

W. K. RICHARDSON.
CENTRIFUGAL PUMP.
APPLICATION FILED SEPT. 30, 1908.

958,768.

Patented May 24, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

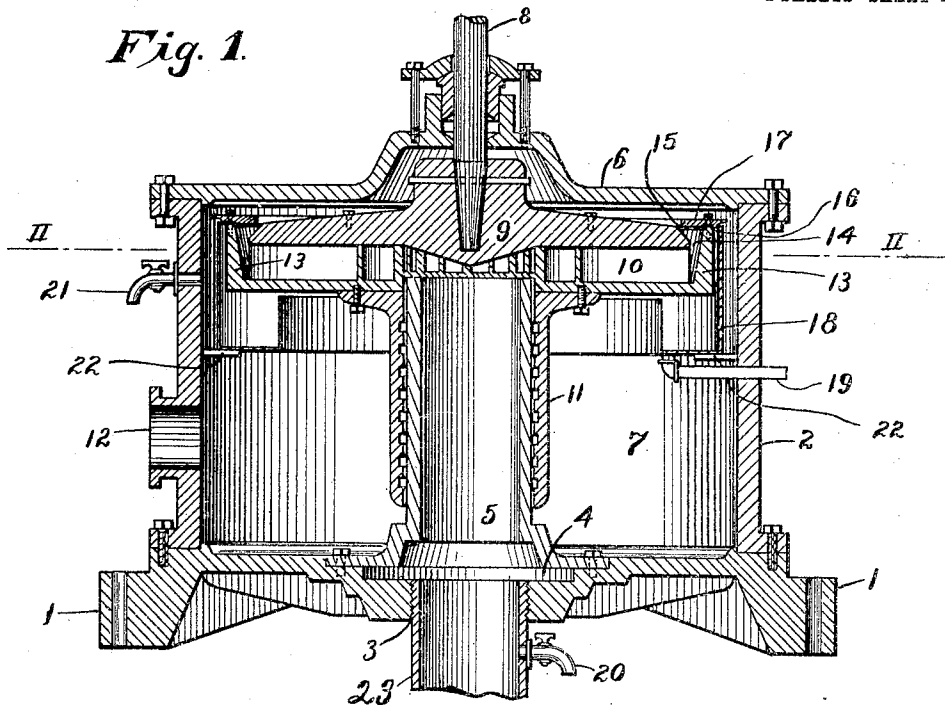
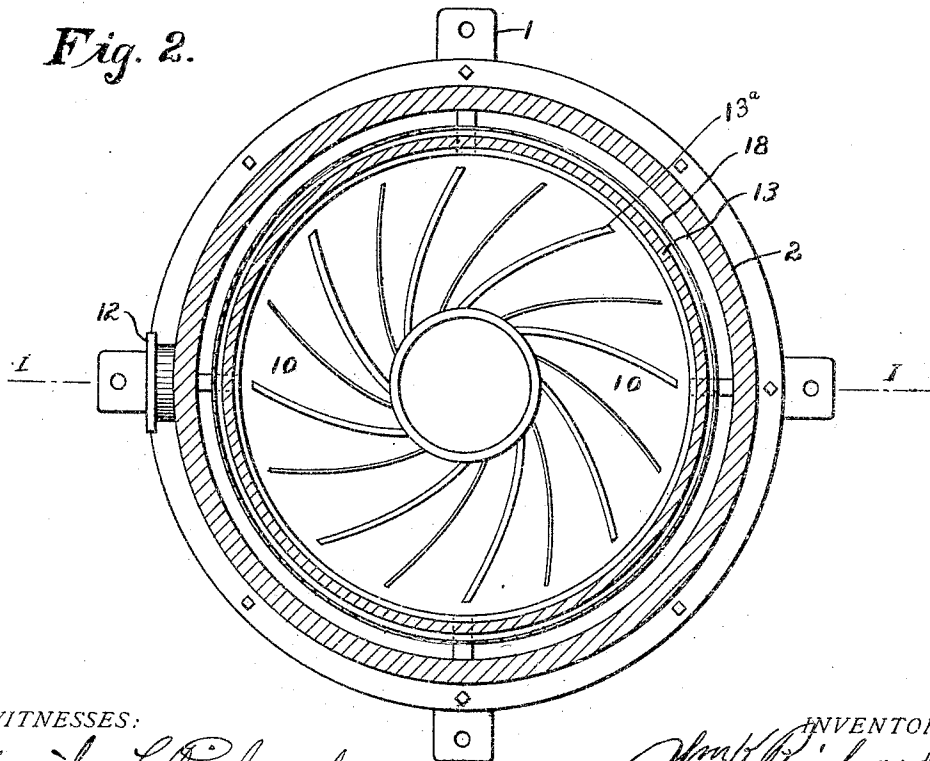


Fig. 2.



