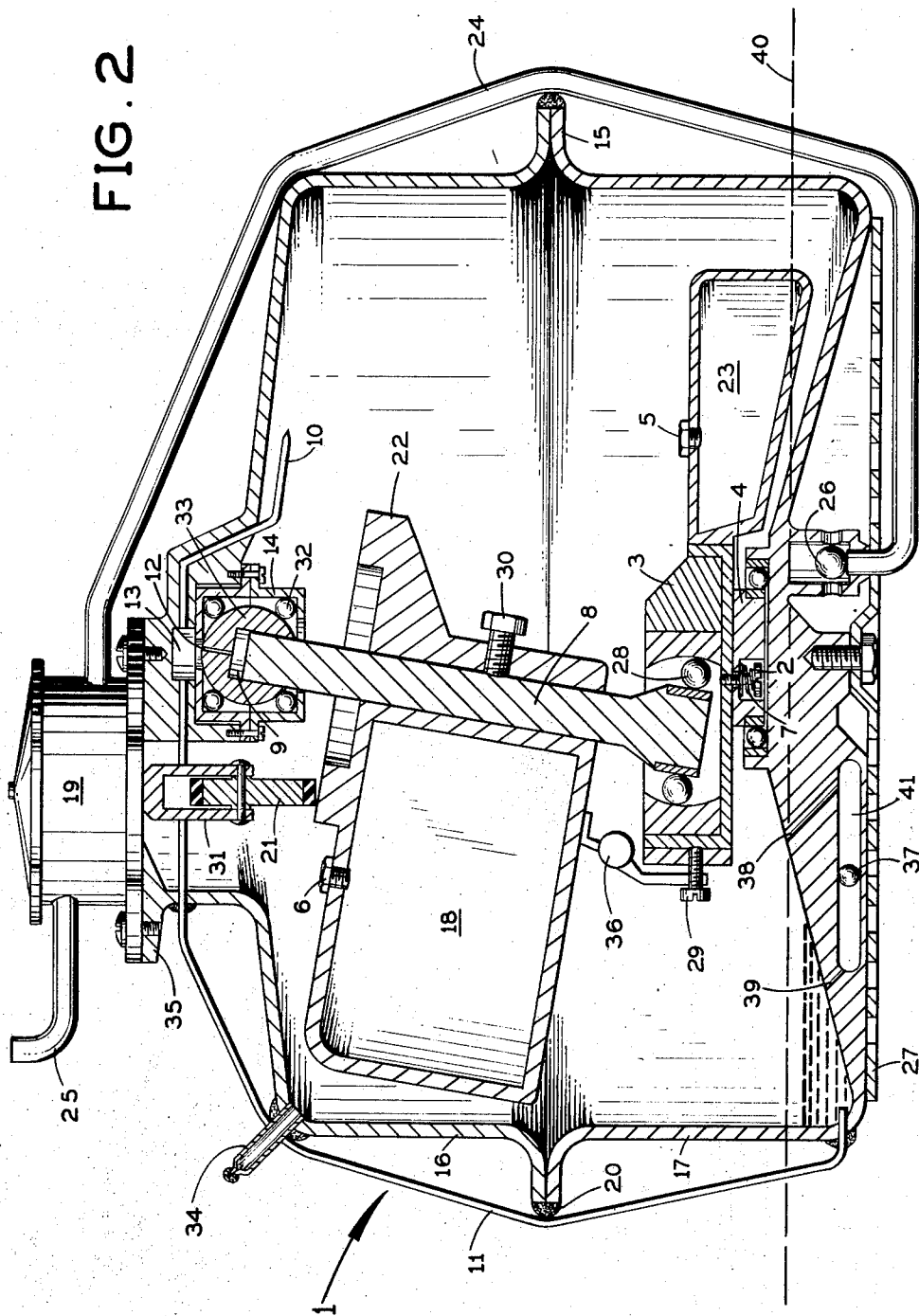


FIG. 1

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FIG. 2



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VACUUM PUMPING UNIT

This invention relates generally to a bilge pump; it is directed particularly to a novel gravity bilge pump comprised of a vacuum body housing several unbalanced weights swinging around the vertical axle's bilge pump and activating water pump by a high frequency device. Two other devices are provided to stop and to filter the water coming into the water pump.

At the present time, gravity bilge pumps have a very poor sensitivity and cannot be used inside harbors. Their mechanism is open to air and destroyed by the dampness of the boat's hull.

