Nov. 16, 1943. E. A. ZADIG 2,334,525

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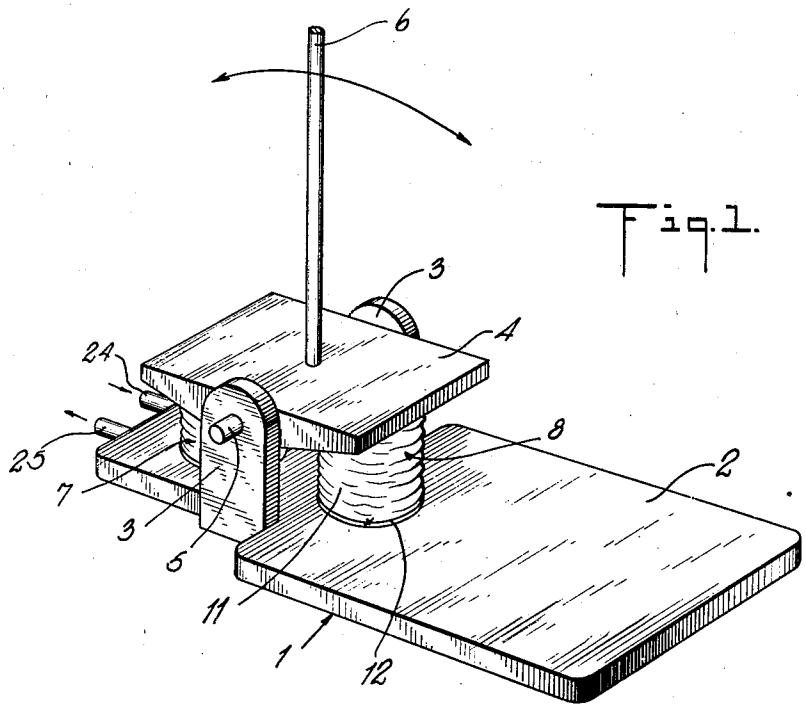


Fig. 1.

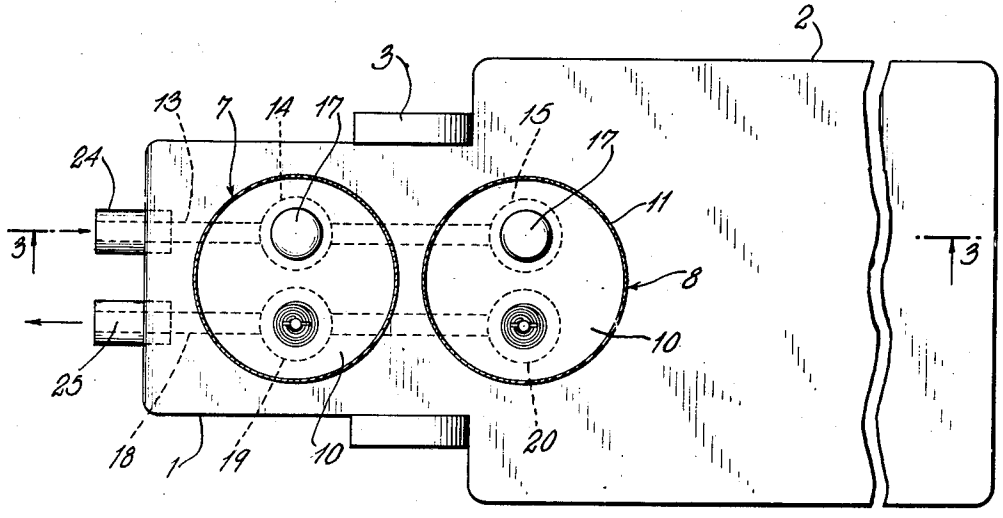


Fig. 2.

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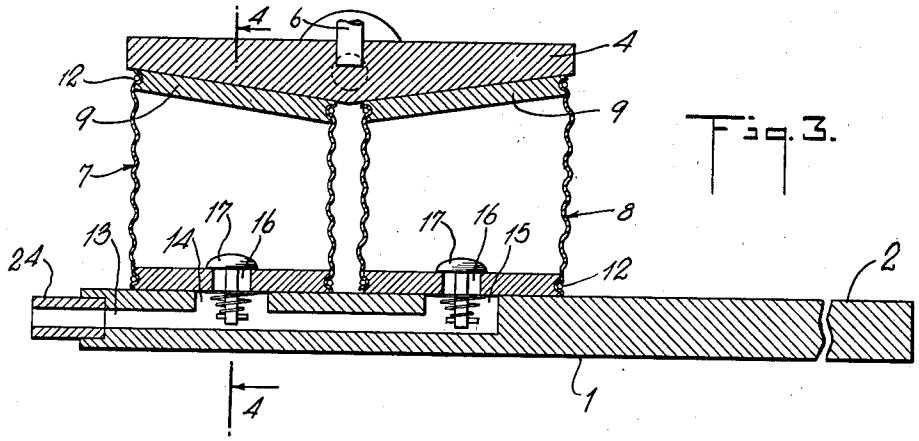


Fig. 3.

