J. LANG.

ROTARY PUMP.

APPLICATION FILED DEC. 16, 1911.

1,052,930.

Patented Feb. 11, 1913.

2 SHEETS—SHEET 1.

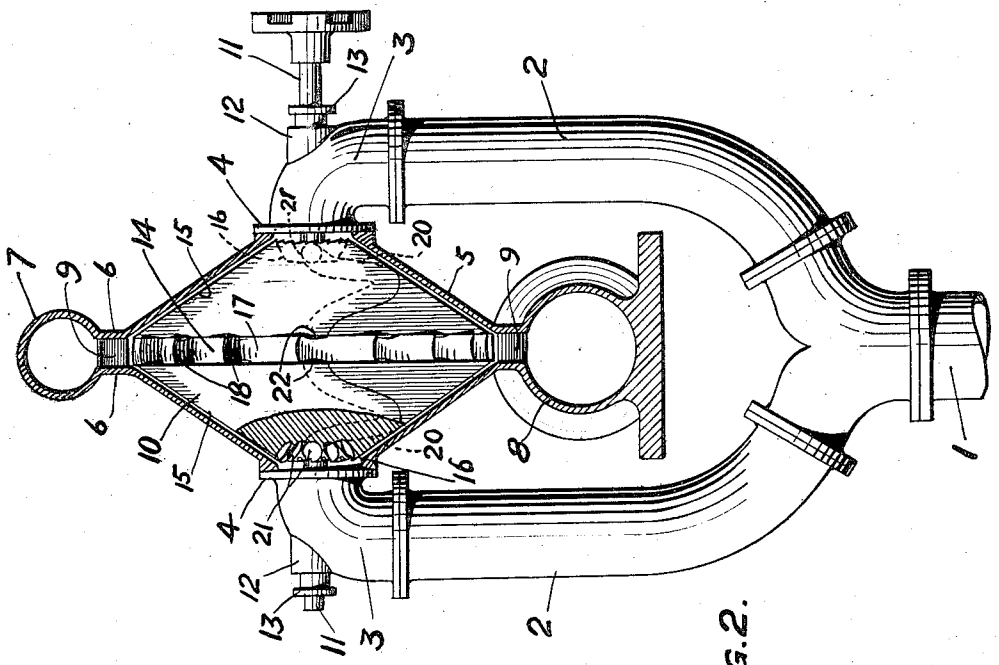

FIG. 2.