It is accordingly, the principal object of this invention to obviate the above described deficiencies of a bilge pump and provide a novel gravity bilge pump having a body in form of two semi-hemispherical cases opposed by their bigger diameter, housing two unbalanced weights swinging around inside the said hemispherical case and contributing together to actuate a diaphragm waterpump. All these devices working in vacuum condition, the said two opposed cases being sealed by welding or by gasket.

This will provide a very sensitive pump which will be enable to keep the boats hull always dry, even when the said boats are moored.

In this connection it will be understood that the unbalanced weights have much more power to actuate the water pump because working in vacuum condition no air can break their swinging. Equally the vertical position of the master weight's axle provides much more sensitivity.

Maintenance of this bilge pump has been eliminated, since the unit is completely sealed, and automatically lubricated. The mechanism is never in contact with moisture from the hull, providing a high working security.

The advantages of this invention will be apparent from the following description when read with reference to the accompanying drawings.

In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

FIG. 1 is a horizontal top view of a gravity bilge pump embodying the invention.

FIG. 2 is an elevational cross-sectional view thereof taken along the line 2—2 of the FIG. 1 in the direction of the arrows.

Referring now in detail to the drawings, reference numeral 15 in FIG. 2 designates a gravity bilge pump embodying the invention and comprises generally a housing preferably constituted by two semi-hemispherical cases 16 and 17, a master unbalanced weight 18, a water pump 19 and a second unbalanced weight 23.

Still as illustrated in FIG. 2 the gravity bilge pump's body 15 is built in the shape to resist at the atmospheric pressure and for this purpose the top and the bottom are coniform shape and the body's wall is cylindrical. In case of building the body in steel it will be seen that the welded joint 20 is formed by the melting of the two strong bended edges of the two cases, in order to hold firmly the central part of the cylindrical wall and to provide durable air tight joint.

If a plastic body is used this joint 20 may be done by gasket or glue, the outside pressure keeping the two hemispherical cases firmly together. The water pump

support 35 is preferably of coniform shape for the same reason.

The bilge pump's body must be set up with the boat's hull in order to have this gravity bilge pump follow the hull movements and using it, to actuate the weights.

As illustrated on FIG. 2 the vacuum work is done inside by pumping the air through the pipe 34 which will be sealed by welding when the work is done. To obviate the pumping of lubricating oil during this vacuum operation, the said lubricating oil will be included in a plastic bag 36 fastened between the two unbalanced weights 18 and 23, the bilge pump's body 15 being motionless. After the said vacuum operation, the oil bag 36 will be torn by moving the bilge pump 15 and the lubricant will get position I, by gravity.

The fork 31 of the said water pump 19 carries an offset wheel 21 running on a ring 22 this device providing a high frequency diaphragm water pump work. This ring 22 and the offset wheel 21 are preferably geared so they will not slip one on the other but be firmly interdependent, so every movement of the unbalanced weight 18 will make the diaphragm's water pump 19 in motion work up and down. Since the inside of housing 15 is under partial vacuum, atmospheric pressure on the upper side of the diaphragm in pump 19 biases the diaphragm down and therefore biases wheel 21 down on ring 22.

Of course this invention could possibly use only the unbalanced weight 18, but will preferably use both of them, the small one 23 being always unbalancing the big one 18 by moving its lower end when the offset ball bearing 28 is rotating with the said unbalanced weight 23 which can move up and down and swinging around.

The unbalancing work of the weight 23 is conditioned by its weight, which must be adjusted to make it rotate faster than the rotation of the master one 18 to provide its permanent unbalance, but the fact that the small weight has only the lower end of the axle 8 to move meanwhile the big one 18 has the pump to move, makes the difference of torque between the both and let the small one 23 to rotate faster than the big one 18 so it will be always in front rotation of it and unbalancing it.

Any type of water pump can be used but the diaphragm type of water pump will be preferred, because its good work with relatively little motion of the said diaphragm. As, for the said ball bearing oil pump, the valve box will be preferred but any type could be used.

Since such pumps are well known, their operation is not further described herein.

As illustrated in FIG. 2 this water pump 19 has an inlet pipe 24 and an outlet pipe 25, the inlet pipe 24 having a floating ball 26 used to close the inlet circuit when the water level is too low.

As illustrated in FIG. 2 a strainer 27 keeps the pump clean.

Means are provided for automatically maintaining the proper lubrication of the said bilge pump 15. Although it is possible to use a heavy ball 37 rolling reciprocally inside a cylinder 41 and pushing the oil alternately through a hole 38 and another hole 39, it will be preferable to use another device as is hereinbelow fully described. The ball 37 alternately sucks oil in openings 38 and 39 and then pushes it out as the ball reciprocates.

