

C. G. DE LAVAL.
CENTRIFUGAL PUMP.
APPLICATION FILED JUNE 2, 1915.

1,269,063.

Patented June 11, 1918.

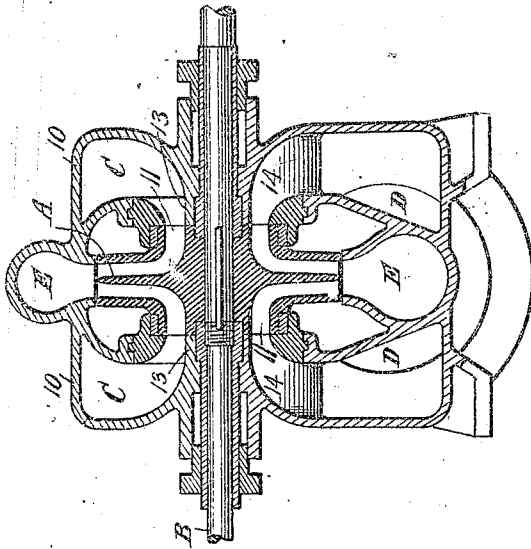


Fig. 2.

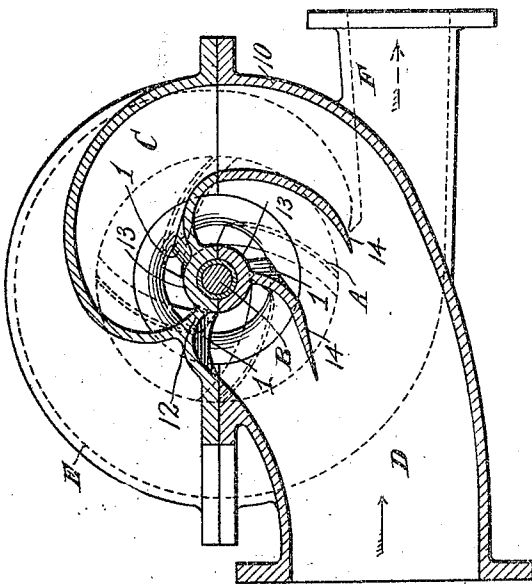


Fig. 1.

Inventor:
Carl George de Laval
by his Attys.
Philip Sawyer Rice & Keane

UNITED STATES PATENT OFFICE.

CARL GEORGE DE LAVAL, OF ORANGE, NEW JERSEY, ASSIGNOR TO HENRY R. WORTHINGTON, A CORPORATION OF NEW JERSEY.

CENTRIFUGAL PUMP.

1,269,063.

Specification of Letters Patent. Patented June 11, 1918.

Application filed June 2, 1915. Serial No. 31,665.

To all whom it may concern:

Be it known that I, CARL GEORGE DE LAVAL, a citizen of the United States, residing at Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Centrifugal Pumps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates particularly to that class of centrifugal pumps, in which the impeller takes its suction horizontally from a suction passage below the center line, the especial object of the invention being to avoid the difficulty in such pumps arising from the fact that the water entering the suction chamber, in flowing around the impeller suction, is given a direction tending to carry it back through the suction chamber into the suction passage, this resulting in counter currents and eddies and reducing the capacity and efficiency of the pump.

I avoid this difficulty by preventing the water passing around the suction chamber from meeting the water coming in through the upper part of the suction passage, thus preventing the objectionable counter currents and producing a uniform distribution of the supply throughout the periphery of suction entrance of the impeller. This result is secured by the use of guide-vanes, so arranged as to divide the flow to the impeller suction into divisions, such as to prevent counter currents. The vanes may be simple curved or volute vanes, or may be developed helically to direct the flow to the impeller. I also preferably avoid the tendency to rotation of the water in the suction chamber, by inclosing the shaft within a fixed casing up to the entrance of the impeller, so that there is no exposed rotating shaft in the suction chamber.

