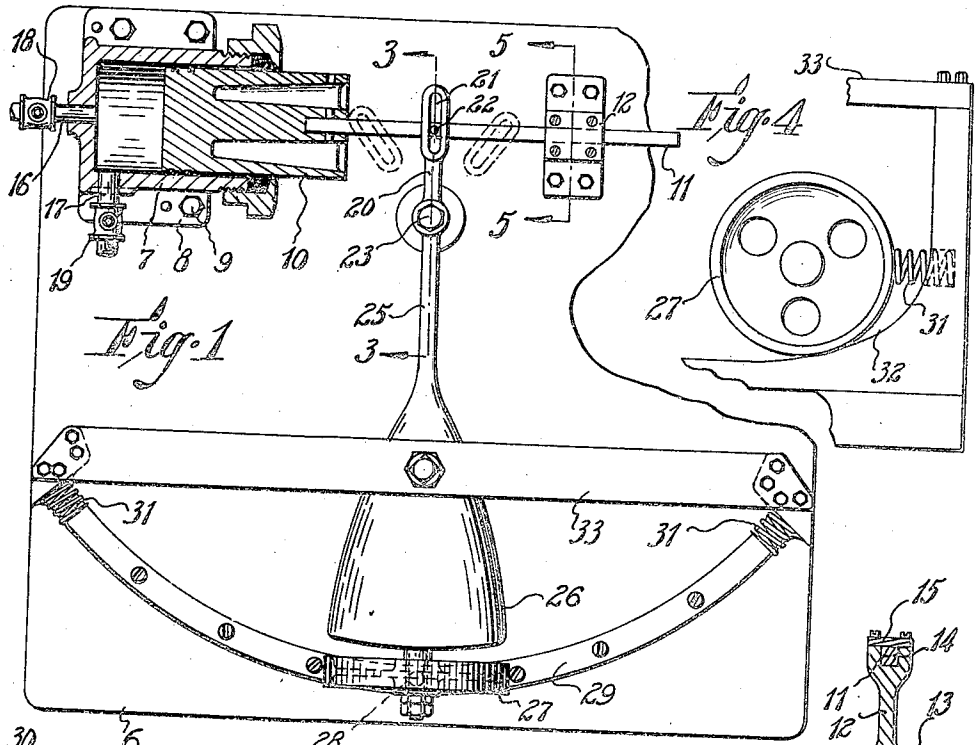
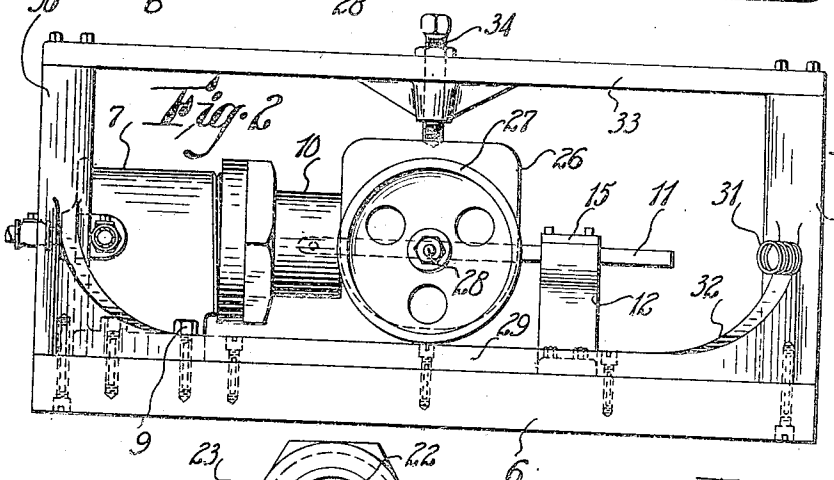
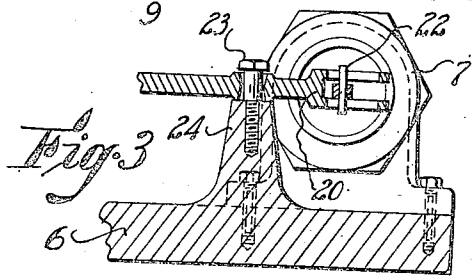
Jan. 16, 1923.

1,442,478

C. L. KEDDY.
WAVE MOTOR PUMP.
FILED JUNE 6, 1919.







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UNITED STATES PATENT OFFICE.

CLIFFORD L. KEDDY, OF LYNN, MASSACHUSETTS, ASSIGNOR TO ALBERT F. ABBOTT, OF MEDFORD, MASSACHUSETTS.

WAVE-MOTOR PUMP.

Application filed June 6, 1919. Serial No. 302,109.

To all whom it may concern:

Be it known that I, CLIFFORD L. KEDDY, a subject of the King of Great Britain, residing at Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Wave-Motor Pumps, of which the following is a specification.

