

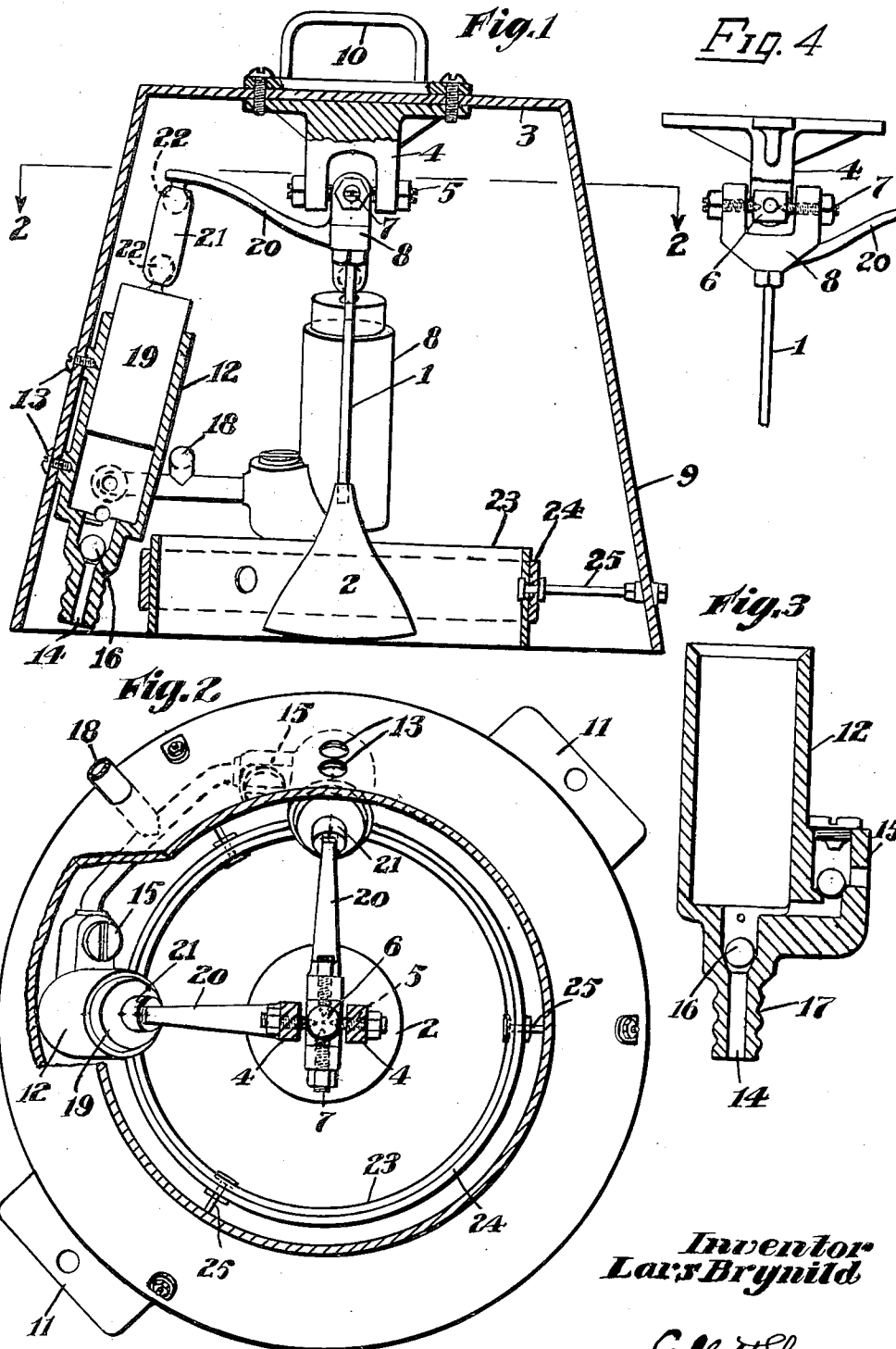
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WAVE OPERATED PUMP

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WAVE OPERATED PUMP

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4 Claims. (Cl. 103—71)

My present invention relates to improvements in wave operated pumps for use in vessels.

The presence of water in vessels because of leaks, storms, and heavy seas has always presented a serious problem. In large vessels, the seriousness of this problem has been minimized because of the available sources of power with which pumps could be operated. This solution of the problem was not applicable to most vessels, because of several factors represented by the cost of the equipment and installation and the size and type of the vessel.

In smaller vessels, accumulated or bilge water has been disposed of by hand operated pumps. The inadequacy of that treatment, while well illustrated by the extreme conditions under which fishing and life boats are operated, may be best appreciated by considering vessels of all types at anchor.

Many boats, particularly those used for recreational purposes, are frequently left unattended for considerable lengths of time during which they are exposed to the risks of an accumulation of water from leaks or storms. While the risk is greater with open vessels, it is a real risk in all types and sizes of vessels, which, if not resulting in property loss or damage, at least necessitates special attention and causes delay if the boat is to be used.

This problem has been recognized for a long time and several attempts have been made to provide an adequate solution of it by utilizing the power of the waves as represented by the motion of the vessel to actuate pumps. It was considered that this could be effected by the use of an arm which was free to swing as the boat was moved by the waves and the resulting pendulum-like action could be used to actuate the pumps. These devices required special guides to ensure the desired action.

These devices did not solve the problem as the effectiveness of their operation was interfered with by limitations inherent in each concept and were further objectionable in that they were costly to manufacture and difficult to install. This alone would have been a serious objection as installations were possible only in certain types and sizes of vessels.

