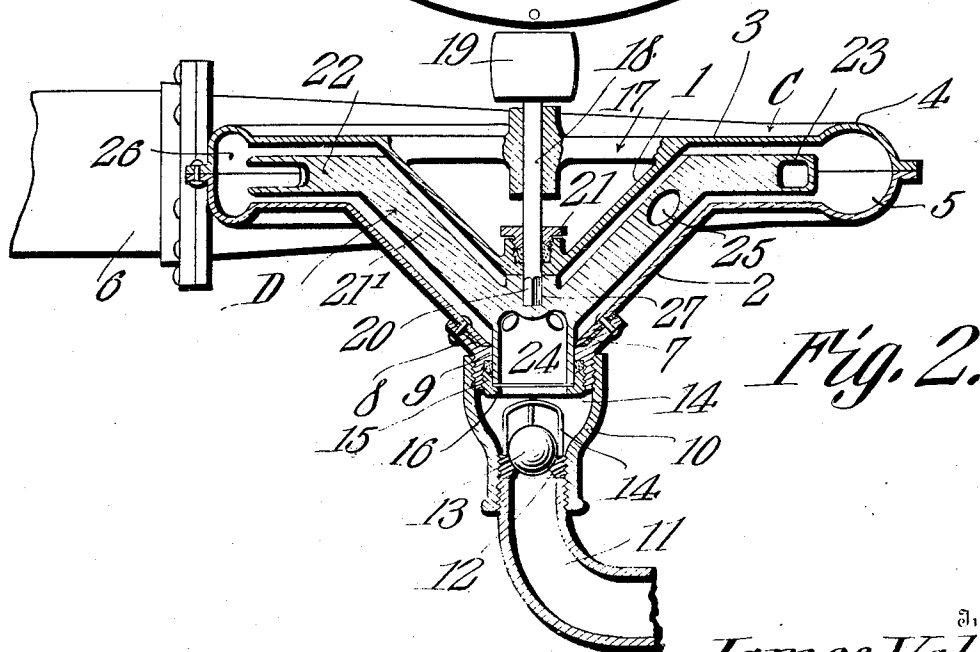
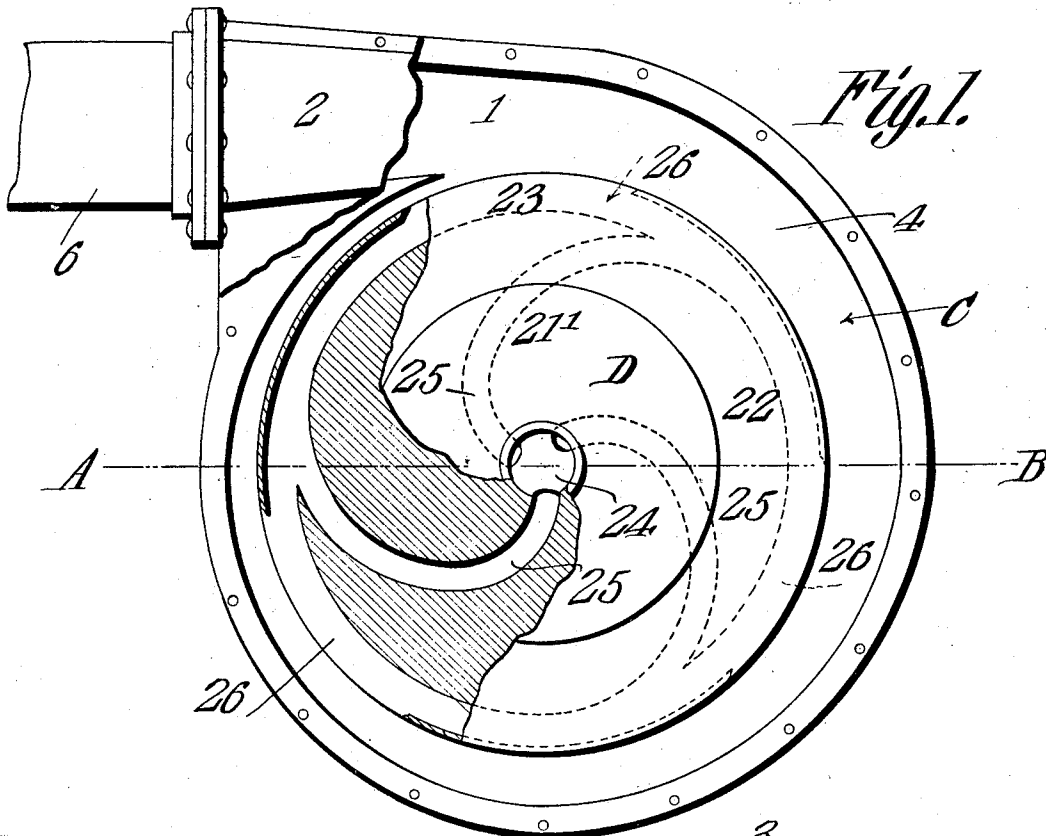


