C. E. BURRESS.

CENTRIFUGAL TURBINE PUMP.

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1,267,180.

Patented May 21, 1918.

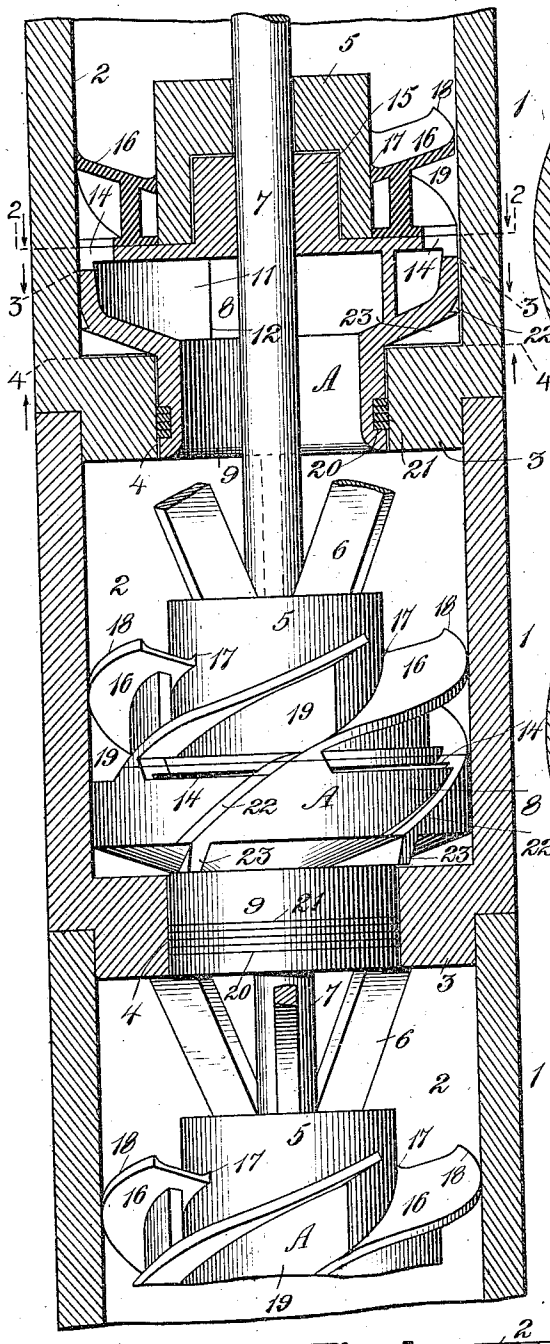


Fig. 1.

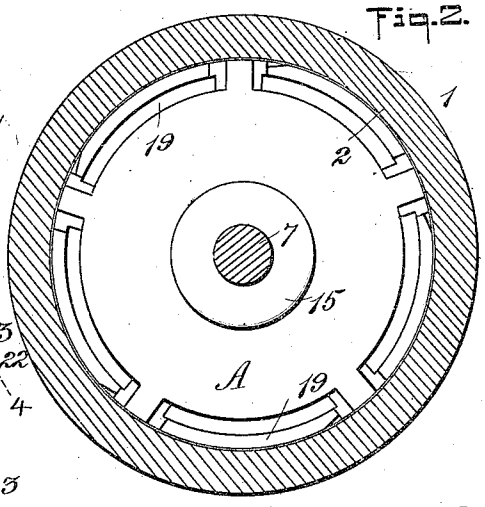


Fig. 2.

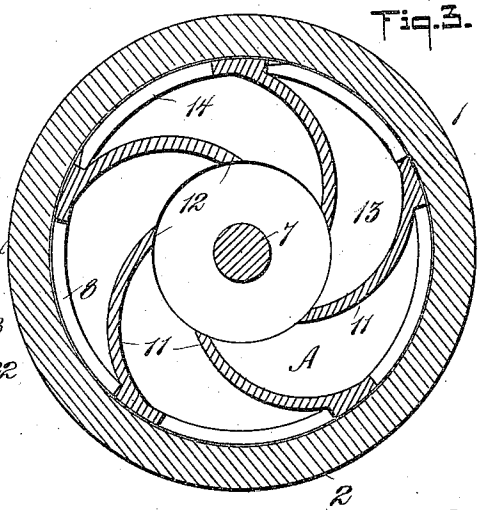


Fig. 3.