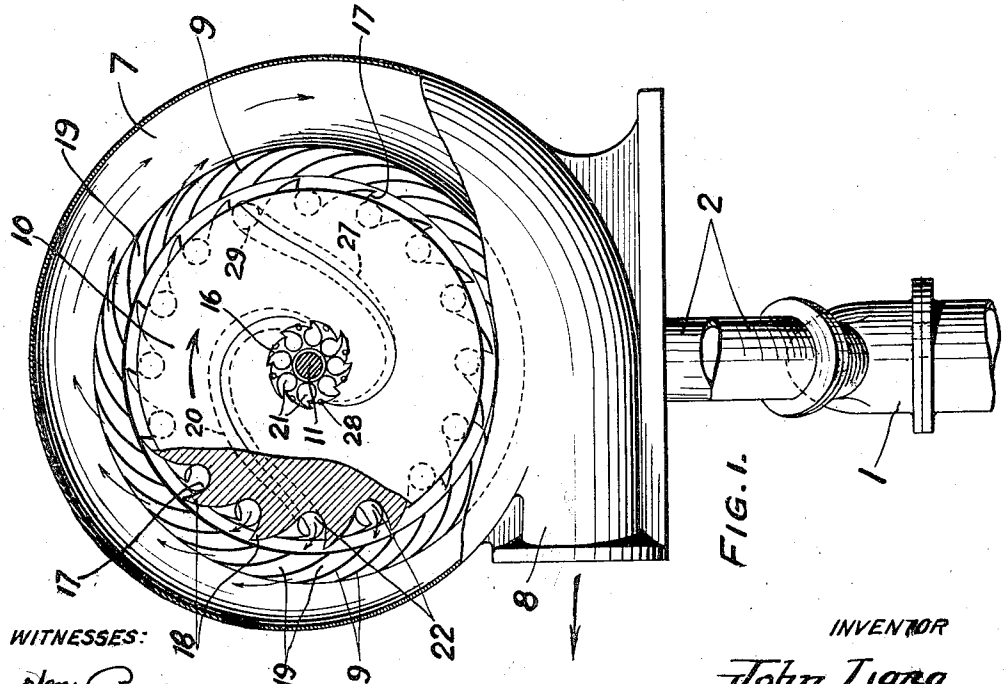

FIG. 1.

WITNESSES:

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2 SHEETS—SHEET 2

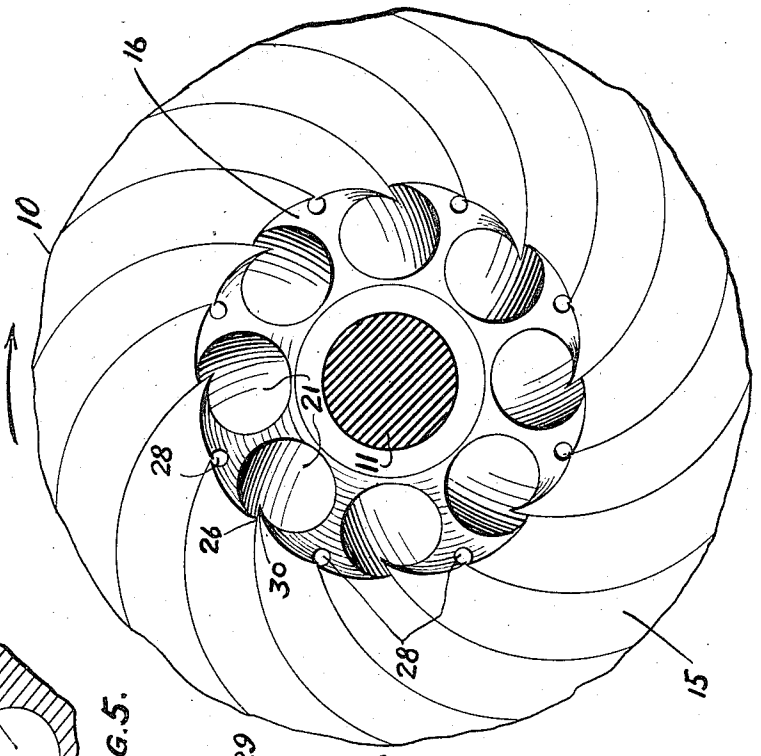

FIG. 4.

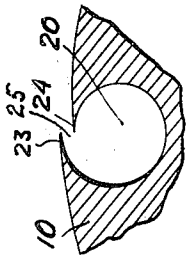

FIG. 5.

