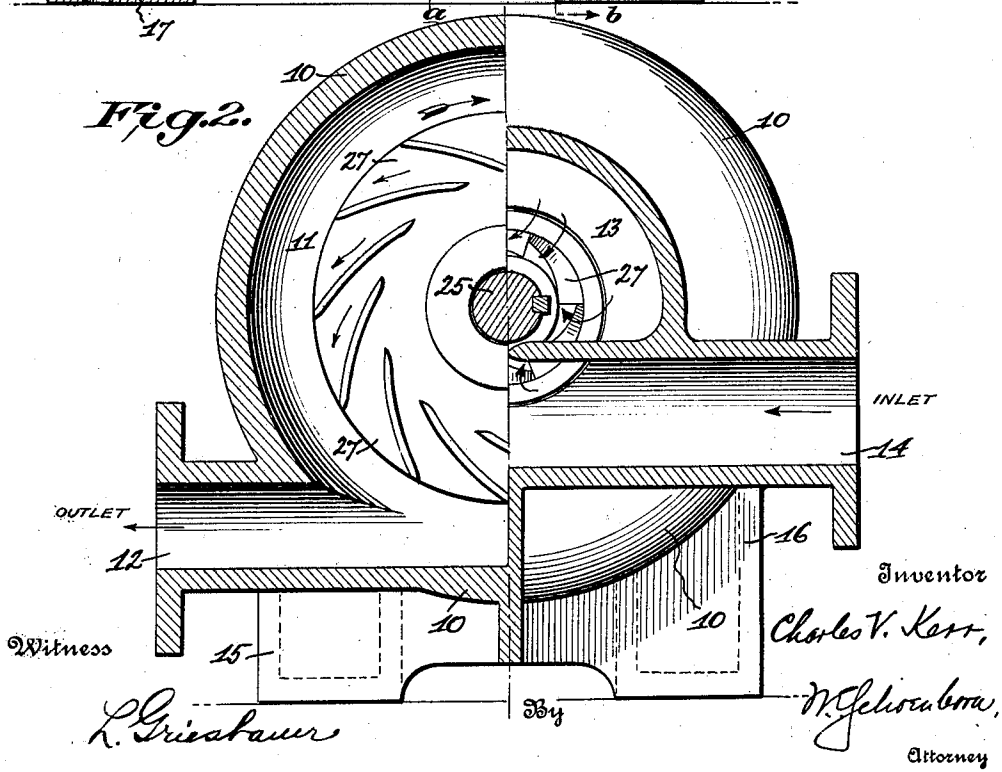
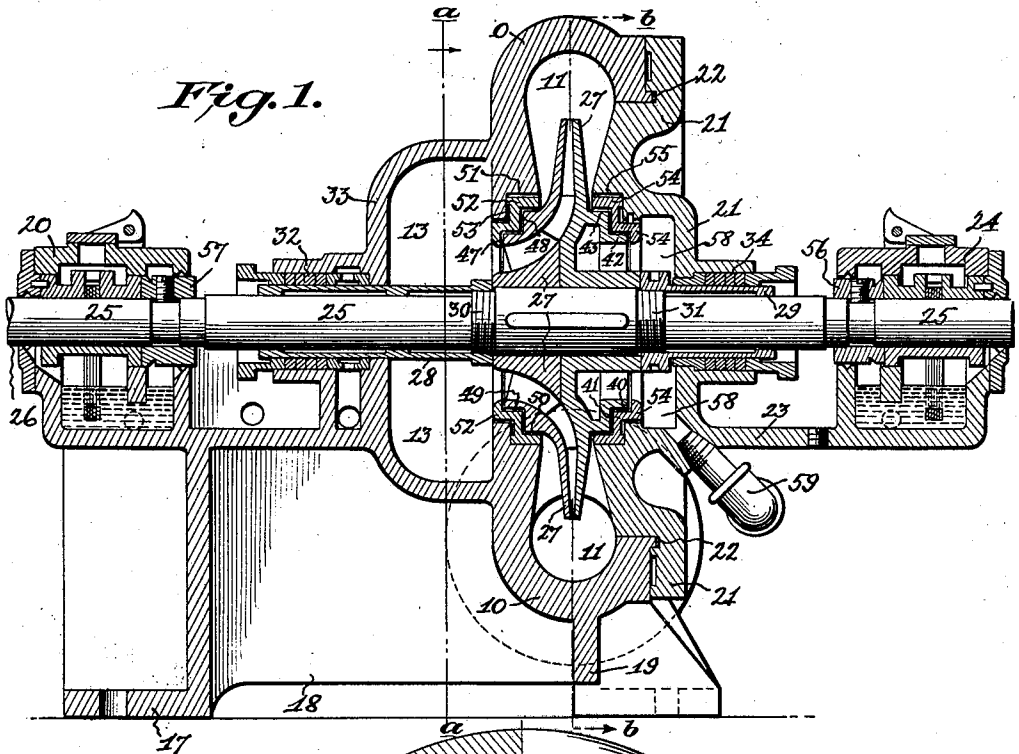