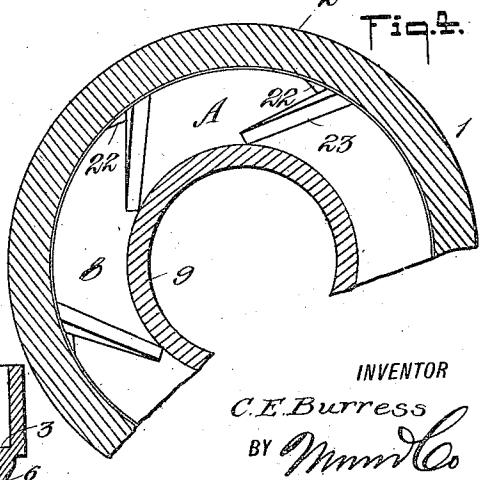


Fig. 4.

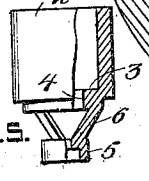


Fig. 5.

WITNESSES

E. Bradway.

INVENTOR

C. E. Burress

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES EDWIN BURRESS, OF LOS ANGELES, CALIFORNIA.

CENTRIFUGAL TURBINE-PUMP.

1,267,180. Specification of Letters Patent. Patented May 21, 1918.

Application filed August 9, 1916. Serial No. 113,869.

To all whom it may concern:

Be it known that I, CHARLES E. BURRESS, a citizen of the United States, and a resident of Los Angeles, in the county of Los Angeles and State of California, have invented a new and Improved Centrifugal Turbine-Pump, of which the following is a full, clear, and exact description.

This invention relates to pumps operating on the centrifugal principle and of the single or multi-stage type.

The invention has for its general objects to improve the construction and operation of apparatus of this character so as to be reliable and efficient in use, comparatively simple and inexpensive to manufacture and install, and so designed as to have a large capacity with a minimum of power consumption.

A more specific object of the invention is the provision of a novel runner construction having impelling tangential blades for forcing up the water or liquid, and helical blades for giving direction to the water discharged by the impelling blades, and converting pressure into motion, there being a novel arrangement of packing means for preventing leakage around the runner from the discharge side of the impelling blades to the inlet side of the runner.

With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claims appended hereto.

In the accompanying drawing, which illustrates one embodiment of the invention and wherein similar characters of reference indicate corresponding parts in all the views,

Figure 1 is a vertical section of a multi-stage pump with one of the runners in section;

Figs. 2, 3 and 4 are transverse sections respectively on the lines 2—2, 3—3, and 4—4, Fig. 1; and

Fig. 5 is a side view, partly in section, of one of the bowls drawn on a reduced scale.

In the drawing is shown a fragment of a pump having a plurality of runners, but it is to be understood that the pump can be made with a single stage as well as a plurality of stages. The body of the pump is made up of sections 1, each section being in the form of a cylindrical bowl 2, the bottom 3 of one bowl being reduced so as to fit into the upper open end of the adjacent bowl below, and in the bottom of each bowl is a cylindrical opening 4 to form a bearing for the runner in the bowl. Each bowl has carried by its bottom a second bearing 5 spaced somewhat below the bearing 4, and this bearing 5, which is of annular form, is integrally or otherwise connected with the bottom of its respective bowl by arms or webs 6. When the bowls are nested together the lower bearing 5 of any one bowl will be disposed in the chamber of the bowl next below it.

Extending axially of the bowls is a rotary shaft 7 journaled in the bearings 5. On the shaft are runners A disposed one above another and one in each bowl. Each runner comprises a chambered body 8 of cylindrical form and of such diameter as to rotatably fit in its associated bowl. Each body 8 has a cylindrical mouth 9 at its bottom which is of such diameter as to fit in the bearing 4 of its associated bowl. The mouth is constantly open at its bottom so as to form an inlet for the water or other liquid. The chambered body 8 of the runner has curved blades 11 which are approximately tangential to a circle in which the inner edges 12 of the blades lie, and between adjacent blades are formed passages 13 through which water is directed outwardly to ports 14 formed in the side wall and top of the runner body. The top of the runner body has an upwardly extending boss 15 which extends into the bearing 5 of the bowl next above. Surrounding each bearing 5 and securely fastened to the associated runner body are helical blades 16 which have their inner edges 17 in close relation to the circumference of the bearing 5 and their outer edges 18 in close relation to the internal wall of the surrounding bowl 1. These blades are so disposed that, between adjacent blades helical passages 19 are formed, and each communicates with a port 14, whereby the water discharged outwardly and upwardly from the impelling blade chamber will have imparted to it a spiral motion. Thus the pressure generated by the impelling blades is converted into motion of the water in such a manner as to insure a discharge in maximum volume. The internal and external edges of the helical blades have upstanding sharpened edges to reduce the leakage or