The object of the present invention is to provide a pump adapted to be mounted on boats and other floating bodies and to be operated by the motion of the waves of the sea. Such a pump may be made in various sizes and is designed to be installed in vessels for the purpose of pumping out bilge water, or for other purposes, under actuation of the motion of the vessel in riding the waves. Further objects are to provide a mechanism of the character and for the purposes indicated which shall have ample power for doing the work required and shall be operated by relatively very slight rolling or pitching movements of the vessel, and to embody such mechanism in a self-contained structure of simple character capable of being made at low cost and sold as an independent machine ready to be conveniently mounted by the purchaser in the position for use.

In the drawings herewith presented, Figure 1 is a plan view in the form of a wave motor pump embodying my invention. Figure 2 is an elevation of the pump. Figure 3 is a sectional view on line 3—3 of Figure 1; Figure 4 is a fragmentary elevation of one end of the guide which forms a part of the apparatus and Figure 5 is a sectional view taken on line 5—5 of Figure 1 showing a detail of the device.

The same reference characters indicate the same parts in all the figures.

Referring to these drawings 6 represents a base plate to which there is secured a pump cylinder 7, the latter having flanges 8 which are suitably secured to the base plate, as by bolts 9. A piston 10 reciprocates in this cylinder, and to the piston is secured a piston rod 11, the outer end of which is supported and guided by a bracket 12. Said bracket, which may also be called the piston rod guide, is shown in detail in Figure 5. It has a foot portion 13 which rests on the base plate and is secured thereto, and in its upper part there is formed a guide or slot 14 in which the piston rod 11 fits, said guide slot or guideway being covered, and the piston rod securely retained therein, by a removable cover plate 15.

The pump cylinder is provided with an intake pipe 16, preferably arranged to deliver through the head of the cylinder, because thereby the suction of the piston acts directly in the line of delivery of the intake, and with an outlet pipe 17 which delivers from the side of the cylinder near the head, but may lead from the head if occasion requires. Both pipes are provided with check valves, the check valve 18 in the intake pipe opening inwardly but closing under outward pressure, and the check valve 19 in the delivery pipe opening under outward pressure and being closed by inward pressure.

The piston rod is engaged with a lever arm 20, the end of which is preferably forked so as to embrace the rod, as shown in Figure 3. Both branches of the fork are slotted as indicated at 21 in Figure 1, and the slots therein receive the ends of a pin 22 mounted in the piston rod. Arm 20 is part of a two armed lever which is mounted on a fulcrum 23, the latter being conveniently a stud set into a post 24 rising from the base plate, as shown in Figure 3. Conveniently the base plate is a casting and said post 24 may be made as an integral stud or boss of such casting; and so also may the guide 12 and the trackway, presently to be described, be made as integral parts of the same casting. The second arm of said lever is designated 25 and its outer end 26 is given a relatively great mass, whereby it is adapted under the influence of gravity to exert considerable force tending to move the pump piston. To provide this mass the said outer end is enlarged, and such enlarged end may be either a solid body of metal integral with the balance of the lever, or a hollow structure filled with heavy metal, such as lead. This weight is supported by a wheel or truck 27, which turns about a stud 28 projecting from the end of the weight and rolls upon a runway or track 29, such track being curved in conformity with the arc of travel of the wheel about the fulcrum 23 and having whatever length is necessary, in proportion to the ratio of the lever arms 20 and 25, to enable the lever to give the predetermined full stroke to the pump piston. At the ends of the track or runway are uprights 30 forming stops which limit the movement of the

weight, and in or upon which are mounted spring buffers 31 arranged to bear against the wheel and thus arrest the lever without abrupt shocks. Adjacent to these posts the supporting surface of the runway is preferably inclined upwardly as shown at 32 in Figures 2 and 4, for the purpose of more quickly starting the weight on its return trip after each completion of a trip. This track or runway or the posts may be made as integral parts of the base plate casting, or as a separate piece or pieces suitably secured to the base plate.

33 represents a bar or strap supported on the posts 30 and extending across from one to the other over the weight 26. It carries a holding screw 34 which is adapted to be set down against the weight when the latter is in position under it, whereby to hold the weight immovable and thus prevent operation of the pump, when desired.

It will be understood from this description that tilting of the bed plate 6 about an axis more or less nearly parallel with the lever 20, 25 will cause the weight to fall toward the low side of the bed plate as far as permitted by the runway stops, and to reverse its direction of movement with each reversal of the manner of tilting of the bed plate. Thereby the pump plunger is moved back and forth in a manner such as to draw water through the inlet and expel it through the outlet. When the apparatus is put on a vessel with the line of the midposition of the lever in a fore and aft line of the vessel, rolling of the vessel will cause working the pump; while if it is placed in an athwart ship position, pitching of the vessel will have the same effect. When a suction pipe leading to the bilges of the vessel is connected to the intake, and a pipe leading overboard is connected to the outlet of the pump, the motor becomes an automatic bilge pump. A number of such pumps may, if desired, be installed in the same vessel arranged in different relative positions if desired, or all in the same relative position, according to the results sought. Pumps of enough capacity would be installed in one vessel to take care of the normal leakage of the vessel, and in the case of an open boat, to pump out rain water; and to this end the motor is effective while the boat lies at anchor.