While the invention is especially applicable to centrifugal or turbine pumps for liquids, it may be applied to pumps, such as compressors, blowers, etc., for handling elastic fluids.

In the accompanying drawings forming a part of this specification, there is shown, for purpose of illustration, a double suction impeller single stage pump embodying the invention in a preferred form, and this pump will now be described in detail and the fea-

tures forming the invention then specifically pointed out in the claims.

In the drawings:

Figure 1 is a vertical section through the suction passage and suction chamber of one side of the pump, and

Fig. 2 is a vertical central section longitudinally of the impeller shaft.

Referring to the drawings, A is the impeller, B its shaft, C the suction chamber on opposite sides of the impeller, D the common suction passage or inlet, and E the discharge volute terminating in discharge F. All the above parts are shown as of a common type, but modified in accordance with the present invention, and it will be understood that the general construction of the pump may be of any other common or suitable form, and the invention is applicable to single suction pumps as well as the double suction pump illustrated.

Referring now to the features forming the invention, the outer wall 10 of the suction chamber, that is, the wall opposite the inlet D and forming a continuation of the lower wall of the inlet, is curved around the upper side of the suction entrance 11 of the impeller, preferably in a volute, as shown, and terminates in a vane 12 integral with or extending to the hub 13 inclosing shaft B, and thus prevents any return flow in this volute toward the inlet D, so that the water entering the suction from the upper part of the inlet D does not meet the flow from the volute formed by wall 10. Additional dividing vanes 14 are used, according to the size of the pump, these vanes extending to and preferably being formed integral with the hub 13 so as to divide the suction flow to the impeller and secure a more uniform distribution of the suction flow throughout the suction entrance of the impeller. These vanes may be simple curved or volute vanes, but preferably, as shown, have the helical development 1 adjacent to the impeller suction, which directs the flow helically to the impeller and forward in the direction of movement of the impeller. The construction is the same in the suction chambers on the opposite sides of the impeller. It will be seen that the hubs 13 entirely cover the shaft B, so that there is no rotating part in either suction chamber tending to cause rotation or whirling motion of the fluid, and this hub

construction preferably is used, although the invention, considered broadly, includes constructions omitting it.

What I claim is:

5 1. A centrifugal or turbine pump having an impeller with a horizontal suction entrance, a suction chamber surrounding the suction entrance of the impeller, a suction
10 passage entering the suction chamber transversely to the impeller shaft, whereby a flow transverse to the impeller shaft is produced, and one or more vanes in the suction chamber
15 arranged to direct said transverse flow about the suction entrance of the impeller and to separate the flow about the suction entrance from the incoming flow through the suction passage, whereby counter-currents are avoided and the flow distributed
20 throughout the impeller suction, said vane or vanes being developed helically adjacent to the impeller suction to direct the water in the direction of the rotation of the impeller.

2. A centrifugal pump comprising in combination, a casing, a rotary impeller mounted
25 therein and provided with an axially disposed suction inlet, an inlet conduit for said casing terminating in a suction chamber which surrounds and extends to the inlet of the impeller, a shaft on which said impeller is mounted, a hub member inclosing

the shaft and forming a bearing therefor which extends from the casing through the suction chamber substantially to the inlet of the impeller and a plurality of vanes extending from the hub member to the walls of
35 the suction chamber and to the inlet of the impeller whereby the flow is directed between said vanes to the inlet of the impeller and counter-currents are prevented.

3. A centrifugal pump comprising in combination, a casing, a rotary impeller mounted therein and provided with an axially disposed suction inlet, an inlet conduit for said casing terminating in a suction chamber which surrounds and extends to the inlet of
45 the impeller, a shaft on which said impeller is mounted, and a plurality of vanes extending from the inner wall to the outer wall of the suction chamber and to the inlet of the impeller whereby the flow is directed between
50 said vanes to the inlet of the impeller and counter-currents are prevented.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

CARL GEORGE DE LAVAL.

Witnesses:

G. S. HAWKINS,
W. J. FRITCHMAN.