C. G. DE LAVAL.

CENTRIFUGAL, TURBINE, AND SIMILAR PUMP.

APPLICATION FILED APR. 2, 1913.

1,094,836. Patented Apr. 28, 1914.

Fig. 1.

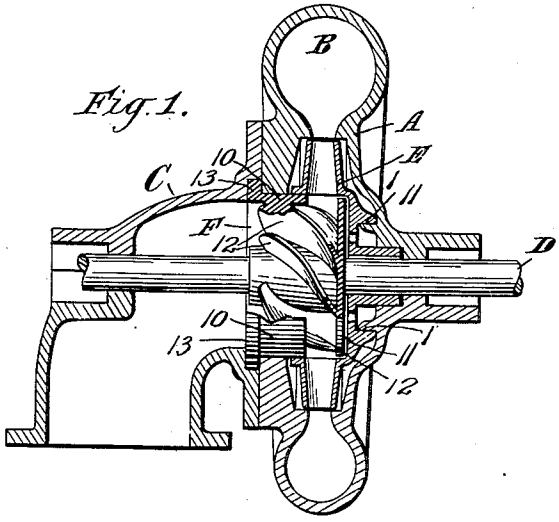


Fig. 2.

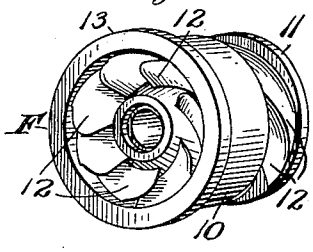
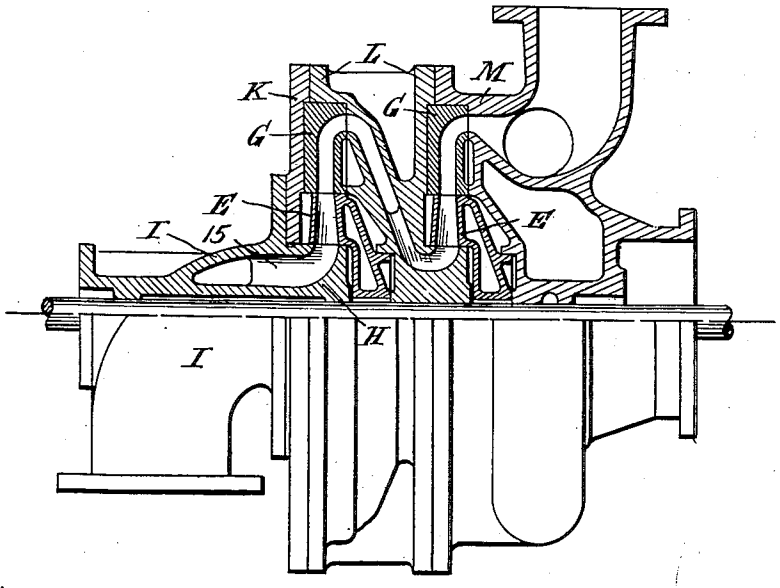


Fig. 3.



Witnesses:
S. E. Brown.
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by his Attys:
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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL, TURBINE, AND SIMILAR PUMP.

1,094,836. Specification of Letters Patent. Patented Apr. 28, 1914.

Application filed April 2, 1913. Serial No. 758,393.

To all whom it may concern:

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

The especial object of the present invention is to avoid the whirling action of the water or other liquid entering the impellers of centrifugal or similar pumps, and to properly direct this suction flow so that the impeller will take up the water without substantial change of direction, thus preventing the rotating effect upon the water produced by the surface of the inlet hub of the impeller in present constructions.

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

In accordance with the present invention, I employ in the suction of a single stage pump, or in each suction of a multistage pump, a fixed distributer having guide vanes arranged helically so as to guide the water from the suction entering at right angles to the impeller and gradually change the direction of flow so that it passes into the impeller in the direction, or substantially in the direction, of the impeller flow. This distributer with its helical vanes may be formed integrally with the suction casing, but, preferably, for simplicity and convenience of construction, the distributer will be made separate and held in place by the casing or otherwise in any suitable manner.

In the accompanying drawings forming a part of this specification there are shown, for the purpose of illustration, single stage volute, and multistage turbine pumps embodying the invention in preferred forms, and these pumps will now be described in detail and the features forming the invention then specifically pointed out in the claims.

