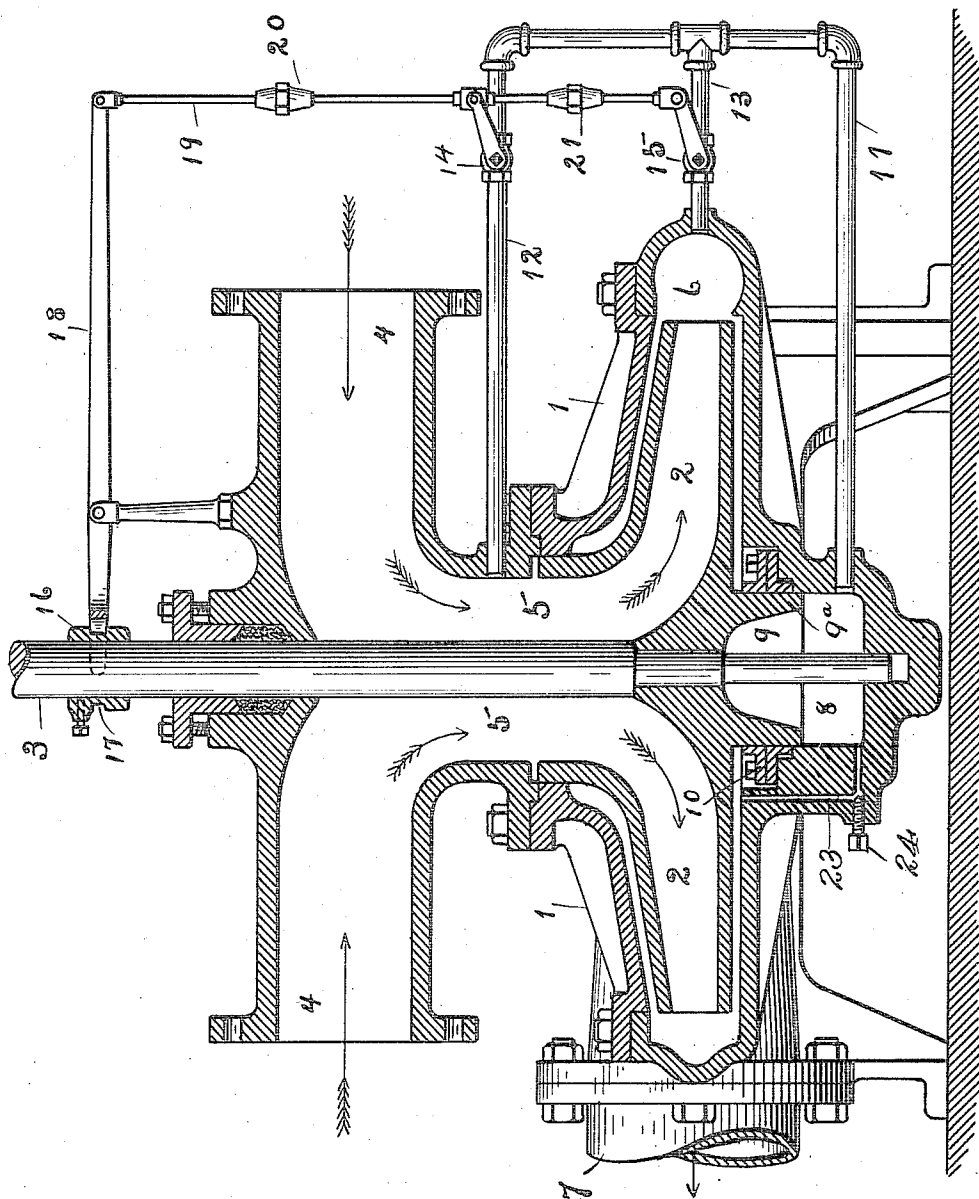


F. W. KROGH.
CENTRIFUGAL PUMP.
APPLICATION FILED NOV. 28, 1905.

971,851.

Patented Oct. 4, 1910.



Witnesses

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UNITED STATES PATENT OFFICE.

FERDINAND W. KROGH, OF SAN FRANCISCO, CALIFORNIA.

CENTRIFUGAL PUMP.

971,851.

Specification of Letters Patent.