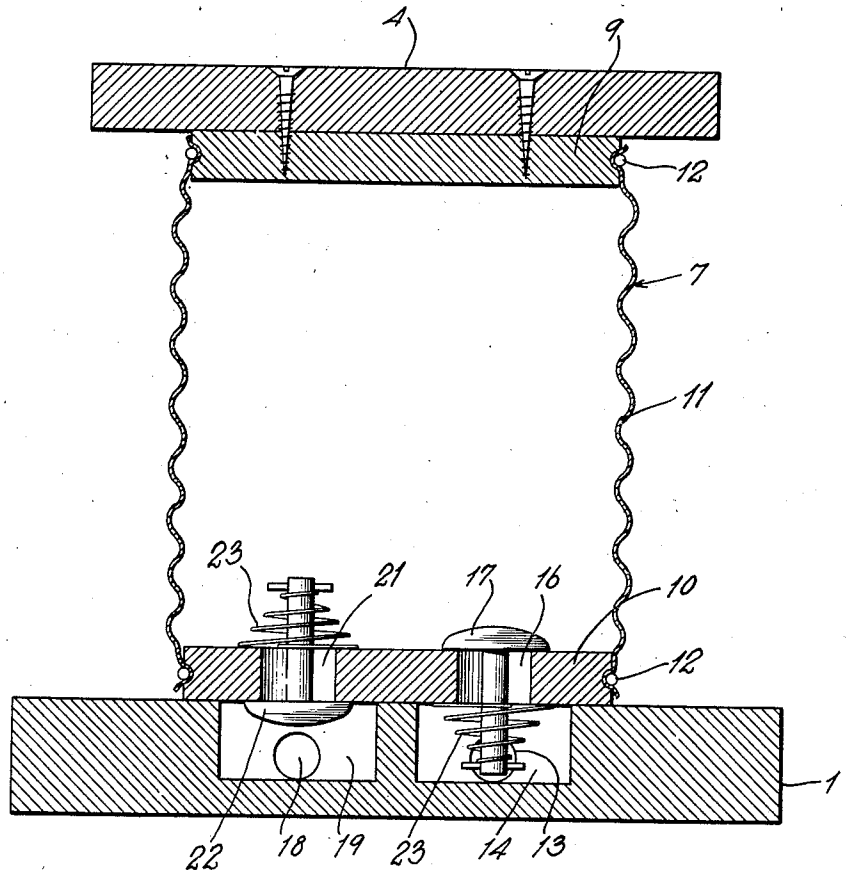


Fig. 4.

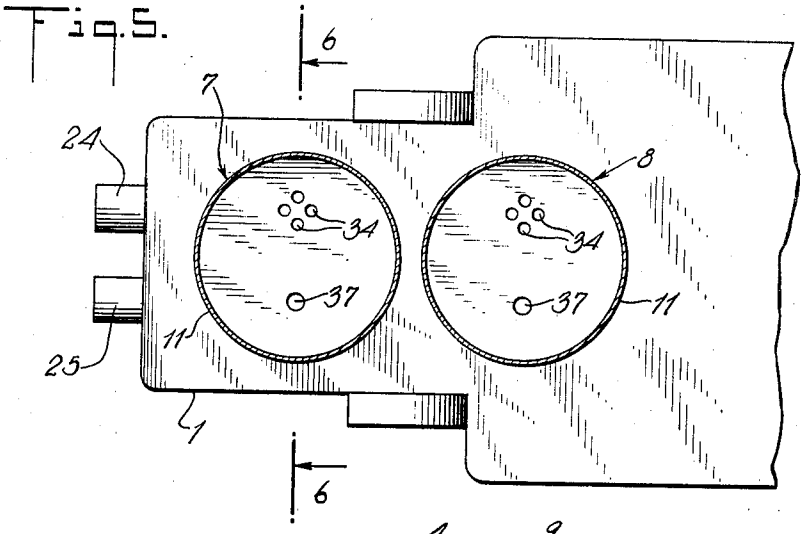
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Fig. 5.



