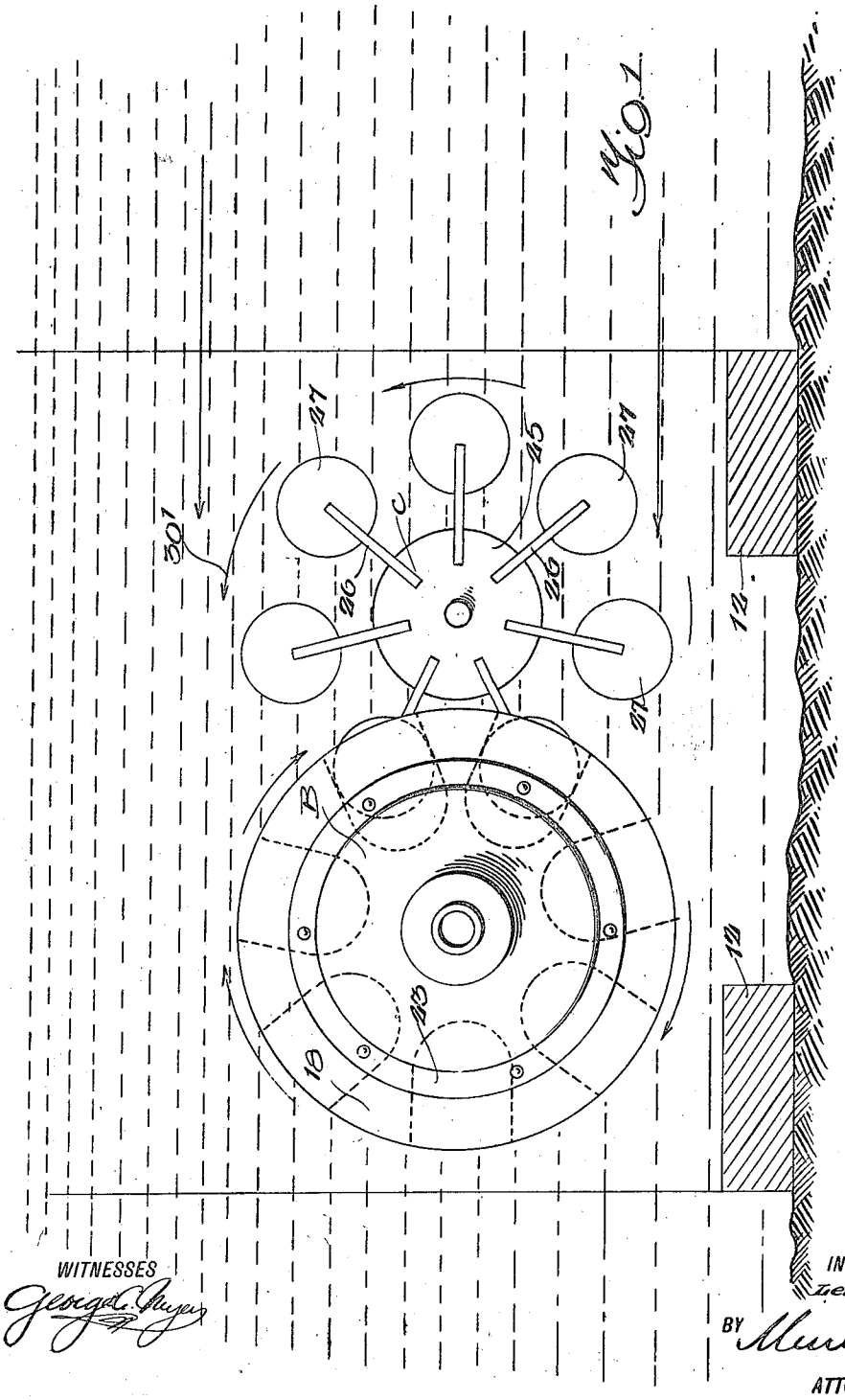
May 29, 1923. 1,456,694

L. L. INGRAHAM

PUMP

Filed June 20, 1921 3 Sheets-Sheet 1



WITNESSES

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May 29, 1923. 1,456,694