Patented Oct. 4, 1910.

Application filed November 28, 1905. Serial No. 289,486.

To all whom it may concern:

Be it known that I, FERDINAND W. KROGH, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

The object of my invention is to make the impelling wheel of a centrifugal pump float in the water or other liquid passing through the pump, and thereby relieve it from the friction which would otherwise develop between the wheel and the casing.

The invention consists in the peculiar arrangements and combinations of parts substantially as hereinafter described and particularly pointed out in the subjoined claims.

In the accompanying drawing I have shown in vertical section a pump containing my invention in what I consider its best form.

In the drawing:—1 is the casing of the pump. 2 is the impeller wheel revolving therein, and mounted on the shaft 3.

4 is the inlet communicating with the suction opening 5, of the casing.

6 is the discharge channel of the casing, communicating with the discharge pipe 7.

8 is the pressure chamber which is arranged on the side of the impeller remote from the suction opening 5.

9 is the cylindrical hub of the impeller wheel 2. The hub 9 constitutes a plunger, and the chamber 8 its cylinder.

10 is a packing for the plunger, to reduce the leakage which would otherwise occur between it and the chamber.

11 is a pipe which connects the chamber 8 with both the discharge channel 6 and the suction 5.

12 is the branch connecting with the suction, and 13 the branch connecting with the discharge. These connections may be made with other parts of the apparatus, the only essentials being that branch 12 shall draw liquid from chamber 8, while branch 13 conveys it thereto.

14 is a valve in the branch 12.

15 is a valve in the branch 13.

16 is a collar on shaft 3, provided with a groove 17.

18 is a lever, fulcrumed on a convenient part of the casing, and engaging the groove

17. The outer end of the lever is connected by a rod 19 with the handles of the valves

14 and 15. Interposed turnbuckles 20 and 21 serve for adjustment. Thus the valves are varied as to their opening, or closing, by the motion of shaft 3, and the adjustment is such that one valve will be opened as the other is closed, and vice versa. Also the collar 16 may be adjusted on the shaft.

The operation of the pump is this:—Supposing the impeller wheel to be running at sufficient speed to produce a suction at 5 and a pressure at 6. If now the wheel is too low in the casing, the valve 14 will be closed and the valve 15 open, owing to the action on them of the lever 18, and water under pressure will pass into chamber 8 under piston 9, and raise the wheel. If the wheel rise too high in the casing, the valve 14 will open and valve 15 close, and water will be released, or drawn from chamber 8, thus causing the wheel to descend. This alternate action will continue, until, at some point, an equilibrium is established, and the wheel will float free in the water, or other liquid.

In order that the suction through pipe 12 shall be effective, it is advisable, to permit a leakage of liquid into the chamber 8. If no packing were employed between the plunger and the walls of the chamber, there would ordinarily be sufficient leakage around the plunger, especially after the pump had been in use for some time and the parts were worn. But I find a packing desirable to insure the accurate operation of the apparatus. Hence I provide a leakage passage 23, which I control by a valve or plug 24. This passage is formed within the wall of the chamber and has its inlet and outlet respectively arranged on opposite sides of the range of movement of the inner end or portion 9^a of the piston. Through it liquid under pressure is supplied to chamber 8 to balance the weight of the impeller shaft and the parts attached thereto.

Obviously structural variations may be made in the above apparatus without changing the principle thereof, and all such variations are within my invention.

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

1. In a centrifugal pump, in combination with a casing provided with a chamber, and an impeller wheel provided with a plunger adapted to play in said chamber, a pipe connecting said chamber with the suction and discharge of the pump, valves controlling

the flow in said pipe, and means connected with the wheel for varying the openings of the valves.

2. In a centrifugal pump, a casing, a
5 chamber, an impeller having a piston in
said chamber, valved pipes connecting said
chamber with the suction opening and pres-
sure portions of the casing, and lever con-
nections between the valves of said pipes
10 and the impeller, adapted to open the valves

alternately by predetermined variations in the position of the impeller from its condition of balance.

In testimony whereof I have affixed my
signature in presence of subscribing wit- 15
nesses this 20th day of November 1905.

FERDINAND W. KROGH.

Witnesses:

WM. S. BATES,

A. S. PARÉ.