June 2, 1925. 1,540,530

P. G. BOGDANOFF

CENTRIFUGAL PUMP

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Fig. 1.

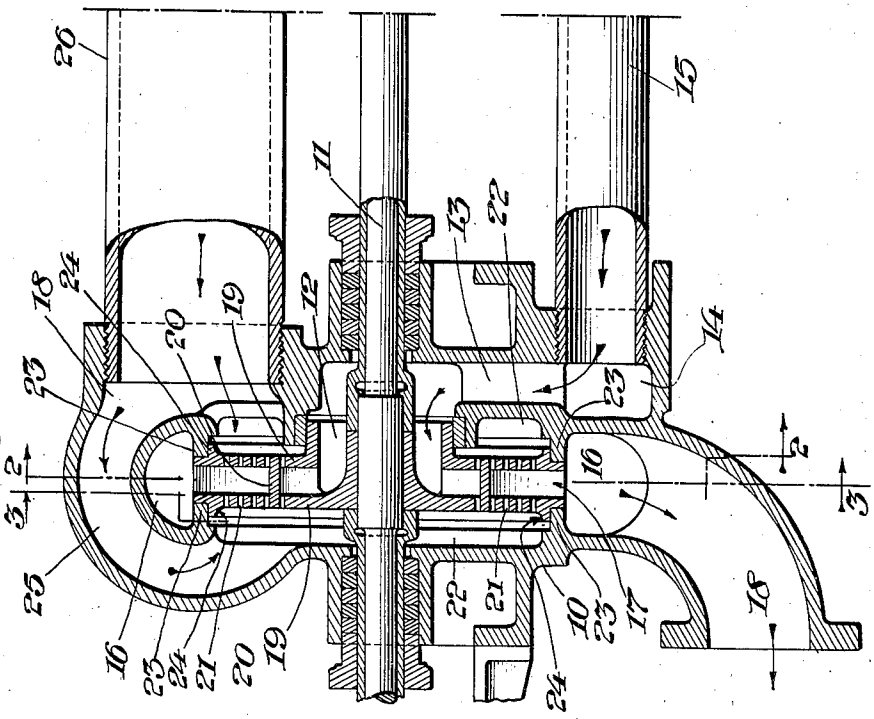
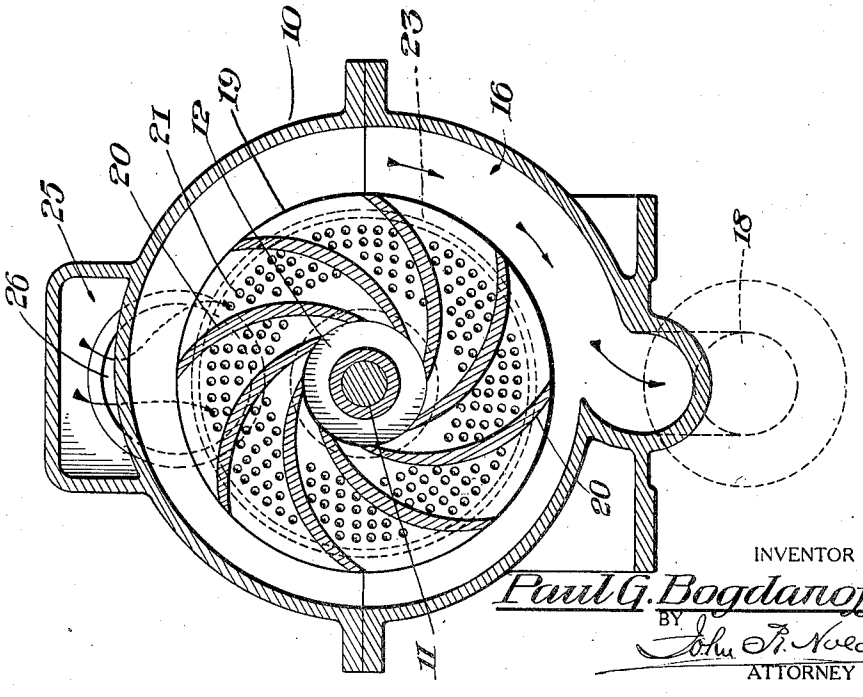


Fig. 2.