In my invention, I utilize a weighted pump actuating member which is connected to a suitable support by a universal joint so that it is free to depend perpendicularly at all times. This construction obviates the necessity for special guides and is well adapted to embodi-

ments permitting easy installation and use as a portable device.

Two or more pumps may be operated by a single weighted member which permits a constant minimum flow at all times whether the vessel is underway or at anchor.

I am thus able to provide a device which is extremely efficient and as it may be manufactured at a cost sufficiently low to be available to all, my invention solves the problem by providing a pump which is always operated when the waves have sufficient force to impart motion to the vessel.

In the drawing I have suggested an embodiment of my invention particularly adapted for portable use while in the specification I have discussed my invention somewhat more broadly. In the drawing:

Fig. 1 is a cross section of an embodiment of my invention.

Fig. 2 is a plan view of the same along the lines 2—2 of Fig. 1.

Fig. 3 shows in detail a pump such as might be used, and

Fig. 4 is a detailed view of the universal joint shown in Fig. 1 viewed at right angles.

In accordance with my invention, I use a rod 1 weighted as at 2 and secured to a support 3 by a universal joint. The universal joint consists of a U-shaped receiver 4 secured to the support 3 through which are threaded pivots 5 for the cylindrical member 6 which also receives the pivots 7 threaded through the U-shaped portion 8 of the rod 1. This type of universal joint is preferred as while permitting the rod 1 to swing in any direction in relation to the support 3, it prevents rotation of the rod 1.

The support 3 as shown in the drawing is part of a housing having side walls 9. A housing is preferred as it permits my invention to be made as a unit which makes installation simple and allows the unit to be used as a temporary or portable device. Such a housing may be provided with a handle 10 and flanges 11 which may be used to hold the housing in place.

I mount pump cylinders 12 on the inner surface of the walls 9 by the bolts 13. Each of the cylinders 12 includes an inlet 14 and an outlet 15, each of which is provided with a valve indicated at 16. The inlets 14 may be formed as at 17 to receive hose pipe (not shown) to the space from which it is desired to exhaust fluid. Where more than one pump is used, the outlets 15 are connected to a common exhaust 18 to which may be secured an extension of any de-

sired length to permit the bilge water to be disposed of as desired.

The plungers 19 in the cylinders 12 are connected to arms 20 on the rod 1 by links 21 which have ball and socket connections 22 with the plungers 19 and the arms 20.

As the vessel is moved by the waves, the housing is moved with it and the effect on the pumps depends on the extent to which the pumps are raised and lowered. This depends in part on the power of the waves and in part on the direction of movement of the cylinders 12 in relation to the cylinders 12. That is, each pump will have the longest stroke when a cylinder is raised and lowered and will have the shortest stroke when the motion of the vessel is on an axis at right angles to the motion effective to cause the maximum stroke.

In order to ensure a desired minimum flow on any motion of the vessel, I use two pumps disposed so that the arms 20 define between them an angle of 90° so that as the length of the stroke of one pump decreases, the stroke of the other increases.

The length of the stroke will depend on the force of the waves and the extent to which the vessel is moved thereby. While this is a variable factor, an adequate stroke may be provided by utilizing arms 20 of sufficient length to permit normal movement of the housing to develop a full stroke.

I limit the stroke of the pumps by a ring 23 which is preferably of rubber to cushion its contact with the weighted portion 2. The ring 23 is backed by a metal support 24 and secured to the walls 9 as indicated at 25.

The installation of my device is extremely simple and its operation is positive as long as the vessel is moved by the waves so that even relatively small capacity pumps are adequate.

My invention, with its many advantages, permits bilge water to be disposed of as it accumulates and it may be manufactured as a standard unit or adapted to operate to meet special requirements so that it affords the solution of the problem.

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

1. In a wave operated pump for vessels, a support and a pump including a cylinder and a

plunger mounted to follow the motion of said vessel, said pump being adapted to be operated by substantially vertical reciprocation, a weighted member, a universal joint connecting said weighted member to said support, means connecting said weighted member and said plunger, and said means comprising an arm on said member and a link, said link being connected to said arm and said plunger by universal joints.

2. A wave operated pump for vessels comprising a housing mounted to follow the motion of the vessel, a pump mounted on the side wall of said housing, said pump including a cylinder and a plunger, a weighted rod, a universal joint on the top of said housing non-rotatably suspending said weighted rod, an arm on said rod adjacent said universal joint, a link member and ball and socket means connecting said plunger and said arm to said link member.

3. A wave operated pump for vessels comprising a housing mounted to follow the motion of the vessel, a pump mounted on the side wall of said housing, said pump including a cylinder and a plunger, a weighted rod, a universal joint on the top of said housing non-rotatably suspending said weighted rod, an arm on said rod, a link member and ball and socket means connecting said plunger and said arm to said link member and a circular member carried by said housing to confine said weighted rod when said relative movement of said rod and said housing has resulted in maximum relative movement of said cylinder and said plunger.

4. A wave operated pump for vessels comprising a housing mounted to follow the motion of the vessel, a pump mounted on the side wall of said housing, said pump including a cylinder and a plunger, a universal joint secured to the top of said housing and actuating means suspended from said universal, said universal joint being adapted to prevent turning of said actuating means, said actuating means including a weighted rod and an arm, and means connecting said arm and said plunger and said actuating means being adapted to develop maximum relative movement of said casing and said plunger on a predetermined relative movement of said housing and said weighted member, and means to confine said weighted member.

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