WITNESSES:

Marion L. Richardson
C. P. Rutherford

INVENTOR.

W. K. Richardson

W. K. RICHARDSON.
CENTRIFUGAL PUMP.
APPLICATION FILED SEPT. 30, 1908.

958,768.

Patented May 24, 1910.
2 SHEETS—SHEET 2.

Fig. 3.

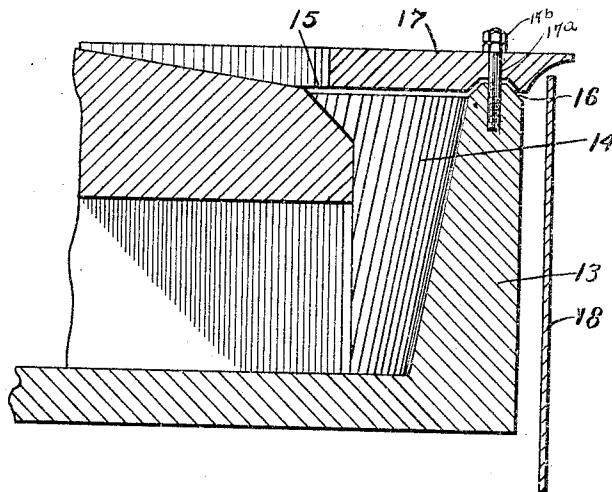
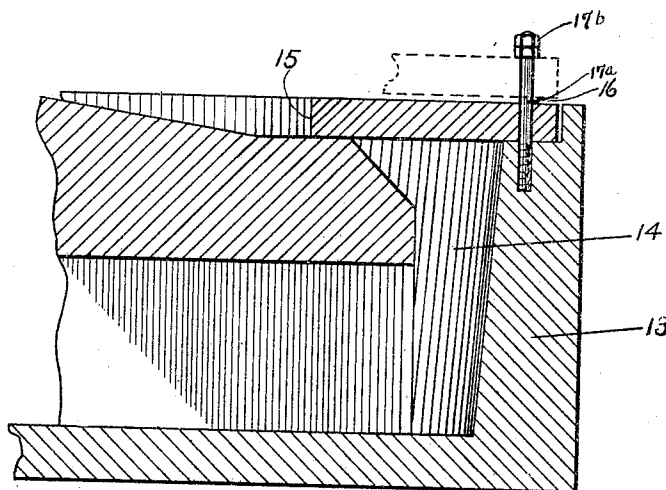


Fig. 4.



WITNESSES:

Marion L. Richardson
C. P. Rutherford

INVENTOR.

W. K. Richardson

UNITED STATES PATENT OFFICE.

WILLIAM KING RICHARDSON, OF LEAVENWORTH, KANSAS.

CENTRIFUGAL PUMP.

958,768.

Specification of Letters Patent.

Patented May 24, 1910.

Application filed September 30, 1908. Serial No. 455,555.

To all whom it may concern:

Be it known that I, WILLIAM KING RICHARDSON, a citizen of the United States, residing at Leavenworth, in the county of Leavenworth and State of Kansas, have invented a new and useful Centrifugal Pump, of which the following is a specification.

This invention relates to certain improvements in centrifugal pumps, and has for its object the dual purpose of preventing the back flow of the fluid from the casing in which the impeller rotates, and for providing a means of allowing the heavier matter contained in the fluid pumped an egress from the impeller. The first purpose mentioned above, enables that class of centrifugal pumps having impellers provided with a liquid seal for the purpose of excluding the air from the chamber of the impeller, to be operated above or out of the fluid pumped, without the aid of a liquid seal. The second purpose mentioned above makes it possible for the same class of pumps to precipitate the solid or heavier matter contained in the water and discharge it with a portion of the water that is being forced through the impeller into a separate reservoir, from that in which the water freed from the impurities which have a greater specific gravity than water, is pumped, thereby purifying and clarifying the water instantly, thoroughly, and inexpensively, and at only a slight detriment to the efficiency of the pump. That this may be understood, reference is to be had to the accompanying drawings, in which,—

Figure 1, is a vertical section, Fig. 2, is a section on line II—II of Fig. 1, Fig. 3, is an enlarged view of valve 17, showing construction and connecting parts. Fig. 4, is a modification of valve 17.