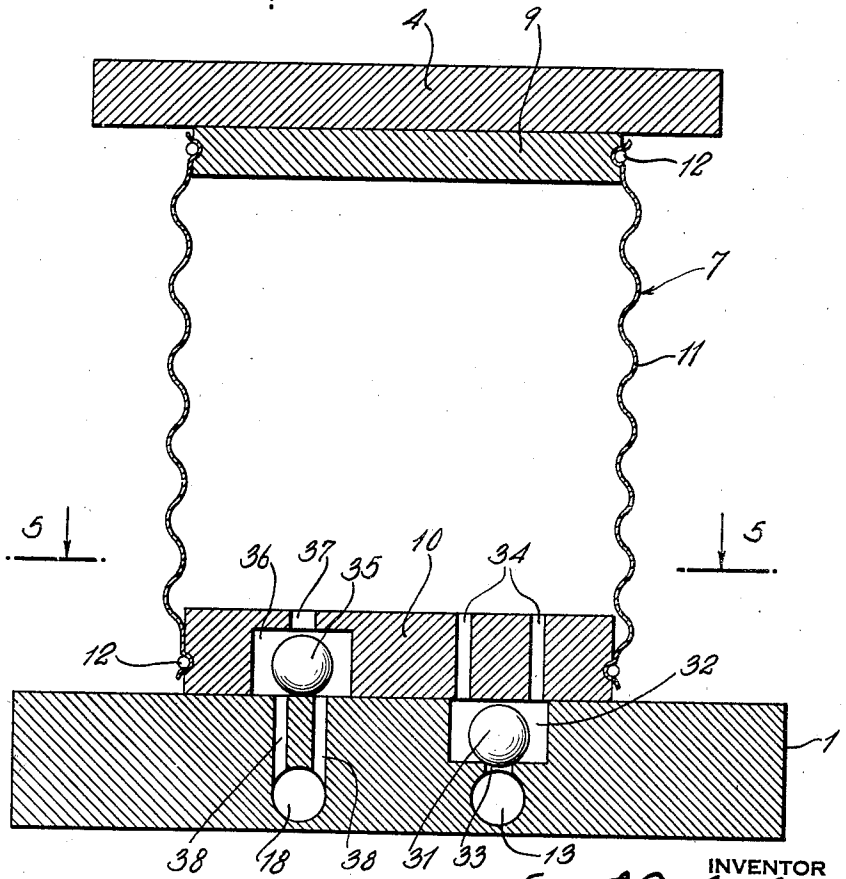


Fig. 6.

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UNITED STATES PATENT OFFICE

2,334,525

PUMP

Ernest A. Zadig, Norwalk, Conn.

Application July 11, 1942, Serial No. 450,495

4 Claims. (Cl. 103—148)

This invention relates to pumps, and pertains more particularly to hand operated liquid pumps of a type particularly adapted for household uses such as emergency fire protection, garden spraying and the like.

It is an object of the invention to provide a pump which is simple in construction, inexpensive to manufacture, and easy to operate.

It is a further object of the invention to provide a pump which can be constructed chiefly of wood and other materials which are readily available at the present time.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which,

Figure 1 is a perspective view of the pump.

Figure 2 is a top plan view of the base with the bellows and bellows operating block removed.

Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 is an enlarged section on the line 4—4 of Figure 3.

Figures 5 and 6 show a modified form of valve construction, Figure 5 being a section on the line 5—5 of Figure 6, and Figure 6 being a section on the line 6—6 of Figure 5.

Referring to the drawings, the pump comprises a base 1 having an extension 2 serving as a platform on which the operator may stand while operating the pump. Mounted on the sides of the base 1 are a pair of vertical standards 3 on which is pivotally mounted a block 4. The said standards are provided with aligned apertures therein to receive the trunnions 5 located centrally on the block 4 and supporting said block in spaced relation to the base. Extending vertically upwardly from said block is an operating handle 6 by means of which the said block may be oscillated.

Mounted in the space between the base 1 and the block 4 are a pair of collapsible bellows 7 and 8, which, in the preferred embodiment illustrated are roughly cylindrical in shape. Each of said bellows comprises a disk 9 secured to the underside of the block 4 near the end thereof, a disk 10 secured to the topside of the base 1, and a tubular member 11 of flexible material forming a collapsible wall therebetween. Each of the disks 9 and 10 is provided with an annular groove in its outer periphery and the ends of the tubular member may be secured therein by baling wire 12 or other suitable clamping device. If desired, a suitable adhesive may also be applied as an additional precaution against leakage.

An intake passage 13 is formed in the base 1, said passage extending through the base from an edge thereof and having branch passages 14 and 15 extending vertically and aligned with apertures 16 in the disks 10 to provide communication with the interior of the bellows 7 and 8. Valves 17 seating against the top surfaces of the disks 10 serve as intake valves permitting liquid to flow into the bellows, but preventing outflow.

A similar discharge passage 18 is also formed in the base 1, paralliel to the passage 13 and having branch passages 19 and 20 extending vertically and aligned with apertures 21 in the disks 10 to provide communication with the interior of the bellows 7 and 8. Inverted valves 22, seating against the under surfaces of the disks 10 serve as discharge valves permitting liquid to flow out of the bellows, but preventing inflow. Each of the valves 17 and 22 may be provided with a light spring 23 urging the valve toward its seat.