slippage to a minimum. The helical blades clear the way for the free discharge from the centrifugal runners or impellers and thereby greatly increase the efficiency. The blades take the pressure from the impelling ports and carry or slide the water from the top of the helical blades, which latter by their shape and pitch better take care of the resistance and pressure of the head of water than could the centrifugal runners alone.

To prevent leakage downwardly around the outside of the runner from the ports 14 to the inlet side of the mouth 9, the external surface of the mouth has a circumferential groove 20 in which are packing rings 21. The circumference of the body of the runner has helical packing grooves 22 which are adapted to be sealed by water. The bottom of the body 8 of the runner is frusto-conical and has tangential ribs 23 depending therefrom which coöperate with the bottom of the associated bowl to form a pump whereby liquid that leaks between the runner and bowl will be discharged upwardly through the passages 22.

From the foregoing description taken in connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A centrifugal turbine pump comprising a bowl having an opening in the bottom, a runner having a cylindrical chambered body rotatable in the bowl and formed with an open mouth rotatable in the opening in the bottom of the bowl, impelling blades in the chamber of the runner body, said body having upwardly and outwardly discharging ports, and helical blades fastened to the top of the body and forming helical passages communicating with the said ports.

2. A centrifugal turbine pump comprising a bowl having an opening in the bottom, a runner having a cylindrical chambered body rotatable in the bowl and formed with an open mouth rotatable in the opening in the bottom of the bowl, impelling blades in the chamber of the runner body, said body having upwardly and outwardly discharging ports, helical blades fastened to the top of the body and forming helical passages communicating with the said ports, a fixed bearing around which the helical blades are disposed, and a shaft for the runner body and journaled in the fixed bearing, the inner and outer margins of the helical blades being disposed respectively in close relation to the said fixed bearing and wall of the bowl and being beveled upwardly.

3. A centrifugal turbine pump comprising a bowl having an opening in the bottom, a runner having a cylindrical chambered body rotatable in the bowl and formed with an open mouth moved rotatably in the opening in the bottom of the bowl, impelling blades in the chamber of the runner body, said body having upwardly and outwardly discharging ports, helical blades on the top of the body and forming helical passages communicating with the said ports, the bottom of the runner body being frusto conical, tangential lugs on the frusto conical bottom of the runner and coöperating with the bottom of the bowl to form a pump means for preventing leakage around the runner body, said runner body having grooves in its external surface through which the pump means discharges, and a packing between the mouth of the runner and the opening of the bowl in which the mouth rotates.

4. A multi-stage centrifugal pump comprising a plurality of bowls each having an open bottom forming a bearing, a lower bearing fastened to and spaced from the bottom of each bowl, the lower bearing of the one bowl being disposed in the chamber of the next bowl below it, a runner journaled in the open bottom of one bowl and the lower bearing of the bowl next above it, and a shaft common to all the runners and journaled in the lower bearings of the bowls.

5. A multi-stage centrifugal pump comprising a plurality of bowls each having an open bottom forming a bearing, a lower bearing fastened to and spaced from the bottom of each bowl, the lower bearing of one bowl being disposed in the chamber of the next bowl below it, a runner journaled in the open bottom of one bowl and the lower bearing of the bowl next above it, a shaft common to all the runners and journaled in the lower bearings of the bowls, impelling blades in the body of each runner, and helical blades surrounding the lower bearing of the bowl and fastened to the top of each runner and imparting a helical direction to the liquid discharged by the impelling blades.

CHARLES EDWIN BURRESS.

Witnesses:
J. C. MEYER,
B. E. HARRIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."