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Fig. 4.

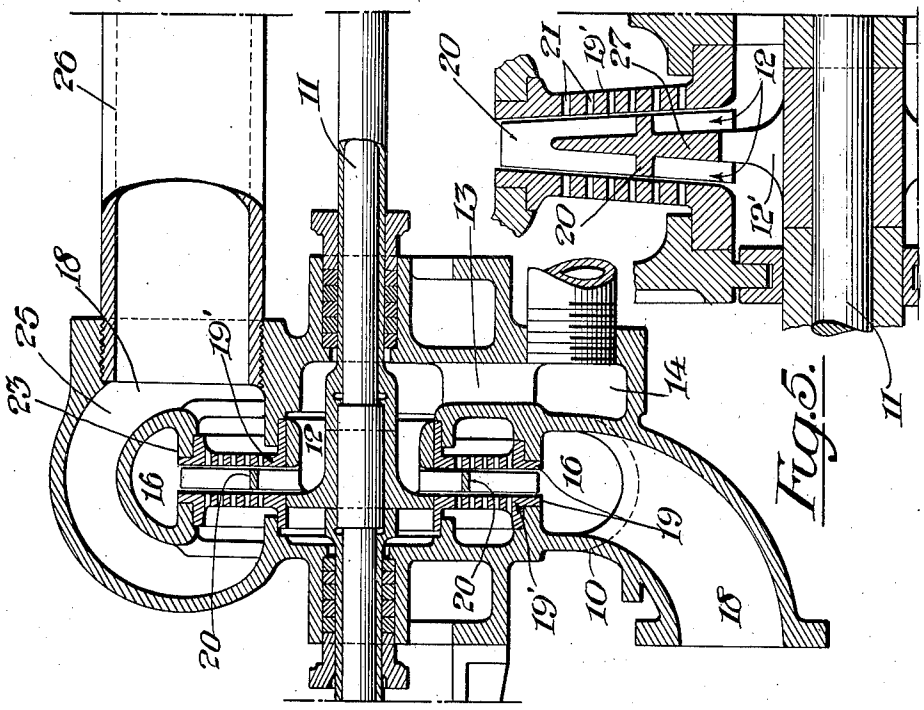
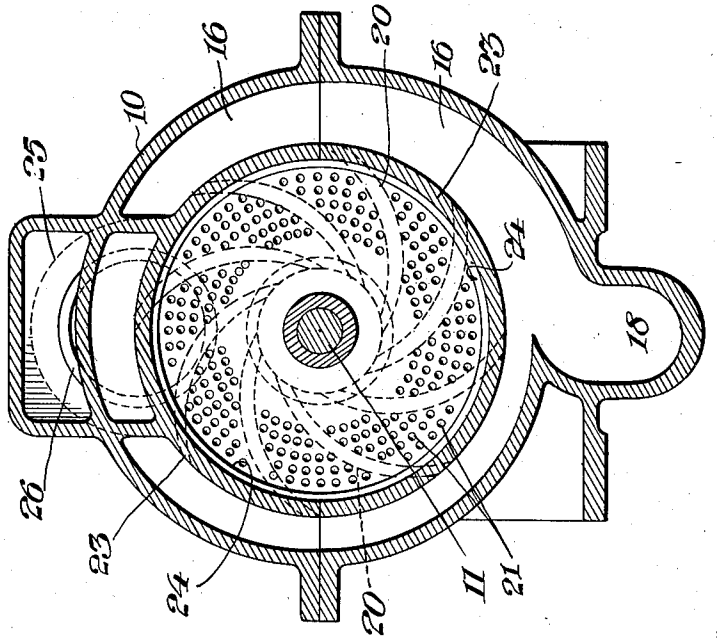


Fig. 5.

Fig. 3.



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Patented June 2, 1925. 1,540,530

UNITED STATES PATENT OFFICE.

