

F. W. KROGH.
TURBINE PUMP.
APPLICATION FILED JULY 6, 1911.

1,135,296.

Patented Apr. 13, 1915.
3 SHEETS—SHEET 1.

Fig. 1.

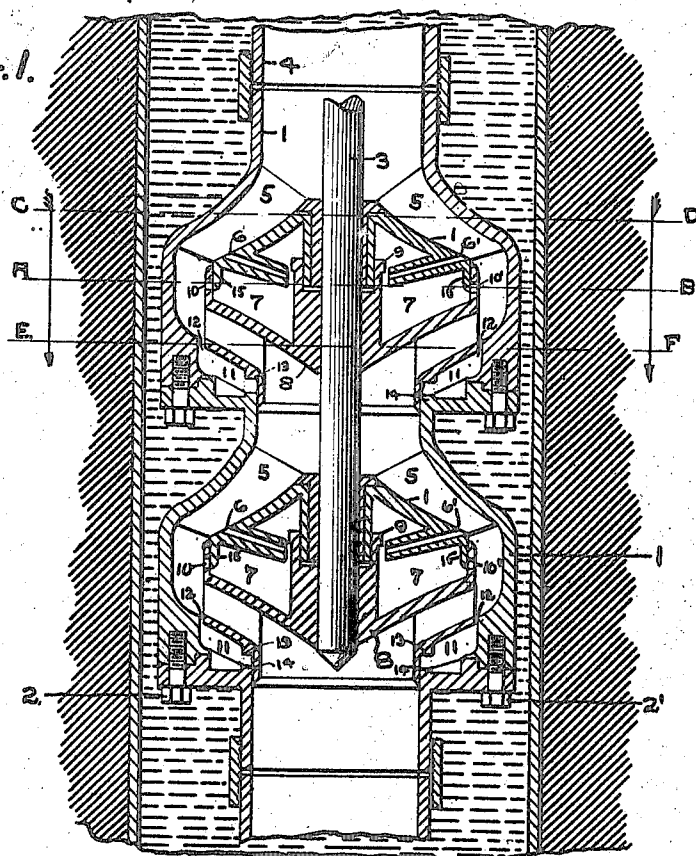
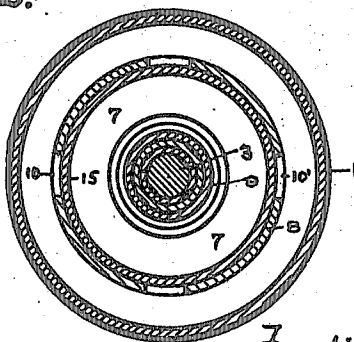


Fig. 2.



WITNESSES
J. H. Hawkins.
Blanche C. Chester.

INVENTOR
Ferdinand W. Krogh.
Jos. A. S. Paré
ATTORNEY.

1,135,296.

Patented Apr. 13, 1915.
2 SHEETS—SHEET 2.

Fig.3.

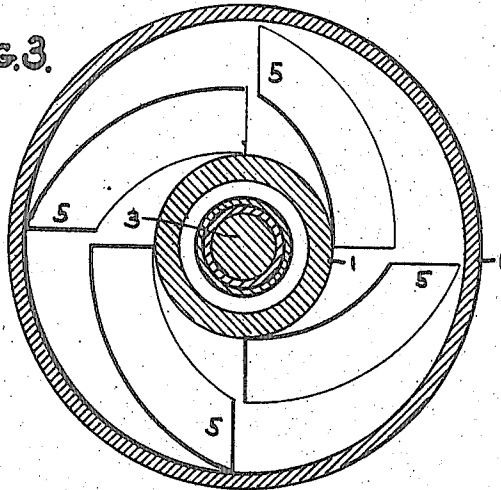


Fig.4.