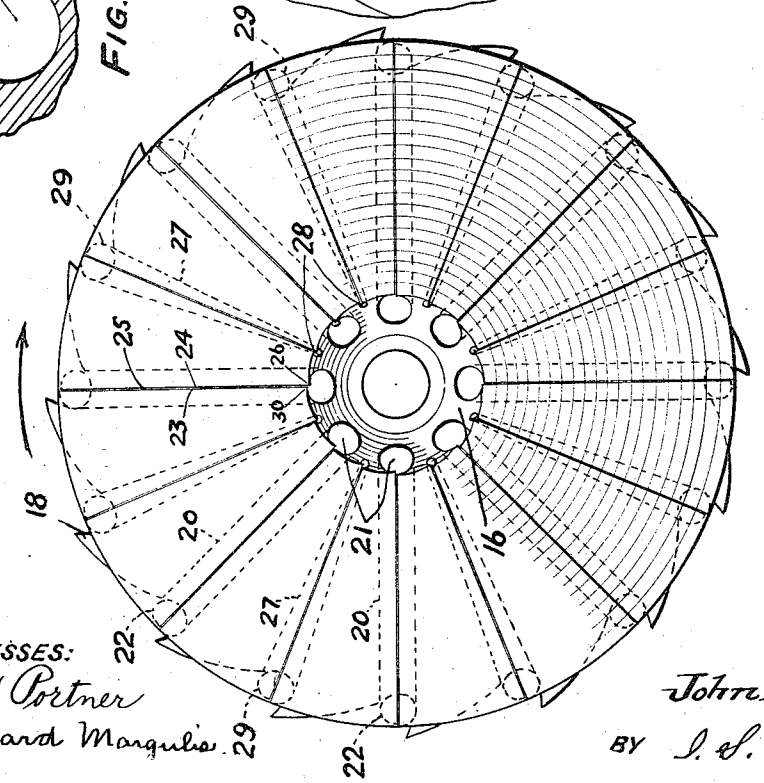

FIG. 3.

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ROTARY PUMP.

1,052,930. Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed December 16, 1911. Serial No. 666,166.

To all whom it may concern:

Be it known that I, JOHN LANG, a citizen of Austria-Hungary, and a resident of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

My invention relates to pumps or water wheels, and to a method and means for causing water to flow from a lower to a higher level or the reverse and to discharge the same in a direction at right angles with the intake.

The object of this invention is to accomplish the lift or pull by a simple, economical and novel method and means.

It is well known that water cannot pass along a path of suddenly changing curvature without the loss of energy, which loss is greater the greater the velocity of the water, and one of the objects of this invention is to provide means for lifting the water from the level of the supply to that of the discharge without any sudden change in its direction or velocity.

Another object of this invention is to cause the water to flow from the supply into the lifting means through intakes on a level and parallel with the supply, and thence into an impeller through outlets on a level and parallel with said impeller.

A further object of this invention is to change the level of water by means of rotating channels, which are open to permit of the water to completely fill the channels and are adapted to prevent any back flow.

A further object of this invention is to cause water to flow on an impeller in the direction and at a velocity at which it passes from the supply to the lifting means.

A further object of this invention is to cause water to flow on an impeller from two opposite outlets and to acquire a resultant in the direction of motion of the impeller.

A further object of this invention is to provide a method and means whereby the maximum energy of the impeller is utilized for forcing the water into the discharging means.

With these and other objects in view, which will be hereinafter more fully described and claimed, my invention consists of the construction, combination and the arrangement of parts illustrated and referred to in the accompanying drawing, it being understood that changes in minor details may come within the scope of my claims without departing from the spirit or sacrificing any of the advantages of my invention.

In the drawing, Figure 1 is a side elevation of my pump or water wheel partially in cross section; Fig. 2 is a right handed end view thereof partially in cross section; Fig. 3 is an explanatory view, obtained by assuming the rotary element shown in Fig. 1, to be twisted through an arc of 180 degrees about its central face; Fig. 4 is an enlarged view of the central portion of the rotating element, and Fig. 5 is an enlarged cross section of a duct taken at any point.

Similar reference figures refer to similar parts throughout the several views.

1 indicates a water main, connected by branch pipes 2, 2 with elbows 3, 3, having axial outlets 4, 4. The elbows are joined around their outlets with the contracted rims of conical casings 5, 5, whose expanded rims are joined with rings 6, 6. The rings are joined with a volute casing 7, which is substantially circular in cross section but increases in diameter from its smallest or contracted portion to its largest or expanded portion which is merged with a water pipe 8.

An impeller 10, mounted on a shaft 11, consists of a cylinder 14, between the rings 6, 6, and of intake faces 16, 16 in front of the outlets 4, 4, which are joined with the cylinder by means of cones 15, 15. The shaft 11 is supported by bearings 12, 12 of the elbows 3, 3, which are provided with stuffing boxes 13, 13.