PAUL G. BOGDANOFF, OF BLOOMFIELD, NEW JERSEY, ASSIGNOR TO BOGDANOFF-FRIEDMAN, INC., OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CENTRIFUGAL PUMP.

Application filed February 16, 1924. Serial No. 693,154.

To all whom it may concern:

Be it known that I, PAUL G. BOGDANOFF, a citizen of the United States, and resident of Bloomfield, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

This invention relates to centrifugal pumps wherein the kinetic energy of a current of water is utilized to exhaust an adjacent space containing air, vapor, steam, or other gaseous fluid; having reference, more especially, to the type of pumps wherein the fluid to be ejected is commingled with the motive liquid and discharged therewith.

The object of my invention is to provide a pump of simple and effective construction and operation whereby the contents of the space to be evacuated are injected directly into and uniformly commingled with the whirling body of water within, the impeller chamber; whereby the frictional resistance to the motive and gaseous fluids in their passage into and through the impeller chamber is reduced to a minimum; and whereby increased velocity of the fluid mixture, with correspondingly greater resultant efficiency of the apparatus, is attained.

The present invention has been especially designed for the purpose of evacuating conduits containing air, vapor, steam, or the like, but it is to be understood that the invention is equally applicable to compressors, condensers and analogous apparatus.

In the drawings—

Figure 1 is a longitudinal vertical section of a pump embodying a form of my invention.

Figs. 2 and 3 are transverse vertical sections of the pump, as on the lines 2—2 and 3—3, respectively, of Fig. 1.

Fig. 4 is a section, similar to Fig. 1, showing a modification of the impeller.

Fig. 5 is a partial section of another modified form.

Referring to the drawings, 10 designates a stationary casing through which centrally extends a power driven shaft 11 on which the rotary impeller is mounted. This impeller is provided adjacent its center with an annular opening 12 to which leads a duct 13 from an inlet 14 to which a water supply conduit 15 is connected, said duct and inlet being, in the present instance, formed in one side of the casing. The casing is also constructed with a volute chamber 16 which encircles the impeller chamber 17, and with a discharge outlet 18 to which the water that is drawn in at the center and thrown from the periphery of the impeller chamber by the action of the rotating impeller, is guided by the wall of the volute chamber.

The form of impeller illustrated in Figs. 1, 2 and 3 of the drawings, is of the closed type, and in pursuance of my invention, it comprises two spaced apart discal members 19 in and between which the vanes 20 are fixedly mounted, said members being transversely perforated, as at 21, to provide a multiplicity of ports in the major part of the space between the annular opening 12 and the periphery of the impeller.

The body of the casing is constructed to provide on the respective sides of the impeller chamber two annular chambers 22, the outer walls of which are provided with inwardly-disposed bearing flanges 23 upon which are rotatably seated concentric flanges 24 formed on the walls of the impeller. At a suitable location the outer walls of the chambers 22 are extended and spaced from the wall of the volute chamber to form a passage 25 which establishes communication between the lateral chambers 22. The passage 25 is connected with the conduit to be evacuated, such, for example, as the discharge pipe 26 of a reduced pressure system.

From the foregoing described construction it will be seen that a simple and efficient centrifugal pump is provided wherein the kinetic energy imparted to the body of water contained within the impeller operates to evacuate the lateral chambers 22, since the contents of the latter pass directly and uninterruptedly in maximum volume distributed through large areas into the respective sides of the impeller and so become entrained at once with the motive liquid, preparatory to the discharge of the mixture from the pump, and since also the motive liquid enters the impeller through an unobstructed path. Consequently the frictional resistance to the motive and gaseous fluids in their passage into and through the impeller is reduced to a minimum, which important result is efficiently contributed to by

the division of the incoming air, steam or vapor into two separate bodies flanking the impeller. Moreover, such division of the fluid, in conjunction with the provision for its injection through a multiplicity of closely-related ports directly into the respective sides of the impeller and between the central water inlet and the periphery of the impeller, not only ensures the utilization of the maximum available kinetic energy imparted to the water by the impeller, but it also tends to balance the impeller on its axis and to permit its rotation at great velocity with a proportionately reduced expenditure of primary motive force.