An advantage results from the fact that the weighted lever arm swings in a substantially horizontal plane, whereby it is able to make its full stroke with a very slight tilting of the bed plate, and in consequence with a very slight motion of the vessel. The wheel or truck 27 running on a trackway, and whether or not equipped with a ball bearing, supports the weight in a manner which largely eliminates friction and prevents cramping of the lever upon the fulcrum, thus allowing the force of gravity to be applied with inconsiderable friction losses to operating the pump.

Of course the foregoing suggestion of a possible use of the invention is not to be taken as indicating a limitation of the scope of the protection which I claim for this invention. The machine may be installed upon any sort of support, whereby it may be actuated by the motions of waves on a body of water, and may be used for pumping any sort of liquid from any source to any destination.

Various modifications in the structure may be made without departing from the protection claimed; as for instance, by connecting the lever and piston head by a pivoted link rather than a rod rigidly guided to move in a straight line; by making the operating lever as a bell crank or otherwise, and with its arms on the same side as well as on different sides of the fulcrum; and in various other respects known to mechanics.

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

1. A wave motor pump comprising a pump chamber with a piston therein, a lever connected with said piston to operate the same by its swinging movements, said lever having a weighted arm mounted at substantially the same height therewith to swing in a substantially horizontal plane, and anti-friction supporting and guiding means for said weighted arm.

2. A wave motor pump comprising a base, a lever pivoted upon said base and having a weighted arm, an antifriction wheel carried by said weighted arm, a trackway on the base upon which said wheel rests and is adapted to run, said lever and trackway being substantially horizontal and the axis of the lever substantially vertical, whereby the lever is caused by gravity to move when the base is tilted, a pump, and connections between said lever and pump by which movements of the former actuate the latter.

3. A wave motor pump comprising in combination a support adapted to be mounted on a floating body and having a substantially vertical pivot, a lever fulcrumed upon said pivot and having a long arm with a weight at its end, means for supporting said weighted long arm in a manner permitting swinging movement of the lever and preventing cramping of the lever upon its pivot, said lever having a second arm, a pump, and means by which said second lever arm operates said pump when the lever swings.

4. A wave motor comprising a pump cylinder having an inlet and an outlet, a piston working in said cylinder, an operating lever one arm of which is operatively connected with said piston, the lever having a second

arm with a weight at its end and being mounted to swing by a substantially vertical pivot, and means for supporting the weighted end of said second arm and permitting the same to move over its support when the machine is tilted.

5. A wave motor pump comprising a base plate having a pivot support, a vertical pivot on said support, a lever fulcrumed upon said pivot having a weighted operating arm, an antifriction wheel mounted upon said arm, a track or runway on said base plate beneath the path in which said wheel moves in the swinging motion of the lever, a pump cylinder and piston, and connections between said lever and pump piston for operating the piston when the lever swings.

6. A wave motor pump comprising a base plate having a pivot support, a vertical pivot on said support, a lever fulcrumed upon said pivot having a weighted operating arm, an antifriction wheel mounted upon said arm, a track or runway on said base plate beneath the path in which said wheel moves in the swinging motion of the lever, a pump cylinder and piston, connections between said lever and pump piston for operating the piston when the lever swings, and stops at the ends of said track limiting the extent of movement of the arm in either direction.

7. In a wave motor pump, a substantially vertical pivot, a trackway concentric with said pivot in a sbstantially horizontal plane, a lever having an arm with a weight on its end mounted to swing about said pivot, an antifriction wheel journaled upon said arm and resting upon said trackway, supporting the arm, stops at each end of the trackway for arresting the movements of said arm, spring buffers on said stops, and a pump unit in connection with said lever for operation thereby.

8. A wave motor pump comprising the combination with a pump cylinder, a piston arranged to travel in said cylinder and having an extended piston rod, of a lever pivoted at one side of said piston rod to swing in a substantially horizontal plane and on a substantially vertical axis when the pump is in position for use, said lever having a long arm with a weigh at its outer end, and a short arm, said short arm extending across the line of the piston rod and having a motion transmitting connection therewith.

9. A wave motor pump comprising a weighted arm adapted to swing in a substantially horizontal plane and having a supporting wheel, a pump having a piston connected with said arm, and being operable by back and forth swinging movements of the latter, and a track on which said wheel is adapted to roll, said pump being adapted for mounting upon a floating support and to be operated by rolling or pitching of the support by wave action, and the wheel engaging-surface of the track being inclined upwardly toward an end thereof, whereby to facilitate the return movements of the weighted arm away from the said track end.

In testimony whereof I have affixed my signature.

CLIFFORD L. KEDDY.