L. L. INGRAHAM

PUMP

Filed June 20, 1921 3 Sheets-Sheet 2

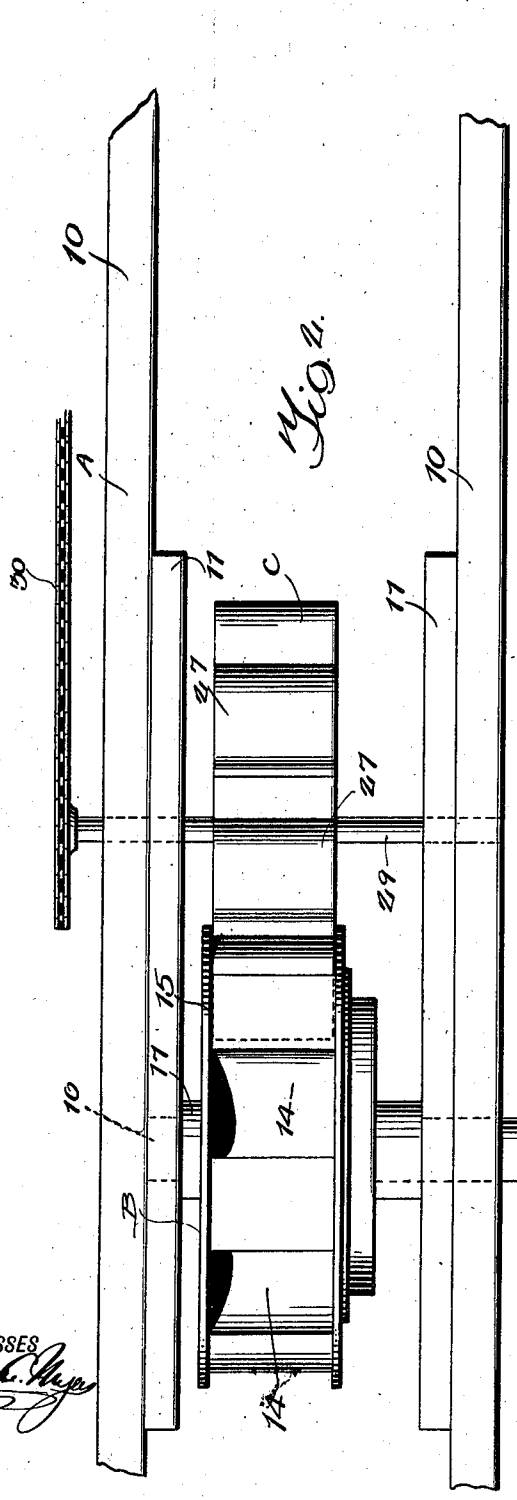

Fig. 2.

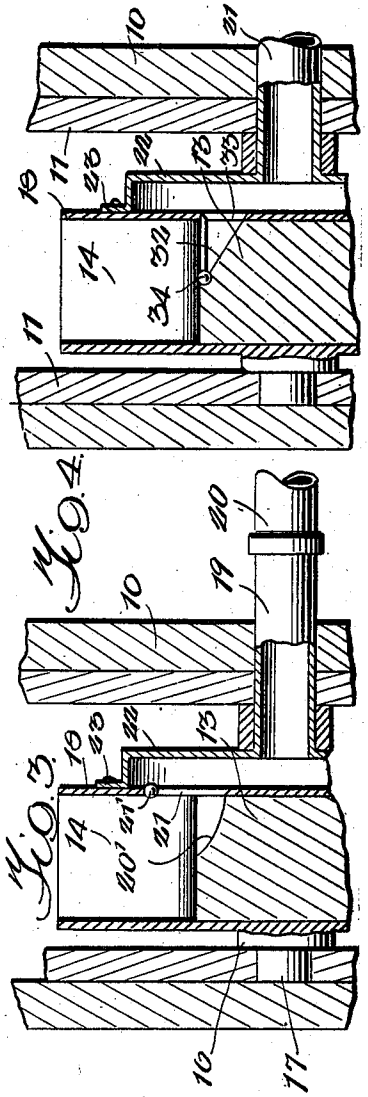

Fig. 4.