The impeller described may be an integral structure, or the vanes may be fastened to and between the two discal members 19; or, if desired, the impeller may comprise a series of vanes mounted to rotate between two stationary side walls 19′, as seen in Fig. 4, which walls are perforated similarly to the rotary discal members previously described.

In Fig. 5 I have shown a double form of open impeller mounted to rotate between the stationary side walls 19′, the vanes of said impeller being divided into two corresponding groups by a median partition, 27, having within the inlet of the tube portion a series of orifices 12′ which permit the ingress of the motive liquid to the respective groups of vanes.

It is to be noted that my invention is characterized by an impeller so constructed and so co-ordinated with the associated chambers of the apparatus as to accomplish the efficient results described; and that the encircling diffusers or the rotary or stationary air separating chambers heretofore employed in connection with the impellers of pumps of the class to which my invention relates are eliminated. It is also to be noted that in the operation of an apparatus embodying my invention any natural wear at the periphery or in the apertures of the side walls of the impeller tends to increase rather than to reduce the efficiency of the apparatus; and, further, that the friction on the outer surfaces of the walls of the impeller of the enclosed type is reduced in direct proportion to the reduced pressure in the lateral chambers 22, while the friction on the outer surfaces of the open type of impeller referred to is practically negligible.

It is to be understood that my invention is not limited to the specific structural details herein disclosed, as the construction may be modified within the principle of the invention and the scope of the appended claims.

I claim—

1. A centrifugal pump comprising an impeller chamber, an impeller therein having a central inlet, a stationary discharge chamber encircling the periphery of the impeller, and a vacuum chamber laterally of the impeller chamber and having direct and unobstructed communication through a multiplicity of colsely-related ports with the impeller chamber in and throughout the major part of the space between the central inlet and the periphery of the impeller, said vacuum chamber also having a fluid inlet portion.

2. A centrifugal pump comprising an impeller chamber, an impeller therein having a central inlet, a stationary discharge chamber encircling the periphery of the impeller, and a vacuum chamber having a suitably disposed inlet portion and having communication through a multiplicity of closely-related ports with each side of the impeller chamber in and throughout the major part of the space between the central inlet and the periphery of the impeller.

3. A centrifugal pump comprising an impeller chamber, an impeller therein having a central inlet, a stationary discharge chamber encircling the periphery of the impeller, and two vacuum chambers flanking the impeller chamber and connected by a supply passage at the wall of the discharge chamber, each of said vacuum chambers having communication through a multiplicity of closely-related ports with the respective sides of the impeller chamber in and throughout the major part of the space between the central inlet and the periphery of the impeller.

4. A centrifugal pump comprising an impeller chamber, an impeller therein having a central inlet and including a discal member provided with a multiplicity of closely-related transverse perforations leading directly into the interior of the said chamber in and throughout the major part of the space between the said inlet and the periphery of the impeller, a stationary discharge chamber encircling the periphery of the impeller, and a vacuum chamber whereof one wall includes the said perforated discal member, said vacuum chamber having a fluid inlet portion.

5. A centrifugal pump comprising an impeller chamber an impeller therein having a central inlet and including two discal members each provided with a multiplicity of closely-related transverse perforations leading directly into the interior of the said chamber in and throughout the major part of the space between the said inlet and the periphery of the impeller, two vacuum chambers flanking the impeller chamber and having one wall of each formed by the adjacent discal member, and inlet means for said vacuum chambers.

6. A centrifugal pump comprising an impeller chamber, an impeller therein having a central inlet and including two discal members, each provided with a multiplicity

of closely-related transverse perforations leading directly into the interior of the said chamber in and throughout the major part of the space between the said inlet and the periphery of the impeller, two vacuum chambers flanking the impeller chamber and having one wall of each formed by the adjacent discal member, said vacuum chambers connected by a common supply passage at the wall of the discharge chamber.

Signed at New York in the county and State of New York this 14th day of February, A. D. 1924.

PAUL G. BOGDANOFF.