In the drawings:—Figure 1 is a vertical central section of a single stage pump of common type with a removable distributer embodying the invention; Fig. 2 is a perspective view of the distributer of Fig. 1; and Fig. 3 is a vertical view of a multistage turbine pump having a distributer formed integrally with the suction elbow.

Referring now to Fig. 1, A is the pump casing shown as having the common discharge volute B and separate suction elbow C, and in which is mounted the shaft D carrying the impeller E, which impeller is shown as of the common inclosed impeller type and may have impeller vanes of any suitable form. Within the suction space and connecting the suction elbow with the impeller inlet, so as to take the place of the ordinary curved inlet hub of the impeller, is the distributer F shown as consisting of outer cylinder 10 and inner head 11 connected by helical vanes 12 extending from the inlet end of cylinder 10 to inner head 11 and curved so as to gradually change the suction liquid entering from elbow C from movement at right angles to the plane of rotation of the impeller to movement substantially in, or approximately in, such plane of rotation, so as to enter the impeller without receiving any whirling motion from the impeller hub, as usual, but to be taken up and thrown out by the impeller directly at right angles to the impeller axis of rotation. The distributer is shown as held in position by flange 13 on the outer end of cylinder 10 set into a groove on the inner end of the suction elbow C between the suction elbow and casing A, so that the distributer can readily be assembled in place with the casing and suction head. The impeller is shown as running on its rear side on shoulders 1 formed on the impeller and casing, and, on its front side, on the cylinder 10, a construction having small bearing surfaces and reducing friction thus being provided. It will be understood that any suitable wearing rings may be used between the running surfaces, if desired.

In the construction shown in Fig. 3, which illustrates the pump with the upper half in section and the lower half in elevation, the two halves being similar, a multistage pump having two impellers E with the usual discharge diffusion rings G is shown, each impeller being provided with a suction distributer H which, with its helical vanes 15, is formed integrally with the suction elbow I, but otherwise substantially the same in construction and operation as in the single stage volute pump shown in Fig. 1. In this construction the pump is shown as divided into

sections vertically, I being the suction elbow, K the suction head, L the partition section, and M the discharge head.

The invention is applicable to single or multistage pumps of any type, and with their sections formed and assembled in any suitable manner, and divided either vertically or horizontally. It will be understood, also, that the invention is not limited to the detail form or arrangement of either of the distributers or impellers shown, but that these may be varied within the invention.

What I claim is:—

1. A centrifugal pump or the like, having on the suction side of the impeller a series of stationary helical vanes formed to change the direction of motion of the suction fluid to deliver the fluid to the impeller in substantially the plane of rotation of the impeller.

2. A centrifugal pump or the like, having on the suction side of the impeller a series of stationary helical vanes for changing the direction of flow of the suction fluid toward the direction of impeller flow.

3. In a centrifugal pump or the like, the combination with an impeller having its suction opening at right angles to the plane of impeller rotation, of a stationary suction distributer extending substantially to the impeller suction and having a series of fixed vanes curved to gradually change the flow of suction fluid from a plane substantially parallel with the axis of rotation of the impeller to a plane substantially at right angles thereto.

4. In a centrifugal pump or the like, the combination with an impeller having its suction opening at right angles to the plane of impeller rotation, of a stationary distributer removably mounted between the suction inlet and impeller and having a series of fixed vanes curved to gradually change the flow of suction fluid from a plane substantially parallel with the axis of rotation of the impeller to a plane substantially at right angles thereto.

5. In a multistage centrifugal pump or the like, the combination with a plurality of impellers and their connecting passages, each impeller having its suction opening at right angles to the plane of impeller rotation, of a stationary suction distributer for each impeller, extending substantially to the impeller suction and having a series of fixed vanes curved to gradually change the flow of suction fluid from a plane substantially parallel with the axis of rotation of the impeller to a plane substantially at right angles thereto.

6. In a centrifugal pump or the like, the combination with the impeller, as E, of a removable suction distributer having the cylinder 10, the inner head 11, and helical vanes 12, carried by the cylinder and head and extending substantially to the impeller inlet.

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

CARL GEORGE DE LAVAL.

Witnesses:

PHINIA KENNEDY,

JAMES F. DONOVAN.