The cylindrical part of the impeller is milled to form buckets 17, between vanes 18 which curve outwardly in the direction of rotation. Between the rings are mounted partitions 9, which are curved similar to the vanes, and form diffusion chambers 19.

The cones, which connect the intake faces with the impeller cylinder, are provided with primary ducts 20. The ducts 20 are provided with intakes 21 around the shaft 11 and on a level with the elbow outlets, and with openings 22 on a level with the cylinder and in line with its buckets. Said primary ducts are in the form of scrolls of a uniform cross section, beginning from an edge 23 and ending at an edge 24 directly under the edge 23, said edges being separated by slots 25 along planes through the axis of the impeller. The impeller cones are also provided with secondary ducts, 27, intermediate the

primary ducts, having intakes 28 and openings 29. The ducts 27 are of a variable cross section, which gradually decreases from the opening 29, which is equal with the outlet 22, to the intake 28 which is considerably smaller than the intake 21. In every other respect the ducts are all alike. Each duct runs spirally along the cones connecting an intake with an opening through an arc of 180 degrees. Each intake is in the form of a spiral beginning with a projection 30 of the edge 23 and ending in a depression 26 of the edge 24. Each opening is in the shape of a helix.

Assume that the water flows through the elbow outlets in the direction of the intake faces. The motion of the shaft causes the water to flow in the shape of a spiral or whirls in the direction of rotation, and to enter the intakes which are on a level with the elbow outlets. After the water has entered the intakes it continues to flow through the ducts in the direction of the openings, and is, at the same time, lifted to the level of the impeller wherein the forward movement is overcome, and is thence forced by the impeller buckets through the diffusion chambers into the volute where the forward movement is overcome and the water is forced by the impeller from the buckets and through the diffusion chambers into the volute. As the buckets are very flat and are practically at the level of the discharge, the losses due to friction against the walls of the buckets or vanes and that due to a high static head are thus avoided, which results in a very high efficiency.

Some of the water which the intakes of the primary channels fail to take up, is taken up by the intakes of the secondary channels, whose cross section increases in the direction of the buckets to take up the water thrown out of the side openings 25. The water expelled from the buckets by the centrifugal force of the impeller, is forced into the volute through the diffusion chambers which are of a curvature similar to that of the buckets, to prevent the water from being impelled against the walls of the volute. The number of buckets which discharge into the volute increases from the intake end of the volute to the discharge end, and to carry the increasing volume of water from the intake to the discharge with the least possible friction, the cross section of the volute is increased in the direction of the discharge.

The purpose of the slots along the ducts is to provide an opening for the escape of air, which is always carried along by flowing water. This air would prevent the water from filling the ducts and reduce the efficiency of the pump, as is the case with water flowing through a closed channel. The advantage of making the ducts scroll-shaped is that the slots or spaces between the edges are in the direction of motion, which prevents the water from being thrown outwardly against the casing, and obviates the formation of a sheet of water between the impeller and the casings which, as is the case with an ordinary open channel, is dragged by the impeller against the friction of the casing and results in reduced efficiency. As the edges are on the sides of the ducts below each other, and not under the casing on the surface of the impeller, it avoids the possibility of the edges catching in the casing. This permits of making the impeller fit closely inside the casing, to reduce the space between the impeller and casing to a minimum. Although in the drawing the ducts are shown in the form of regular scrolls, I do not intend to be limited to the exact shape thereof, as they may be made in the shape of an irregular scroll. The spiral shape of the intakes serves the purpose of preventing the formation of a ring of water to be dragged by the faces of the impeller against the friction of the pipe outlets.

It will of course be understood that this pump can be used as a motor when the water is directed through it from a higher level, which would result in changing its direction of rotation and, therefore, whatever I claim for the pump will also apply to a motor.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent, is—

1. In a pump, the combination of a casing provided with means for introducing water axially on opposite sides thereof, an impeller rotatably mounted therein and provided with slotted ducts adapted to change the level of the water during its axial flow through opposite ends thereof, and buckets between the ducts adapted to change the direction of the flow.