J. VALK.
CENTRIFUGAL PUMP.
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933,681.

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Inventor
James Valk.

Witnesses
E. J. Maurer
Herbert D. Lawson.

By *C. A. Snow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

JAMES VALK, OF TOPEKA, KANSAS.

CENTRIFUGAL PUMP.

933,681.

Specification of Letters Patent.

Patented Sept. 7, 1909.

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To all whom it may concern:

Be it known that I, JAMES VALK, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented a new and useful Centrifugal Pump, of which the following is a specification.

This invention relates to centrifugal pumps of that type utilizing a revolvable impeller constructed to receive at its center the liquid to be forced and to discharge the said liquid from the periphery of the impeller along substantially tangential lines.

The object of the invention is to so construct and arrange the parts of the pump as to reduce to the minimum the resistance caused by the friction of water upon the impeller.

Another object is to provide means whereby the passage of the water or other fluid to be forced is subjected to the minimum resistance within the impeller.

A still further object is to provide novel means for coupling the pump to the suction pipe thereof, said means including a valve designed to automatically close when the pump is inactive.

With these and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—Figure 1 is a horizontal section through a pump embodying the present improvement, the impeller being shown partly in plan and partly in section. Fig. 2 is a section on line A—B Fig. 1.

Referring to the figures by characters of reference C designates the casing of the pump, the same preferably consisting of similar spaced conical heads 1 and 2, each of which is surrounded by a flat annular portion 3 rounded at its periphery as indicated at 4, the two rounded portions being bolted or otherwise secured together at their outer edges to form a volute 5, from which the discharge pipe 6 extends. An opening 7 is formed at the apex of the head 2, and bolted to this head is a thimble 8 extending beyond the opening and having an inwardly directed flange 9 against which the head 2 abuts. This thimble is exteriorly screw-threaded and is engaged by a coupling member 10 into the outer end of which is

threaded the suction pipe 11 of the pump. A ring 12 is secured within the coupling 10 and upon the end of the suction pipe 11, and constitutes the seat of a ball valve 13 held against displacement by a spider 14 secured within the coupling 10. A ring 15 is threaded into the thimble 8 as shown particularly in Fig. 2 and has an inwardly directed flange 16 constituting an end bearing as hereinafter set forth.

Extending diametrically upon the concave face of the head 1 is a cross-bar 17 in the middle portion of which is journaled a shaft 18. This shaft has a pulley 19 at its outer end, while its inner end is provided with an angular head 20 located in the space formed between the two heads 1 and 2. It is of course to be understood that suitable means such as a gland 21 may be provided for preventing leakage through the head 1 at the point where the shaft 18 extends there-through.

Arranged between the heads 1 and 2 and their annular portions 3 is an impeller D of novel form. This impeller consists of a central conical portion 21' having an annular marginal portion 22, in which is formed a circular bore 23. A tubular extension 24 projects from the apex of the impeller and this extension communicates with the circular bore 23 through a series of preferably three passages 25 formed within the conical portion 21' and the annular portion 22 of the impeller, said passages being curved oppositely to the direction of rotation of the impeller so as to cause the discharge of liquid from said passages along lines substantially tangential to the direction of rotation of the impeller. Outlet openings 26 are formed in the periphery of the impeller at points between the outlets of passages 25, so that the fluid after leaving said passages will be directed longitudinally of the bore 23 until it reaches the nearest outlet opening 26. A socket 27 is formed in the middle portion of the impeller and is designed to receive the head 20 of shaft 18.

