G. C. KUECHLER.

CENTRIFUGAL PUMP.

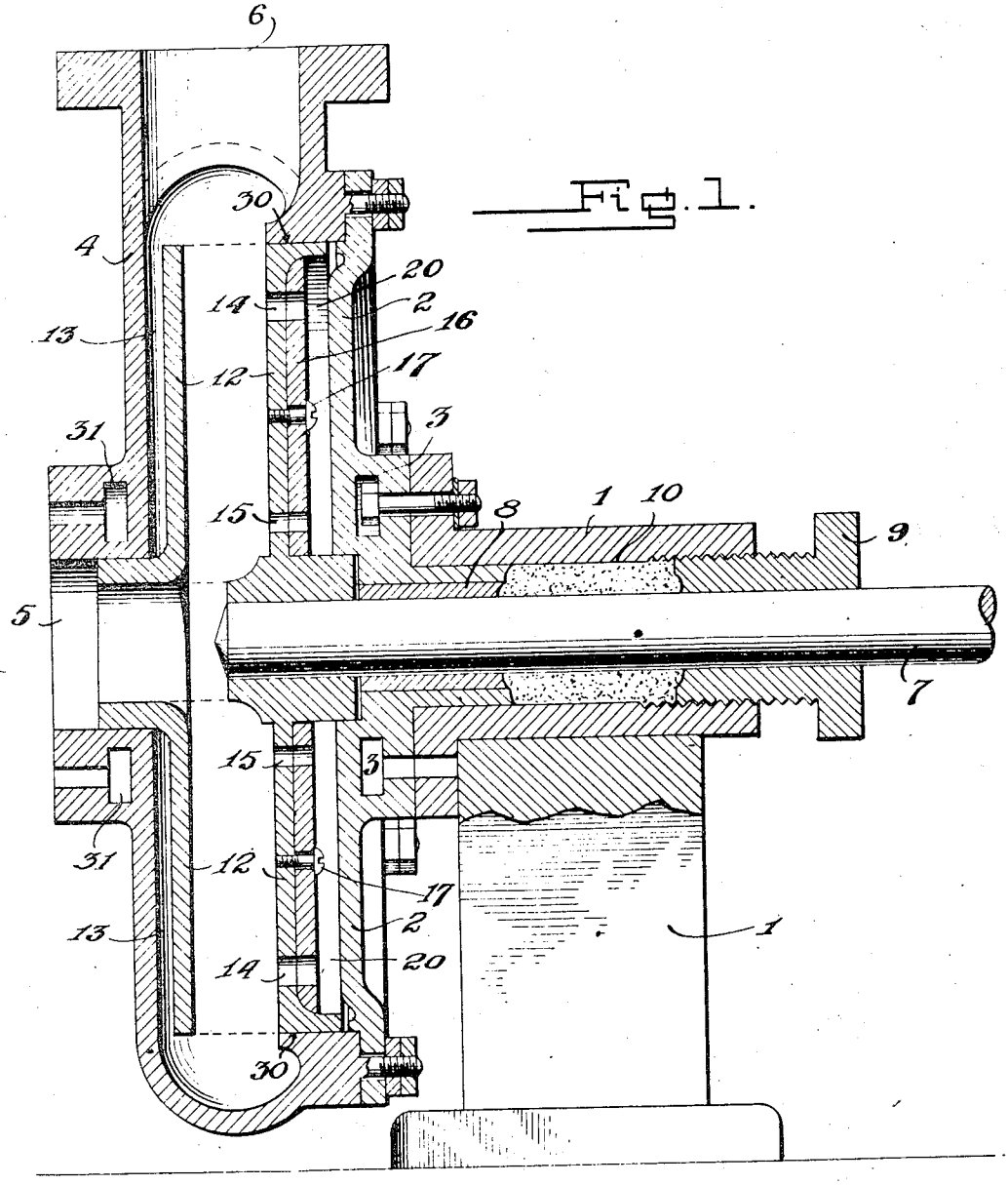
APPLICATION FILED OCT. 18, 1910.

1,022,425.

Patented Apr. 9, 1912.

2 SHEETS-SHEET 1.

Fig. 1.



WITNESSES

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Fig. 2.

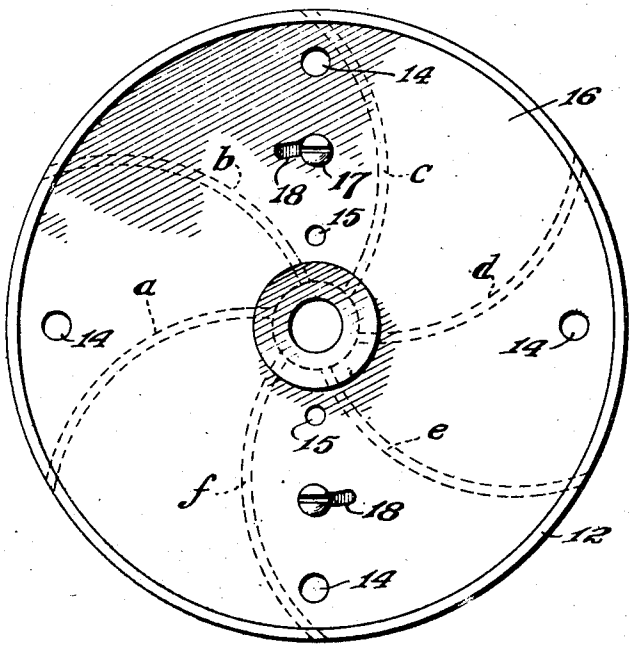


Fig. 3.