In said drawing 1, designates the base plate of this apparatus, which is bolted or otherwise secured to annular casing 2; the base plate having a central threaded opening 3, and an internal central opening 4, of greater diameter than 3, formed by an offset or step as shown. Secured to step of opening 4, is a semi-steel or strong cast iron water-column 5, the flange of which is faced and turned, the outside perpendicular wall of water-column being turned and polished.

6, indicates the top plate, bolted or otherwise secured to casing 2, and with base plate 1, forms the air and water chamber of the pump 7.

8, indicates the shaft which is keyed to driver 9.

10, is the chamber of the impeller which is formed by bolting driver 9, to casting 13.

11, indicates a cast steel water-seal sleeve, which should be turned all over, with water-seal grooves cut as shown in Fig. 1. This water-seal sleeve is bolted to impeller 14, and is to prevent water from entering the impeller from the air and water chamber 7, its lower end always being immersed below the surface of the water.

12, indicates outlet or discharge.

13^a, indicates the impeller blades which are cast integral with member 13 and are of usual type.

14, is an annular water chamber. 15, discharge port for pure water. 16, discharge port for solid matter and impure water. 17, an annular check valve which partly covers the annular water chamber 14, extending over the driver 9 sufficiently far that the port 15, will form a liquid seal to the chamber 10, and supported upon the outer rim of casting 13, and held in place by studs 17^a inserted into casting 13; on the end of these studs are lock nuts 17^b for regulating the throw of the valve; the valve seat being formed as shown and for the purpose of opening and closing the restricted passage 16, as hereinafter described.

18, indicates a secondary reservoir for the purpose of receiving the water and impurities discharged through port 16, having outlet through pipe 19.

20, indicates an air valve in the suction 23, said suction being provided with a check or foot valve of usual type, not shown. 21, an air valve which communicates with the air and water chamber 7, through casing 2.

22, is a ledge or bracket on which is supported the reservoir 18.

Having thus described the several parts of this machine, I will describe its operation, and results obtained therefrom. This pump is primed in the usual way. The suction pipe is filled with the fluid to be pumped to the level of the impeller. Power is applied to the impeller through the shaft 8. The revolving impeller forces the fluid to the periphery and fills the water discharge casing 14. The pressure of the water upon the under side of the valve 17, causes it to raise against the lock nuts which are set at any desired height to regulate the cross section of discharge opening 16. The cen-

trifugal force throws the matter contained in the water of a greater specific gravity than water, against the outer wall of chamber 14, where, by the erosive action of the water and centrifugal force, it is deflected along the outer wall of chamber 14 and through discharge opening 16 into the reservoir 18, the larger portion of the water flowing into chamber 14, being discharged through port or opening 15.

The modification of valve 17 as shown in Fig. 4, acts as a check valve to both discharge ports 15, and 16, and is not dependent upon a water seal to prevent the back flow of air from the chamber in which the impeller rotates.

The flowing of the water from the chamber 14 to chamber 7 is evidence of an unbalanced pressure and the valve is held open. Should the pressure in the casing 7, at any time exceed the pressure within the impeller, the valve will close and prevent back flow.

The process which is founded upon the apparatus shown and described in this application is described and claimed in the application No. 455590.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a centrifugal pump, the combination with a closed casing having an outlet passage, of an impeller within said casing and provided with a chamber, an inlet, an outlet passage communicating with said chamber, said outlet passage provided with a valve,

of a reservoir contained within said casing for the purpose specified.

2. A rotary impeller having a chamber, blades in said chamber, an inlet for said chamber, an annular outlet chamber for and concentric with the center of said first named chamber, a valve carried by the impeller, and consisting of a vertically movable band bridging the outlet chamber, and adapted to be raised by the water discharge from said outlet chamber, to provide passages for the escape of water from said outlet chamber between its inner edge and the impeller, and its outer edge and the impeller, the area of the inner passage materially exceeding that of the outer passage.

3. In a pump the combination with a rotary impeller having an outlet chamber, and an outlet passage leading therefrom, one side of which is nearer the center of the impeller than the opposite side, of a valve controlling said pump, and opening from the chamber under the pressure of water discharged, taking when open such a position that one way is opened toward the center of the impeller, and another way toward the periphery of the impeller, the latter being more restricted, whereby the larger portion of the water may be discharged through the inner way against centrifugal force, forming a water seal, and sedimentary deposits and water may pass through the outer way.

WILLIAM KING RICHARDSON.

Witnesses:

MARTHA L. RICHARDSON,
C. P. RUTHERFORD.