Fig. 3.

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Fig. 6.

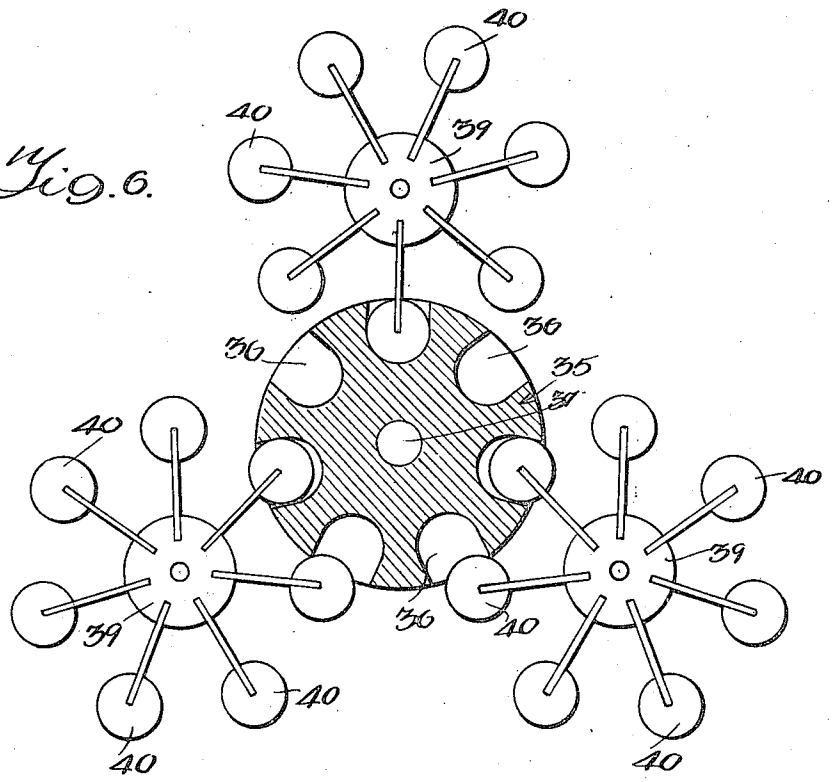
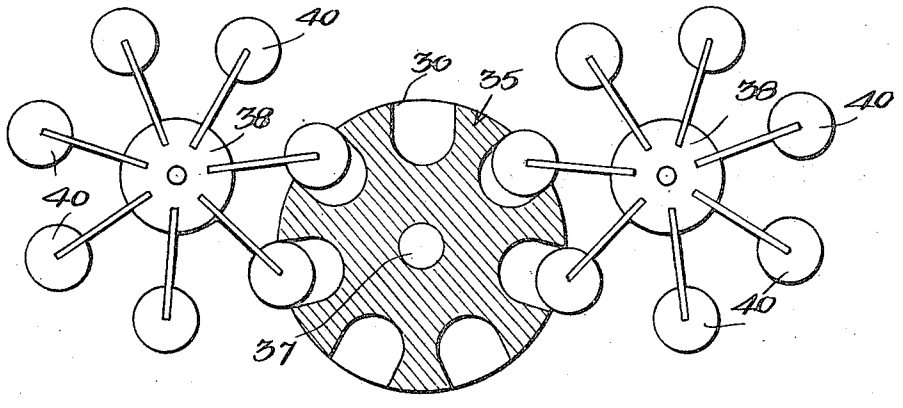


Fig. 5.



WITNESSES

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Patented May 29, 1923. 1,456,694

UNITED STATES PATENT OFFICE.

LEO L. INGRAHAM, OF GOODING, IDAHO, ASSIGNOR OF ONE-FOURTH TO ERLE WHIPKEY, OF GOODING, IDAHO.

PUMP.