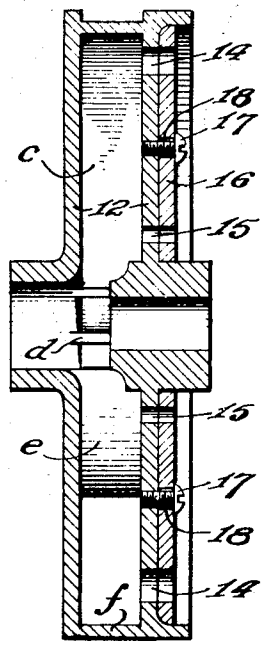


Fig. 4.

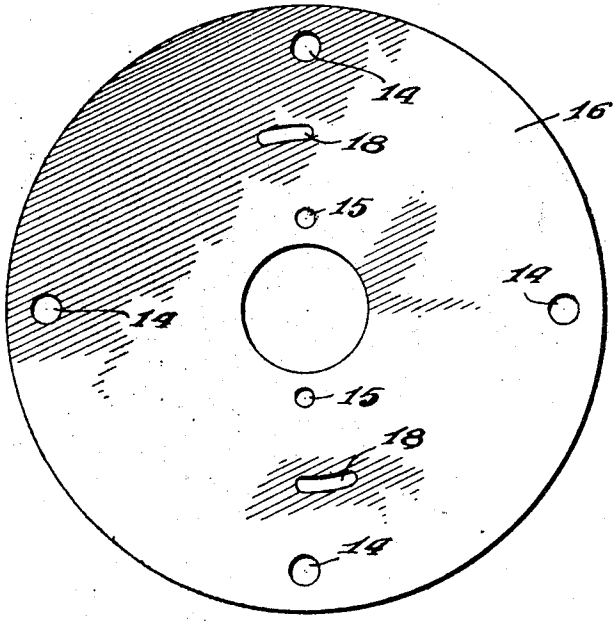
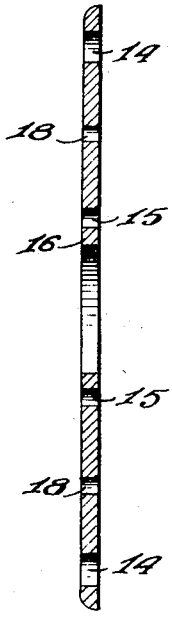


Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL PUMP.

1,022,425. Specification of Letters Patent. Patented Apr. 9, 1912.

Application filed October 18, 1910. Serial No. 588,013.

To all whom it may concern:

Be it known that I, GUSTA C. KUECHLER, a citizen of the United States and a resident of Sacramento, in the county of Sacramento and State of California, have invented new Improvements in Centrifugal Pumps, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates almost entirely to the rotor or revolving member of a centrifugal pump.

Figure 1 of the accompanying drawings represents a cross section of a pump equipped with my improved rotor. Fig. 2 represents a detail of the said rotor. Fig. 3 represents a cross section of same. Fig. 4 represents a part of the said rotor, the purpose of which will be explained later. Fig. 5 is a vertical cross section of the same.

In Fig. 1 1 represents the foundation of the pump, which is the same as any ordinary centrifugal pump. 2 represents a part of the outer shell of the pump, which is bolted to the foundation (1) by means of bolts inserted at intervals in the groove (3). 4 is the main part of the outer shell in which the rotor revolves in the well known manner. 3 represents a groove similar to groove 3, in which bolts are inserted so that a pipe flange may be bolted on. 5 represents the suction and 6 the discharge end of the pump. 7 represents the shaft, 8 the bearing for same, 9 a bushing which may be secured in one end of the packing box and made adjustable so the packing in the space (10) may be put under pressure to prevent any air entering the pump proper. On the shaft (7) is secured my improved runner or rotor (12), which consists of two round flat metal pieces secured together by the well known ribs—not shown in Fig. 1, but indicated in Fig. 2 by the curved lines *a. b. c. d. e. f.*

When this pump is connected to a supply of water, or other liquid, at the inlet (5) and the shaft (7) rotated, the liquid will be sucked into the inlet and discharged through the outlet (6). In the ordinary centrifugal pump, the back pressure of the water being discharged, will force some of the water into the space (13), between the rotor (12) and the outer casing (4). In case of a high pressure the rotor will be forced to the opposite side of the housing or shell (4), causing a great deal of friction.

The object of my invention is to prevent the friction by means of a water cushion or an equalizing effect, which I secure by the novel manner in which I construct the runner.