At the end of each of the passages 13 and 18 is a nipple 24, 25 serving as a convenient means for attachment of a tube or hose (not shown). The hose connected to nipple 24 would be led to a source of liquid supply, of course, and the hose connected to nipple 25 may be provided with a suitable discharge nozzle.

In operation, the operator stands on the platform 2, and moves the handle 6 back and forth to oscillate the block 4, the handle being within easy reach of the operator standing on the platform. Because of the convenient position of the handle and the leverage provided, the pump can easily be operated with one hand, leaving the other hand free to hold and direct the discharge nozzle. Oscillation of the block 4 collapses and expands the bellows 7 and 8 in alternation, the bellows 7 being collapsed while the bellows 8 is being expanded and vice versa. Whenever one of the bellows is expanded, its intake valve is open and its discharge valve is closed, and whenever one of the bellows is collapsed, its discharge valve is open and its intake valve is closed. Thus, the pump is double acting and a continuous flow of liquid is provided.

The base 1, the standards 3, the block 4 and its trunnions 5, the handle 6, disks 9 and 10, and valves 17 and 22 can all be made of wood which is light, cheap and plentiful. The tubular member 11 may be made of any suitable material which is strong and flexible, as for example, a woven textile material such as heavy duck, preferably treated by known methods to increase its water resistance.

In the modified form illustrated in Figures 5

and 6, ball valves are used in place of the mushroom valves previously described. In this case the intake valves **31** are located in valve chambers **32** formed in the base **1**, and each valve seats against the rim of a branch passage **33** communicating with the intake passage **13**. Above the chamber **32** the disks **10** are provided with a plurality of passages **34** communicating with the interior of the bellows. Discharge valves **35** are located in valve chambers **36** formed in the disks **10** and seat against the rims of the passages **37** communicating with the interior of the bellows. A plurality of branch passages **38** communicate with the discharge passage **18**.

The intake valves are made of material such as glass, for example, having a specific gravity greater than water, so that they are caused to seat by their own weight. The discharge valves **35**, on the other hand, are made of material such as wood, for example, having a specific gravity less than water, so that they tend to float upwardly to seat against the rim of the passages **37**. In this manner the use of valve springs may be dispensed with.

By using bellows having a diameter of approximately 3'' and a handle approximately 3' long operated a distance sufficient to cause the ends of the block to move through an arc of approximately 2'', a copious flow of liquid may be induced with very little effort, the losses due to mechanical friction being negligible as compared to those encountered in piston type pumps.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. A liquid pump comprising, in combination, a base, a block pivotally mounted above said base in spaced relation thereto, a pair of collapsible bellows each having one end connected to said base and another end connected to said block and adapted to be collapsed and expanded in alternation by oscillation of said block, said base being provided with valve controlled intake and discharged passages communicating with the interior of both of said bellows, and said base having an extension serving as a platform on which the operator may stand.

2. A liquid pump comprising, in combination, a base, a block pivotally mounted above said base in spaced relation thereto, a pair of collapsible bellows each having one end connected to said base and another end connected to said block and adapted to be collapsed and expanded in alternation by oscillation of said block, said base being provided with valve controlled intake and discharge passages communicating with the interior of both of said bellows, said base having an extension serving as a platform on which the operator may stand, and an operating handle extending upwardly from said block for oscillating the same, said handle being within easy reach of an operator standing on said platform.

3. A liquid pump comprising, in combination, a base, a block pivotally mounted above said base in spaced relation thereto, a pair of collapsible bellows each having one end connected to said base and another end connected to said block and adapted to be collapsed and expanded in alternation by oscillation of said block, said base being provided with a straight intake passage extending longitudinally therethrough and having angularly disposed branch passages leading therefrom and communicating with each of said bellows, an intake valve in each of said branch passages controlling communication between said intake passage and one of said bellows, said base being also provided with a straight discharge passage extending longitudinally therethrough and having angularly disposed branch passages leading therefrom and communicating with each of said bellows, and a discharge valve in each of said branch passages controlling communication between said discharge passage and one of said bellows.

4. A liquid pump comprising, in combination, a base, a block pivotally mounted above said base in spaced relation thereto, a pair of collapsible bellows each having one end connected to said base and another end connected to said block and adapted to be collapsed and expanded by oscillation of said block, said base being provided with intake and discharge passages communicating with the interior of both of said bellows, intake valves controlling communication between said intake passage and each of said bellows, said valves seating downwardly and being made of material having a specific gravity greater than water, and discharge valves controlling communication between said discharge passage and each of said bellows, said valves seating upwardly and being made of material having a specific gravity less than water.

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