Application filed June 20, 1921. Serial No. 478,890.

To all whom it may concern:

Be it known that I, LEO L. INGRAHAM, a citizen of the United States, and a resident of Gooding, in the county of Gooding and State of Idaho, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

The object of the invention is to provide a pump adapted for elevating liquids when submerged in a body of water and having a relatively high pumping capacity.

It is also an object of the invention that the parts forming the pump be simple and not subject to getting out of order.

Other objects and objects relating to details of construction, combination and arrangement of parts, will hereinafter appear in the detailed description to follow.

The invention is illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a vertical sectional view illustrating the pump when submerged in a liquid and the manner in which it operates,

Figure 2 is a top plan view of the pump and supporting frame therefor,

Figure 3 is a detail sectional view illustrating the manner in which the liquid is ejected from the different troughs,

Figure 4 is a view similar to Figure 3 showing a modified arrangement of the valve for controlling the ejection of the liquid from the troughs,

Figures 5 and 6 are diagrammatic views illustrating means by which the capacity of the pump may be increased.

Referring to the drawings in detail and particularly to Figures 1 to 4 inclusive, A indicates generally a supporting frame structure comprising the two side walls 10, each of which are reinforced by the members 11 having extending between their lower edges the cross members 12.

Between the walls 10 there is rotatably supported a drum B and wheel C. The drum B comprises a cylindrical core 13, the periphery of which is formed with a plurality of sockets 14, said sockets being substantially U-shaped in cross section and preferably seven in number. Upon one side of the core 13 there is welded, or otherwise secured a circular plate 15 which is equal in diameter to the core and has formed therewith a boss 16, from which there extends a stub shaft 17 which is journaled in the member 11 carried by the adjacent wall 10. Upon the other side of the core there is likewise secured a circular plate 18, and in the adjacent wall 10 there is journaled a hollow axle 19 which terminates at its inner end in a cup shaped member 22, and said cup shaped member 22 having formed therewith a flange 23 by which the same is secured to the plate member 18 by the means of rivets as shown. Intermediate the cup shaped member 22 and the adjacent wall 10 there is positioned upon the axle 19 a collar 24. The outer end of the axle 19 communicates with a pipe 20 through which the liquid pumped may be elevated.

Each of the sockets 14 has formed in the bottom thereof a lateral arcuate recess 20′, said recess communicating with the interior of the cup shaped member 22 through a suitable opening provided in the circular plate 18. The opening in the plate 18 through which the sockets communicate with the cup member 22 is closed by a flap valve indicated at 21, the flap valve being hinged at its top as shown at 21′ and adapted to normally remain in a vertical position, and also adapted to only move outwardly and permit liquid to flow from the sockets 14 of the drum B.

Referring to the wheel C the same comprises a hub member 25 from which there extends a plurality of radial leaves 26, each of said leaves having formed upon its outer end a cylindrical member 27, said cylindrical members being adapted to enter the sockets 14 of the drum B and form a close fitting therewith. The hub member 25 is supported by a shaft 29, the shaft 29 having its ends journaled in the walls A, and also having one end extended and carrying thereon a sprocket wheel 30 about which a sprocket chain may be passed for applying power to rotate the wheel C.

In the use of the present device, the pump as a whole is immersed in water, as shown

in Figure 1, and a chain is passed over the sprocket wheel 30 and driven by a suitable means above the water. The wheel C will of course be rotated in the direction of the arrows 30′ and the cylinders 27 carried thereby will successively enter the U-shaped sockets 14 of the drum B. As is obvious as the wheel C rotates the cylinders 27 entering and leaving the sockets 14 of the drum B will cause rotation of the drum. The sockets 14 will of course be always filled with water or other liquid with which the pump may be immersed, and as the cylinders 27 enter the sockets 14 they will act as a plunger and compress the water therein, whereupon the valve 21 will open to permit the water to escape from the sockets; the water will then pass through the hollow axle 19 and from thence be elevated through the pipe 20.