The runner is made in the ordinary manner, a number of holes, (14) are then made near the outer edge of the runner and a number of smaller holes, (15) near the center of the runner. A plate, (16) (shown to better advantage in Fig. 4) having holes corresponding in size and position to the holes 14 and 15 in the runner is then secured to the runner by means of screws, 17. Slotted holes (18) are made in the disk (16) so that when the screws (17) are loosened the disk may be shifted a small amount. It is obvious by shifting the disk 16, the holes 14 and 15 may be closed or opened to any extent desired. I employ these means of adjusting the size of the holes 14 and 15, which I find necessary, as a given size of hole will work successfully when pumping against a certain head but will not work satisfactorily with a higher or a lower head.

The casing 4 and the runner 12 are so constructed that a practically water tight joint is made at 30, so that the only place where water can enter the compartment 20 is through the holes 14 and 15. This is obviously necessary in order that the amount of water entering the compartment 20 can be regulated by means of the adjusting mechanism above referred to.

Unless a very close fit is made between the casing 4 and the runner 12 the back pressure would force water into the compartment 20 and destroy the balance.

Having described the construction of the pump I will now proceed to show how it will work in actual use: Assuming that the suction end 5 is connected to a water supply, and a source of power applied to the shaft (7). When the pump is properly primed suction will take place and water will be drawn into the opening 5 and discharged

at the outlet (6). If the water is discharged at 6 against a pressure, water will be forced into the compartment (13) between the rotor (12) and the outer casing (4). With the ordinary pump the pressure of the water in the spaces 13 and 20 would force the rotor to one side or the other and cause a great deal of end thrust or friction at the bearing. With my improved construction, a certain amount of water will flow through the openings 14 into the compartment 20, the amount being regulated by means of the disk 16, as above explained. The back pressure of the pump will force water through the holes, fill up the compartment 20 and flow back into the runner through the holes 15. By properly regulating the size of the holes, sufficient water will be circulated through the space 20 to exactly balance the pressure exerted by the water in space 13. It is obvious that the runner revolves freely without end thrust, and therefore there is no friction except the ordinary bearing friction.

It will be seen that the disk 16, constitutes valve controlling means for regulating the flow of liquid into the normally closed chamber 20. The chamber 20 may be conveniently designated a normally closed chamber as any liquid passing thereto is dependent upon the disposition of the disk 16. It will also be noted that by reason of difference in the size of the openings 15 and 14, and the radial disposition thereof, a differential control to and from the normally closed chamber may be obtained. This differential control is obtained by reason of the fact that movement of the adjustable plate or disk 16 causes the radial outer and inner apertures to be chained in area in different relative proportions.

I claim—

1. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart from the walls thereof to form liquid receiving chambers on each side of said rotor, one of said chambers being normally open to an inflow of liquid and the other chamber being normally closed to such inflow, and differential valve controlling means for permitting an inflow to the closed chamber to automatically counteract the thrust on said rotor from said open chamber.

2. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart from the walls thereof to form liquid receiving chambers, one of said chambers being normally open to the liquid passing through said pump and the other chamber being normally closed to such liquid, and differential valve controlling adjustable means on said rotor for permitting a variable inflow to said closed chamber to automatically counteract the thrust on said rotor from said open chamber.

3. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart from the walls thereof to form liquid receiving chambers, one of said chambers being normally open to the liquid passing through the pump and the other chamber being normally closed to such liquid, and adjustable valve controlling means permitting an inflow and an outflow to and from said normally closed chamber corresponding to the variations of pressure in the normally open chamber to counteract the thrust on said rotor from said open chamber.

4. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart from the walls thereof to form liquid receiving chambers on opposite sides of the rotor, one of said chambers being normally open to the liquid passing through said pump and the other being closed thereto, and adjustable valve controlling means permitting an inflow from the pump to said normally closed chamber and an outflow from such chamber back to the pump corresponding to the variation of pressure in the open chamber.

5. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart from the walls thereof to form rotor balancing chambers, one of said chambers being normally opened to the liquid passing through said pump and the other chamber being normally closed, the rotor having openings permitting entrance of the liquid to said closed chamber, and an element adjustably carried by said rotor for controlling said opening.

6. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart from the walls thereof to form rotor balancing liquid chambers, one of said chambers being normally opened to the liquid passing through said pump and the other chamber being normally closed, the rotor having openings of different sizes permitting entrance of the liquid to and egress from said normally closed chamber, and means carried by the rotor for wholly closing certain of said openings and controlling the size of other openings in said rotor, substantially described.

7. A centrifugal pump comprising in combination, a casing having an inlet and an outlet, a rotor in said casing spaced apart

from the walls thereof to form liquid rotor balancing chambers, one of said chambers being normally opened to the liquid passing through said pump and the other chamber being normally closed, the rotor having openings permitting entrance of the liquid from the interior of the pump to said normally closed chamber and egress therefrom back to the interior of the pump, and a disk concentrically mounted with respect to the rotors for controlling passage of the liquid through said openings.

GUSTA C. KUECHLER.

Witnesses:
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GEO. COWLES.