As illustrated FIG. 2 this preferred device is constituted by a special ball bearing oil pump 14 having a special hub with spherical shape 33 and a cylindrical bore 9 inside accurately fitting the upper end of the axle 8, a bore 12 flowing oil through the valves box 13. Each time the axle 8 is moving up and down because the two different motions of the unbalanced weight 23 the oil pump 14 is working, taking the lubricating oil 1 at the bottom of the lower case 17 through the inlet pipe 11 and spraying it inside the housing 15, through the small end hole of the pipe 10. The lubricating oil will return to the housing bottom by gravity.

It will be contemplated that we may use the above described oil type of pump as a water pump instead of using the well known diaphragm's one.

As described FIG. 2 a ball bearing 4 holds the small unbalanced weight 23 through a screw 2 and a spring 7 which allows it to go down, the said ball bearing 4 permitting its rotation.

It is contemplated that each time the weight 23 is moving one way or the other or both, the upper end of the said axle 8 is moving as piston inside the bore cylinder hub 33 of the special ball bearing 14 actuating this oil pump 32. To secure the work of the oil pump 32 when the weight 23 is swinging around it is necessary to put the screw 2 a little off center with respect to the central axis of housing 15. Then as weight 23 swings, screw 2 will swing or rotate about the main axis causing the upper end of axle 8 to move up and down like a piston.

An oscillating ball-bearing 28 held by a screw 29 in the weight 23's body holds the lower end of the axle 8; a liner 3 allowing the adjustment of the offset position of the said lower end axle 8. The weight 23 can reciprocate vertically in a rocking motion due to spring 7, and this further contributes to vertical reciprocation of the axle 8.

The pump stroke is adjustable by the screw 30 to get the better work of the said water pump 19.

It will be understood that in this invention three ways are provided to move the said water pump 19:

The first is provided by offset wheel 21 when rotated on the ring 22.

The second is provided by the offset bearing 28 when the weight 23 rotates.

The third is provided by the spring 7 when the weight 23 is upwardly and downwardly working.

It will be understood that in this invention, although the two weights 18 and 23 could be made by plain material, they will be preferably made hollow and filled as much as needed with the adequate material to adjust the weight of each of them, this filling being done through the two plugs 5 and 6.

It is contemplated that the bilge pump according this invention must be immersed until the line 40 in FIG. 2, in order to secure the better work.

While I have illustrated and described herein only

one form in which the invention can conveniently be embodied in practice it is to be understood that this form is presented by way of example only, and not in a limiting sense. For example, to simplify the lubrication of the mechanism we may use ever greased bearings. Also in order to improve the water pump's work the said water pump has to be built in a way to get the help of the vacuum force, which keeps the wheel 21 always under mechanic pressure on the ring 22, and will push the water pump's diaphragm in the way to lift the water out-board, which work is more important than the suction, because the big difference of the level work's pumping; the suction level difference being at the maximum height of the bilge pump while the lift out-board could be of several yards. The invention, in brief, comprises all the modifications and embodiments coming within the scope and spirit of the following claims.

What I claim as new and desire to secure by letters patent is:

1. In a bilge pump, the combination comprising a vacuum body in the form of two (semi)- hemispherical cases opposed (by) at their bigger diameter, a master unbalanced rotating weight with a vertical axle mounted in said cases, a high frequency working water pump driven through a ring an offset wheel connection by said master weight, a ball bearing g oil pump, a second unbalanced weight rotatable about said axle, (an oil bag tearable), a floating ball water valve connected to said water pump, a support holding the second unbalanced weight, and an offset ball bearing support with liner holding the lower end of said vertical axle for causing said axle to operate said oil pump.

2. A gravity bilge pump as defined in claim 1 wherein the mechanism actuating the water pump is working under vacuum condition.

3. A gravity bilge pump as defined in claim 1 wherein the second unbalanced weight swings around its vertical axle to unbalance the master unbalanced weight.

4. A gravity bilge pump as defined in claim 2 wherein a tearable oil bag is initially affixed between the two unbalanced weights while the vacuum is created and automatically torn when the said bilge pump starts to work.

5. A gravity bilge pump as defined in claim 1 wherein said floating ball water valve keeps the water inside the pump inlet pipe when the water level is too low.

6. A gravity bilge pump as defined in claim 1 wherein a flexible support holding the second unbalanced weight by a screw and spring lets said second unbalanced weight move up and down.

7. A gravity bilge pump as defined in claim 1 wherein said offset ball bearing support using a liner holds the lower end of the master unbalanced weight's axle to unbalance it.

8. A gravity bilge pump as defined in claim 1 wherein the unbalanced weights are hollow and filled with heavy material.

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