C. V. KERR.
CENTRIFUGAL PUMP.
APPLICATION FILED DEC. 22, 1919.

1,374,664.

Patented Apr. 12, 1921.



UNITED STATES PATENT OFFICE.

CHARLES V. KERR, OF AURORA, ILLINOIS, ASSIGNOR TO THE AMERICAN WELL WORKS, OF AURORA, ILLINOIS, A CORPORATION OF ILLINOIS.

CENTRIFUGAL PUMP.

1,374,664.

Specification of Letters Patent.

Patented Apr. 12, 1921.

Original application filed September 10, 1917, Serial No. 190,524. Divided and this application filed December 22, 1919. Serial No. 346,610.

To all whom it may concern:

Be it known that I, CHARLES V. KERR, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

This invention relates to centrifugal pumps in general and has for its salient objects to simplify the construction of the casing and impeller and more particularly with reference to single impeller pumps.

The invention also is an improvement in the construction described and claimed in my earlier Patent No. 1,129,038, granted February 16, 1915.

In the accompanying one sheet of drawing, I have illustrated certain preferred constructions which embody the invention, similar reference characters indicating the same parts throughout the several figures of the drawings.

The invention will be hereinafter more fully and clearly described, and particularly pointed out in the appended claims.

In the drawings:

Figure 1, is a longitudinal section of a centrifugal pump; and

Fig. 2, is a composite view, the right hand half of which represents a partial section on the line *a-a* of Fig. 1, and the left hand half of the figure representing a partial section on the line *b-b* of Fig. 1.

Referring to the drawings, 10 is a casing provided with an annular discharge chamber 11, preferably in the form of a volute, the outlet from which is at 12. On one side of the chamber 11 is a suction chamber which is also preferably in the form of a volute with the intake at 14. The casing 10 is supported by legs 15, 16 and 17, which are suitably braced by the webs 18 and 19. Above the leg 17 is a bearing 20, of any suitable construction, but preferably of the ring-oiling type, illustrated. On the opposite side of the chamber 11, from the chamber 13, the casing has a removable cover or side plate 21 which is bolted to the casing proper, and a tight joint formed therebetween by means of packing 22. The plate 21 has a bracket 23 which carries a bearing 24, similar to the bearing 20.

A shaft 25 is mounted in the bearings 20,

and the end 26 thereof may be extended and provided with any suitable form of driving means. The impeller indicated generally by the numeral 27 is keyed on shaft 25 and secured against axial movement as a whole, by the sleeves 28 and 29, which abut the ends of the impeller hub and are respectively secured to the shaft by the threaded connections 30 and 31. A stuffing-box 32 of the usual construction is arranged in the wall 33 of the chamber and prevents leakage along the surface of sleeve 28. A similar stuffing-box 34 is arranged in the plate 21 and prevents leakage along the surface of sleeve 29.