In operation the impeller D is rotated in any preferred manner through the pulley 19 and the shaft 18, the direction of rotation being indicated by the arrows in Fig. 1. The fluid to be forced is sucked through the pipe 11 and into the coupling 10 and thence through the tubular extension 24, from which it is discharged by centrifugal force through the passages 25. These passages be-

ing curved in the manner described will direct the fluid in streams along lines of least resistance, said streams entering the circular core 23 and traveling therein until they reach the nearest outlet openings 26, whereupon the liquid will be thrown outwardly into the volute 5, and thus discharged through the pipe 6. Importance is attached to the fact that the liquid upon entering the impeller is not immediately deflected along lines perpendicular to the axis of the impeller, but is, instead, conducted along lines gradually diverging from the inlet. The resistance resulting by friction of the fluid against the walls of the passages 25 is thus reduced to the minimum. By directing the fluid from the curved passages 25 and into the circular concentric bore 23 the resistance to the movement of the fluid is still further reduced.

It is of course to be understood that various changes may be made in the construction and arrangement of the parts without departing from the spirit or sacrificing the advantages of the invention.

Although the pump has been shown with the impeller disposed in a substantially horizontal position, it is to be understood that the same can be arranged in any other desired manner and it will operate as efficiently in one position as in any other in which it may be placed.

What is claimed is:—

1. In a centrifugal pump an impeller having a conical central portion and a flat annular portion, there being an inlet at the apex of the conical portion, and outlets in the periphery of the annular portion, said conical portion having curved passages for conducting fluid from the inlet to the outlets, said passages communicating within the impeller and adjacent the periphery thereof.

2. In a centrifugal pump a casing having a central inlet and a tangential outlet, and an impeller mounted for rotation within the casing and having a conical central portion and a flat annular portion, there being a circular passage within the impeller adjacent the periphery thereof and means for conducting fluid along curved lines from the middle of the impeller to said passage, there being outlets within the periphery of the impeller and opening from said passage.

3. In a centrifugal pump a casing having a central inlet and a tangential outlet, and an impeller mounted for rotation within the casing, said impeller consisting of a central

conical portion and an annular flat portion, there being an inlet at the apex of the conical portion and peripheral outlets, the impeller having a circular passage opening into the outlets, and curved passages for conducting fluid from the inlet to the circular passage.

4. A centrifugal pump comprising a casing having a central inlet and a tangential outlet, a valve for controlling the admission of fluid to the inlet, and an impeller mounted for rotation within the casing and consisting of a central conical portion and an integral flat annular portion, there being an inlet in the apex of the conical portion and outlets within the peripheral portion of the impeller, said impeller having a circular passage adjacent the periphery thereof and passages for directing fluid along curved lines from the inlet to the circular passage.

5. A centrifugal pump comprising a casing having a central conical portion and a flat annular portion there being an inlet in the apex of the conical portion and a tangential outlet in said annular portion, and an impeller mounted for rotation within the casing and consisting of a central conical portion, and a flat annular portion, there being an inlet within the apex of the conical portion and outlets within the periphery of the annular portion, and means for directing fluid along curved lines from the inlet and within the impeller to the outlets, said means communicating at points adjacent the outlets and within the impeller.

6. A centrifugal pump comprising a casing having a central inlet and a tangential outlet, and an impeller mounted for rotation within the casing, said impeller having a central conical portion and a flat annular portion, there being an inlet in the apex of the conical portion and outlets in the periphery of the annular portion, said impeller having a circular passage therein opening into the outlet, and passages for directing fluid along curved lines from the inlet of the impeller and through said impeller to the circular passage at points between the outlets.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES VALK.

Witnesses:

JAS. M. WALKER,
J. ROSS COLHOUN.