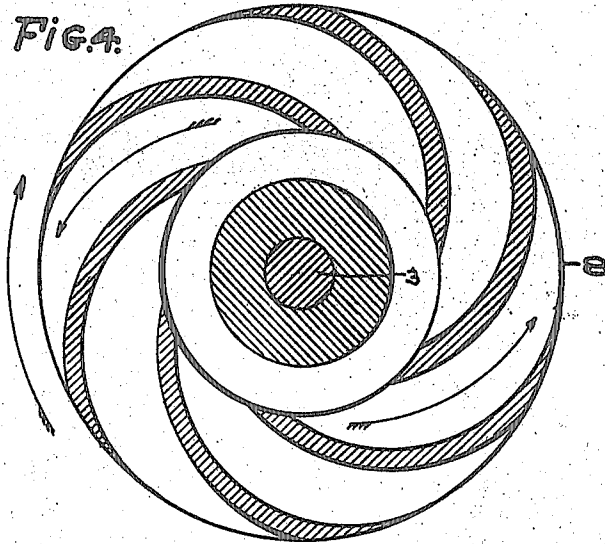
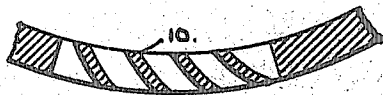


Fig.5.



WITNESSES

J. D. Hawkins,
Blanche C. Chester.

INVENTOR

Ferdinand W. Krogh,
per A. S. Fair.
ATTORNEY.

UNITED STATES PATENT OFFICE.

FERDINAND W. KROGH, OF SAN FRANCISCO, CALIFORNIA.

TURBINE-PUMP.

1,135,296.

Specification of Letters Patent.

Patented Apr. 13, 1915.

Application filed July 6, 1911. Serial No. 637,165.

To all whom it may concern:

Be it known that I, FERDINAND W. KROGH, of San Francisco, California, have invented certain new and useful Improvements in Turbine-Pumps, whereof the following is a specification.

My present invention relates to turbine pumps in general and more particularly to that class of pumps which are intended to be submerged or placed below the fluid level of the well or cistern in which the same may be applied and consists in the arrangement and construction of pressure stagings with pressure regulating means in the impellers of each stage.

The object of my invention is to provide a centrifugal pump, the impeller of which imparts circumvolute motion with an angle for discharge of fluid equal to the angle at which the fluid comes in contact with the imparting surface.

Another object of my invention is to provide a centrifugal pump in which the impeller is balanced in the fluid without thrust bearings and maintains comparatively a steady position by regulating means therein.

In the accompanying two sheets of drawings, I have illustrated the novel arrangements of its coöperative parts by which I accomplish my purpose in which.

Figure 1, is a sectional elevation of my pump showing two pressure stages submerged in a well below the liquid level; Fig. 2, is a cross section taken on the line A B, of Fig. 1, showing the outlet ports and vacuum chamber looking in the direction of the arrows. Fig. 3, is another cross section taken on the line C D, of Fig. 1, showing the curve of the discharge vanes discharging into the common chamber, looking in the direction of the arrows. Fig. 4, is also another cross sectional view taken from Fig. 1, on the line E F, showing the construction of the impellers. Fig. 5, is a section taken through one of the pressure ports showing the vanes therein.

Similar characters of reference denote similar parts throughout the several views of the drawings.

Now describing my invention in detail, 1 is the casing of my pump of which there may be a plurality of stagings as shown in Fig. 1, connected together by cap screws 2 and 2'; 3 is the driving shaft extending throughout the length of the well or cistern inside the discharge pipe 4; at 5 is shown

the curvature of the vanes formed on the inner portion of the casing, there may be any number of these vanes as may suit the requirements to which the pumps shall be subjected.

6 and 6' are inlet ports connecting the vanes 5 with a pressure chamber 7 in the interior portion of a revolving impeller 8 located on the shaft 3 under the casing 1. The hub of the impeller is equipped with a cut-off 9 for opening and closing the ports 6 and 6'.