Referring to Figure 4 it will be seen that the bottom of each of the sockets 14 is formed with a slightly different shaped recess as indicated at 32. Each of these recesses communicate with the interior of the cup shaped member 22 through a recess 33 formed in the plate member 18. A flap valve member 34 is hinged at the upper end of the recess 32 as shown and adapted to close the opening formed by the recess 32 when in the position as shown. The position shown of the flap valve will be maintained by centrifugal force as long as the drum B rotates, and will only open when pressure is exerted thereagainst at the time water is compressed within the sockets 14 by the cylinder 27.

Referring to Figures 5 and 6, 35 indicates generally a drum similar to the drum B shown in Figures 1 and 2. The drum is likewise provided with the seven U-shaped sockets as indicated at 36 and supported by a shaft at 37 similar to the manner in which the drum B is supported. In Figure 5 it will be seen that two wheels 38 are positioned with respect to the drum 35, while in Figure 6 three wheels 39 are so positioned. Each of the wheels shown in Figure 5 and also in Figure 6 carry seven cylinders 40 which are adapted to co-operate with the sockets 36 of the drums 35 in the manner heretofore described for Figures 1 to 3 inclusive. As is obvious the purpose of increasing the number of cylinders 40 is to increase the pumping capacity of the pump.

It may be here mentioned that the pump structure heretofore described and shown is adapted to operate at a very low speed, and at the same time deliver or pump a large volume of liquid.

I claim:

1. In a device of the character described, a rotatable drum having radial pockets arranged circumferentially upon the periphery thereof, said pockets open at their outer ends, and having lateral recesses in their inner ends, a hollow axle supporting said drum at one side and communicating with said lateral recesses, a one way valve controlling each lateral recess, said valves adapted to open and permit liquid to escape from the pocket into the hollow axle upon predetermined pressure in the pockets, a wheel comprising a plurality of radial spokes, each spoke carrying at its outer end a cylindrical plunger adapted to have rolling contact with and move within said pockets, and means for positioning said wheel whereby upon rotation thereof its plungers move into and out of said pockets for the purpose described.

2. In a device of the character described, a rotatable drum having pockets arranged circumferentially upon the periphery thereof, a hollow axle supporting said drum at one side and communicating at one side with each of said pockets, a one-way valve for each of said pockets adapted to open and permit liquid to escape from said pocket into the hollow axle when a predetermined pressure is exerted thereon, a wheel comprising a plurality of spokes, each spoke carrying at its outer end a plunger adapted to move within the pockets of said drum, and means for positioning the wheel so that upon rotation thereof its plungers will move into the pockets of said drum for the purpose described.

3. In a device of the character described, a drum shaped member having transversely extending pockets occurring in spaced relation upon the periphery thereof, a plate upon each side of the drum corresponding in diameter to the drum and adapted to form side closures for the pockets, and means for rotatably supporting said drum at one side and including a hollow axle section terminating at its inner end in a cup-shaped member, said cup-shaped member being secured upon the associated side plate of the drum.

4. In a device of the character described, a drum shaped member having transversely extending pockets occurring in spaced relation upon the periphery thereof, a plate upon each side of the drum corresponding in diameter to the drum and adapted to form side closures for the pockets, means for rotatably supporting said drum at one side and including a hollow axle section terminating at its inner end in a cup-shaped member, said cup-shaped member being secured upon the associated side plate of the drum, and a one-way valve in one side plate for each of said pockets adapted to establish communication between the pockets and the interior of said cup-shaped member.

5. In a device of the character described, a drum shaped member having transversely extending pockets occurring in spaced relation upon the periphery thereof, a plate upon each side of the drum corresponding in

diameter to the drum and adapted to form side closures for the pockets, means for rotatably supporting said drum at one side and including a hollow axle section terminating at its inner end in a cup-shaped member, said cup-shaped member being secured upon the associated side plate of the drum, and a flap valve for each of said pockets, said flap valve being in each instance hinged to one of the side plates secured to the drum and adapted to establish communication between the pocket and the interior of said cup-shaped member carried by the axle section.

LEO L. INGRAHAM.