The casing 10 has an annular recess for the wearing ring 52, a ground joint being maintained between the ring and casing on the surface 53 and the ring being seated by the discharge pressure acting on its inner surfaces. The interior of the ring 52 is stepped to correspond to the stepped arrangement of the surfaces 47, 48, 49 and 50 of the impeller. The construction, however, is such that the surface 47 will contact with the opposing surface of the ring 52 and prevent the surface 48 from contacting with the surface opposed thereto. This stepped formation of the impeller and of the ring 52 provides a tortuous passage through which small quantities of water may flow from the discharge chamber 11 to the suction chamber 13, this water forming a fluid packing which reduces wear to a minimum and cushions endwise movements of the impeller. On the other side of the impeller a similar ring 54 is provided, this ring seating in a recess 55 in the plate 21 and having a stepped interior to correspond to the stepped arrangement of the surfaces 40, 41, 42 and 43 of the impeller. As in the case of the ring 52, the inner surface 40 will contact with the opposing surface of the ring 54 and prevent the surface 41 from contacting with the surface of the ring opposed thereto. These rings 52 and 54 are given a radial clearance in casing 10 and plate 21 to permit self-centering with the impeller 27 as the shaft 25 sinks in consequence of wear in the bearings 20 and 24, whereby leakage backward from discharge to suction chambers is reduced.

When the pump is in operation the water is drawn from chamber 13 and discharged

into chamber 11, as is well known. The pressure in chamber 11 forces water through the tortuous passages on the interior of the rings 52 and 54. The collars 5 56 and 57 are set for bearing contact by means of set screws or otherwise to permit the surfaces 40 and 47 of the impeller to contact simultaneously with the opposing surfaces on the wearing rings to reduce 10 wear and then any unbalanced axial pressure in the impeller will move the latter and the shaft 25. Assuming this movement to be toward the right in Fig. 1, then the surface 40 will contact with the opposing surface 15 on the ring 54 and close the passage along the interior of the latter. At the same time the passage along the interior of the ring 52 is enlarged and a larger flow of water permitted, this resulting in a reduction 20 of the pressure on the surfaces 47 and 48 and an increase of the pressure on the surface 41, thereby equalizing the end pressure on the impeller. If the excess of pressure is toward the left the operations will 25 be reversed.

In order to substantially balance the pressures on the impeller, a leakage chamber 58 is provided in the plate 21 and communication with the suction chamber 13 established 30 by means of a pipe 59, or by a cored passage around the discharge chamber 11. The central portions of both sides of the impeller are thus subjected to the suction pressure.

35 I do not herein claim the specific construction of the impeller as this is the subject matter of a separate and independent application filed by me September 10, 1917, Serial Number 190,524, and patented April 40 20, 1920, Number 1,337,659, of which the present application is a division.

What I claim is:—

1. In a centrifugal pump, the combination with a casing, of a rotary impeller having 45 annular flanges at each end, said casing having cylindrical shoulders spaced from said impeller flanges, and floating annular members coacting with said flanges and peripherally shouldered to coact with said 50 shoulders on said casing, as specified.

2. In a centrifugal pump, the combination with a casing, of a rotary impeller

having annular portions at each end, said casing having surrounding annular portions spaced from the annular portions of said impeller, and floating annular members disposed between said annular portions on said casing and impeller to coact with both, for the purpose specified. 55

3. In a centrifugal pump, the combination with a casing, of a rotary impeller having an annular portion, said casing having a surrounding portion spaced from the annular portion of said impeller, and a floating annular member disposed between said 60 annular portions on said casing and impeller to coact with both, for the purpose specified. 65

4. In a centrifugal pump, the combination of a casing having a suction chamber and a discharge chamber, a rotary impeller 70 mounted in said casing, and rings carried by the walls of the casing at the ends of the impeller and having interior parts which cooperate with corresponding outer walls of 75 the impeller to provide passages through which water may flow from said discharge chamber, said rings having radial clearance in said casing to permit self-centering with said impeller and being seated by difference 80 of pressure between suction and discharge chambers and said parts constructed and arranged to be adapted to meet and close the passages alternately on the two sides of the 85 impeller, whereby the fluid pressure in the discharge chamber will act in the passage so closed and equalize the axial pressures on the impeller.

5. In a centrifugal pump, the combination of a casing having a suction and a discharge chamber, an impeller rotatively 90 mounted in said casing, a wearing ring having radial clearance cooperating with said impeller and seated by pressure in the casing on each side of said impeller, and self-centering therewith for reducing leakage, a leakage chamber in said casing axially opposite said suction chamber and means connecting said leakage and suction chambers 95 for equalizing fluid pressure in said chambers. 100

In testimony whereof I affix my signature.

CHARLES V. KERR.