10 and 10' are outlet ports from the chamber 7 adapted to be opened and closed by a circular extension of the casing; 11 is a cushion chamber under the impeller and in the base of the casing 1 having also a communicating passage 12 between the impeller and casing.

The mode of operation of my invention is as follows:—The shaft 3 is set in motion by any particular source of power which revolves the impeller 8 in the direction of the arrow Fig. 4, creating a suction for the fluid and drawing the same around the surface of the impeller ports in the direction of the arrow, and discharging the same to the next area above through the horizontal vanes in the form of the tractrix shown in Figs. 1 and 3.

It will be noted that when the impeller 8 is standing still the shoulder 13 will rest on the circular projection 14 of the casing 1 at the same time the ports 10 and 10' in the periphery of the impeller will be opened and the ports 6 and 6' between the hub of the impeller and the inner part of the casing closed by the cut-off 9, but as soon as the impeller starts to move and rise by the pressure in the cushion chamber 11 or from other source, said ports 10 and 10' begin to close by the circular extension 15 of the casing and the ports 6 and 6' will begin to open until the impeller finds its own equilibrium, should however, the ports 10 and 10' close entirely, as shown in Fig. 1, that will create a pressure in the chamber 7 and force the impeller to move downwardly until the ports 6 and 6' close and the ports 10 and 10' open and again the impeller finds its equilibrium. Thus in this manner I am able to control the balancing of the impeller to a great degree of efficiency without mechanical appliances.

It will be further noted that while I have shown means for revolving one element

against the regular surface of another, I do not desire to limit myself to that particular showing, as I am aware many modifications of the same, without departing from the spirit of the invention, may be had, as the specifications and drawings are illustrative only to one branch of design, nor do I desire to use my invention as always submerged in fluid as I am aware said stages may be within the ranges of suction limitation to accomplish the same result.

Having thus described my invention and believing I have produced novel and useful improvements in that class of apparatus, what I claim and desire to secure by Letters Patent of the United States is:—

1. In combination with the casing and the impeller therein of a turbine pump, a pressure chamber in said impeller, an inlet in said casing above said chamber adapted to create a downward pressure in said chamber and means to close said inlet.

2. In combination with the casing and the impeller therein of a turbine pump, a pressure chamber in said impeller, an inlet in said casing, and an outlet in said chamber communicating with said inlet, means on said casing to close or open said outlet, and means on said impeller to close or open said inlet.

3. In combination with the casing and the impeller therein of a turbine pump, longitudinal passages in said casing adjacent to said impeller, a downward pressure chamber in said impeller, an inlet in said casing communicating with said chamber adapted to be closed by said impeller, an outlet in said chamber communicating with said passages and an inwardly circular extension on said casing projecting in said chamber

adapted to close said outlet when said impeller moves upward.

4. In combination with the movable and stationary parts of a turbine pump, a chamber in the movable part having an outlet, and an inlet in the stationary part projecting inwardly in said chamber and adapted to create a downward pressure therein and automatic means to close and open said outlet and inlet alternately and thereby regulating the pressure in the chamber.

5. In combination with the casing and the impeller of a turbine pump, a receiving chamber in said casing provided with an inlet, a pressure chamber in said impeller provided with an outlet communicating with said inlet and automatic means to close or open said inlet and outlet.

6. In combination with the casing and the impeller of a turbine pump, a receiving chamber in said casing provided with an inlet, a pressure chamber in said impeller provided with an outlet and respective means on said casing and impeller to close alternately said inlet and outlet.

7. In combination with the casing and the impeller of a turbine pump, a receiving chamber in said casing provided with an inlet, a pressure chamber in said impeller communicating with said receiving chamber, and provided with an outlet, said inlet and outlet being adapted to be closed or opened by the movement of said impeller.

In testimony that I claim the foregoing I have hereto set my hand this 26th day of June, 1911, in the presence of witnesses.

FERDINAND W. KROGH.

Witnesses:

BLANCHE C. CHESTER,
ESSIE V. KNACKSTEDT.