

1,283,879.

P. OSTENBERG,  
CENTRIFUGAL PUMP.  
APPLICATION FILED JAN. 23, 1918.

Patented Nov. 5, 1918.  
2 SHEETS—SHEET 1.

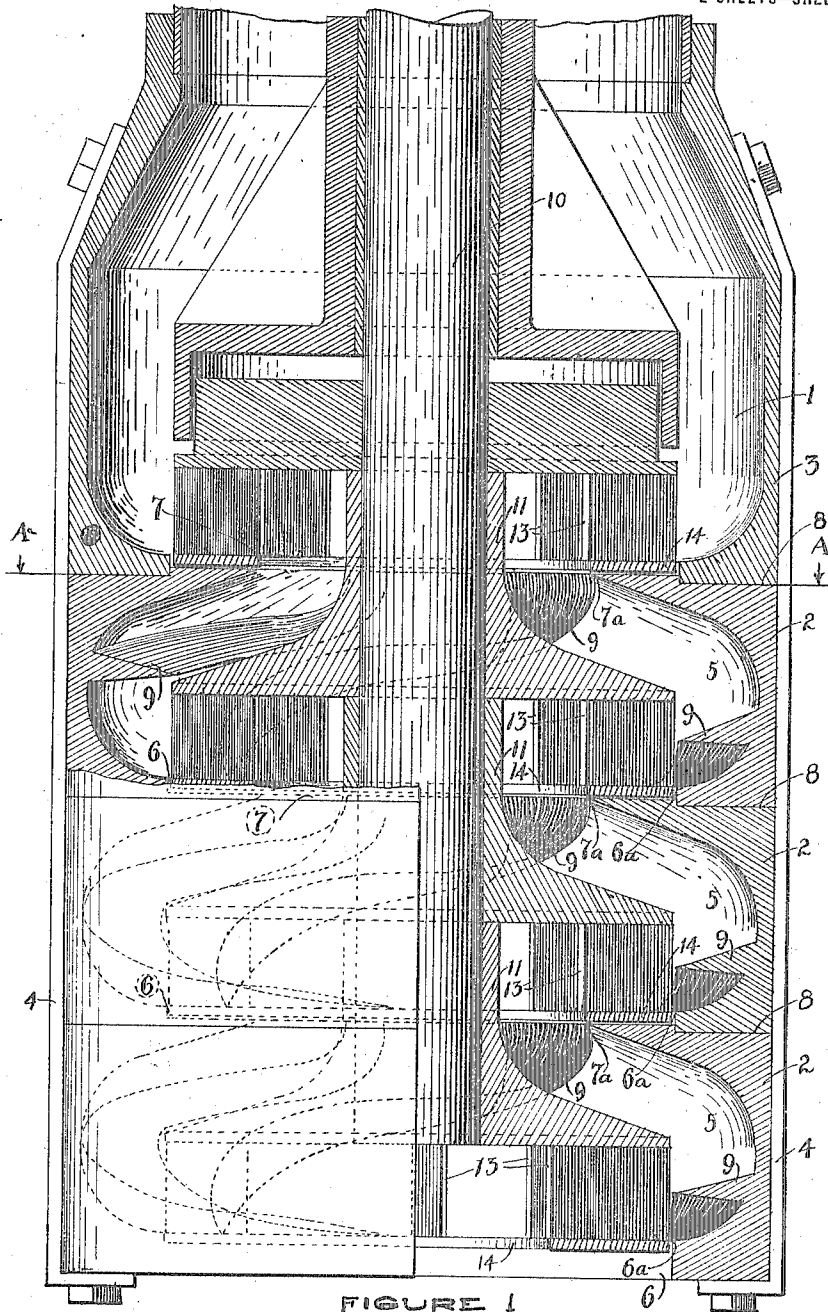


FIGURE 1

INVENTOR  
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BY *John A. Praisnitz*  
HIS ATTORNEY

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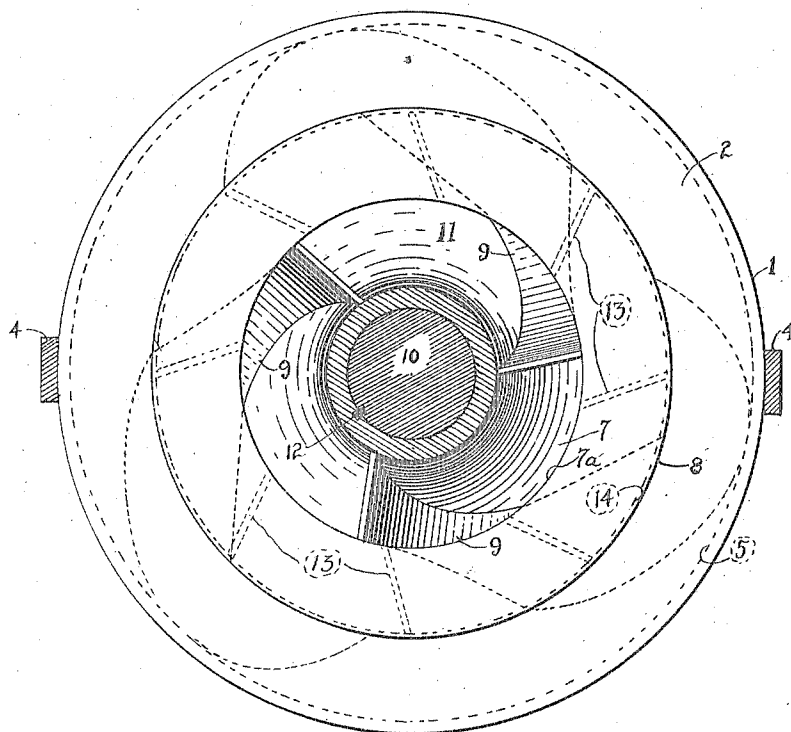