2. In a pump or water wheel, the combination of a casing provided with means for introducing water axially therein and for discharging it tangentially therefrom, and an impeller mounted in said casing provided with slotted ducts adapted to change the level of the axially flowing water and with vanes adapted to direct the water centrifugally through the discharging means.

3. In a pump or water wheel, a rotor comprising an impeller, outlets on opposite sides thereof and on a level therewith, inlets below the level of the outlets, and slotted ducts connecting the inlets with the outlets.

4. In a pump or water wheel, a rotor comprising an impeller, helical outlets on a level therewith, spiral intakes below the level thereof, and scroll shaped channels connecting the intakes with the outlets.

5. In a pump or water wheel, a rotor,

comprising an impeller, helical outlets on a level and on opposite sides thereof, spiral intakes radially and axially removed therefrom, and ducts provided with radial slots connecting spirally an intake with an outlet through an angular distance of 180 degrees.

6. In a pump or water wheel, a rotor, comprising an impeller, faces on opposite sides thereof and on a smaller diameter than that of the impeller, said faces provided with intakes, and ducts provided with radial slots spirally connecting the intakes with the impeller.

7. In a pump or water wheel, a rotor comprising an impeller provided with buckets, cones tapering downwardly and outwardly thereof and provided with scroll shaped channels opening into the buckets.

8. In a pump, or water wheel, a rotor comprising an impeller provided with flat buckets, intakes radially and axially removed therefrom, slotted ducts spirally connecting the intakes with the buckets, and means for introducing water on a level with said intakes.

9. In a pump or water wheel, a rotor comprising an impeller provided with buckets, intakes radially and axially removed therefrom, slotted ducts running spirally from the intakes to the buckets, means for introducing a fluid or liquid flowing axially in the direction of the intakes, and a volute surrounding the impeller.

10. In a pump or water wheel, the combination of a rotor comprising an impeller provided with intakes below the level thereof and at a distance therefrom and slotted ducts leading from the level of the intakes to that of the impeller, of means for introducing water axially at the level and in the direction of said intakes, a volute surrounding the impeller, and a diffuser between the impeller and the volute.

11. In a pump or water wheel, the combination of a rotor comprising an impeller provided with vanes, outlets between the vanes on a level with the impeller, intakes below the level of said impeller and open slotted ducts spirally connecting the intakes with the outlets, pipes through which water is flowing axially on a level and in the direction of the intakes, a volute surrounding the impeller, diffusion chambers between the impeller and volute, and conical casings connecting the pipes with the volute.

12. In a pump or water wheel, the combination of a rotor comprising a centrally located impeller provided with curved vanes and conveyers on opposite sides thereof tapering radially and axially therefrom and provided with slotted ducts running spirally from the level of the impeller to the opposite ends of the conveyers, a volute surrounding the impeller, water pipes and closures surrounding the conveyers connecting the pipes with the volute.

13. In a pump or water wheel, the combination of a closure, impeller provided with means for introducing a fluid or liquid therein, means for discharging the fluid therefrom and slotted ducts through which the fluid passes adapted to change the level thereof during the passage of the fluid from the introducing means to the discharging means.

14. In a pump or water wheel, the combination of a closure, means for introducing water therein on opposite sides thereof, means for discharging the water therefrom, and an impeller provided with slotted ducts for passing the water between the introducing and the discharging means adapted to change the level of the water during said passage.

15. In a pump or water wheel, the combination of a closure, provided with water introducing and discharging means, an impeller for passing the water between said means and provided with slotted ducts adapted to change its level and with vanes adapted to change its direction without changing its level, substantially as described and for the purposes set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN LANG.

Witnesses:
JOSEPH MOODY,
CHAS. A. LONGENBERGER.