FIGURE 2

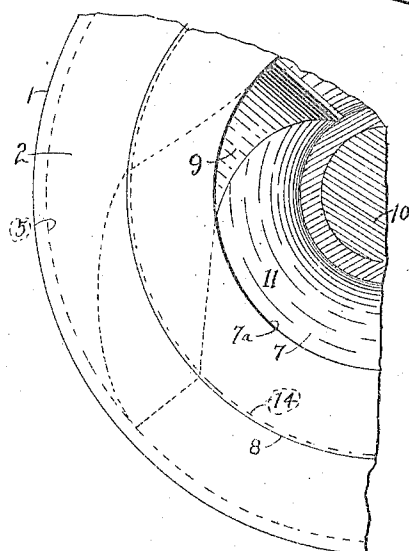


FIGURE 3

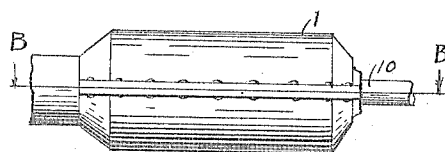


FIGURE 4

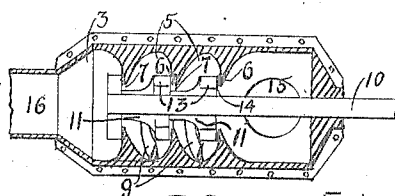


FIGURE 5

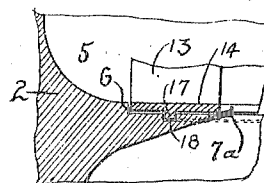


FIGURE 6

INVENTOR  
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# UNITED STATES PATENT OFFICE.

PONTUS OSTENBERG, OF NEAR SAN JOSE, CALIFORNIA.

## CENTRIFUGAL PUMP.

1,283,879.

Specification of Letters Patent.

Patented Nov. 5, 1918.

Application filed January 23, 1918. Serial No. 213,359.

### *To all whom it may concern:*

Be it known that I, PONTUS OSTENBERG, a citizen of the United States, and residing near San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

My invention relates to improvements in centrifugal pumps, and particularly to improvements in that type of pump shown and described in my copending application entitled Centrifugal pump, Serial No. 155,020, filed March 15, 1917, allowed January 2, 1918.

It is the object of my invention to provide bowls for pumps of the above indicated character that will be of such a form and be provided with vanes of such a character as to prevent reduced efficiency through frictional losses.

With these and other objects in view the invention consists in the novel and useful provision, construction, formation, combination and relative arrangement of parts, members and features as hereinafter described, shown in the drawings and finally pointed out in the claims.

In the drawings;—

Figure 1 is a vertical, transverse section through my improved pump, partly in elevation.

Fig. 2 is a sectional view on line A—A of Fig. 1.

Fig. 3 is a fragmentary illustration showing a modified form of diffusion vane.

Fig. 4 is a side elevation of a horizontal pump embodying my invention.

Fig. 5 is a sectional view on line B—B of Fig. 4.

Fig. 6 is a detail sectional illustration showing a provision for preventing water from being forced back under the impeller vanes.

Similar characters of reference refer to similar parts throughout the several views.

At 1 I have shown a tubular pump body, bowl or casing built up of several sections, as 2, bound together and to discharge section 3 by ties 4. Each section has an annular chamber as 5 formed in its inner circumference, the lower or inlet opening in said section being shown at 6 and the upper or discharge opening being shown at 7, the latter being of less diameter than the former, and each succeeding section fitting into a

seat 8 in the next lower section. The lower inner edge and the upper inner edge of chamber 5 are indicated by characters 6<sup>a</sup> and 7<sup>a</sup> respectively. Each chamber is fitted with a number of diffusion vanes as 9 rising from edge 6<sup>a</sup> and curving upwardly around the surface of said chamber and discharging at edge 7<sup>a</sup> as clearly shown in Fig. 1. At 10 is shown a shaft having rotors 11 secured thereto by key 12, without intervening bearings, each rotor carrying impeller blades of any suitable form as 13, and the bottom edges of said blades 13 being spaced and secured by an annular ring 14. These several parts are so formed and assembled that the lower edge of chamber 5, that is edge 6<sup>a</sup>, is substantially flush with the upper surface of ring 14 of the adjoining rotor, and the inner perimeter of ring 14 is substantially flush with the edge 7<sup>a</sup> of the next lower chamber 5. In the embodiment shown in Figs. 1 and 2 the inner edges of diffusion vanes 9 are alined with the edge 6<sup>a</sup> of chamber 5 until they rise to the upper surface of rotor 11 where the said inner edges are directed inwardly and upwardly close to said upper surface to the discharge opening 7 as shown.

When formed and fitted as above set forth the water is delivered to each rotor directly from the next lower rotor, and preferably with a vertical movement, the upper surface of the revolving rotor assisting in the work of raising the water by imparting a rotary motion thereto until the said water is sheared off of the rotor by the said diffusion vanes 9. Also by carrying the upper portion of chambers 5 inwardly to the inner perimeter of ring 14 the said ring 14 is cut off completely from the rising water below, consequently the entire force of the revolving vanes 13 and ring 14 is expended upon the water discharged into chamber 5.

In Fig. 3 it is shown that when deemed necessary or advisable the diffusion vanes may be started from any suitable point in chamber 5 without departing from the spirit of my invention. In this figure one vane 9 is shown starting from a point on a level with the outer edge of the upper surface of rotor 11.

In the above described embodiment it is necessary to assemble the pump by alternately placing a section 2 and then a rotor 11 in position, but the casing 1 may be split lengthwise if desired as shown in Figs. 4

and 5, in which case the rotors may be assembled on the shaft and then positioned in one half of the casing, the other half of the casing subsequently being bolted in position. In these figures a horizontal pump is shown with the shaft reversed, the inlet being shown at 15 and the discharge at 16.

In Fig. 6 it is shown that ring 14 may have a rib 17 formed on its under surface to engage groove 18 formed as shown, this construction preventing water from being forced backwardly past the under side of ring 14 and thus lessen the efficiency of the pump.

Having thus described my invention, what I claim is:—

1. A centrifugal pump including a shaft, a plurality of rotors mounted thereon without intervening bearings, and a casing provided with a plurality of chambers operatively mounted with relation to said rotors, each chamber having axially alined inlet and discharge openings, the discharge opening being of less diameter than the inlet opening.

2. A centrifugal pump including a shaft, a plurality of rotors mounted thereon without intervening bearings, and a casing provided with a plurality of chambers operatively mounted with relation to said rotors, each chamber having axially alined inlet and discharge openings, the discharge opening being of less diameter than the inlet opening, and diffusion vanes positioned therein and terminating at said discharge opening.

3. A centrifugal pump including a shaft, a plurality of rotors mounted thereon without intervening bearings, and a casing provided with a plurality of chambers operatively mounted with relation to said rotors, each chamber having axially alined inlet and discharge openings, the discharge opening being of less diameter than the inlet opening, and diffusion vanes positioned therein and extending from said inlet opening to said discharge opening.

4. A centrifugal pump including a shaft, a plurality of rotors mounted thereon without intervening bearings, and a casing pro-

vided with a plurality of chambers operatively mounted with relation to said rotors, each chamber having axially alined inlet and discharge openings, the discharge opening being of less diameter than the inlet opening, and diffusion vanes positioned therein and terminating at said discharge opening, the free edges of said diffusion vanes being formed to follow the contour of the contiguous surface of the adjacent rotor.

5. A centrifugal pump including a shaft, a compound rotor mounted thereon, and a casing provided with a plurality of chambers operatively mounted with relation to said compound rotor, each chamber having axially alined inlet and discharge openings, the discharge opening being of less diameter than the inlet opening.

6. A centrifugal pump including a shaft, a compound rotor mounted thereon, and a casing provided with a plurality of chambers operatively mounted with relation to said compound rotor, each chamber having axially alined inlet and discharge openings, the discharge opening being of less diameter than the inlet opening, and diffusion vanes positioned therein terminating at said discharge opening.

7. In a pump of the character described the combination of a centrifugally acting rotor operatively mounted on a pump shaft and a plurality of diffusion vanes operatively mounted with relation to said rotor, the inner edges of said vanes being disengaged and formed to follow the contour of the contiguous surface of said rotor.

8. A centrifugal pump including a shaft, a compound rotor mounted thereon, and a casing provided with a plurality of chambers operatively mounted with relation to said compound rotor, each chamber having inlet and discharge openings, the discharge opening being of less diameter than the inlet opening, and diffusion vanes positioned between said inlet and discharge openings.

Signed at San Jose in the county of Santa Clara and State of California, this 14th day of January, 1918.

PONTUS OSTENBERG.