United States Patent

Price

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[54] **PUMP IMPELLER HOUSING WITH INTEGRAL FLOW REGULATOR**

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[52] **U.S. Cl.** **415/148,** 417/423, 138/46

[51] **Int. Cl.**.....**F04d 27/00,** F04d 25/06, F15d

[58] **Field of Search** 138/37, 40, 45, 46; 415/148, 415/121; 137/247.13; 417/423

[56] **References Cited**

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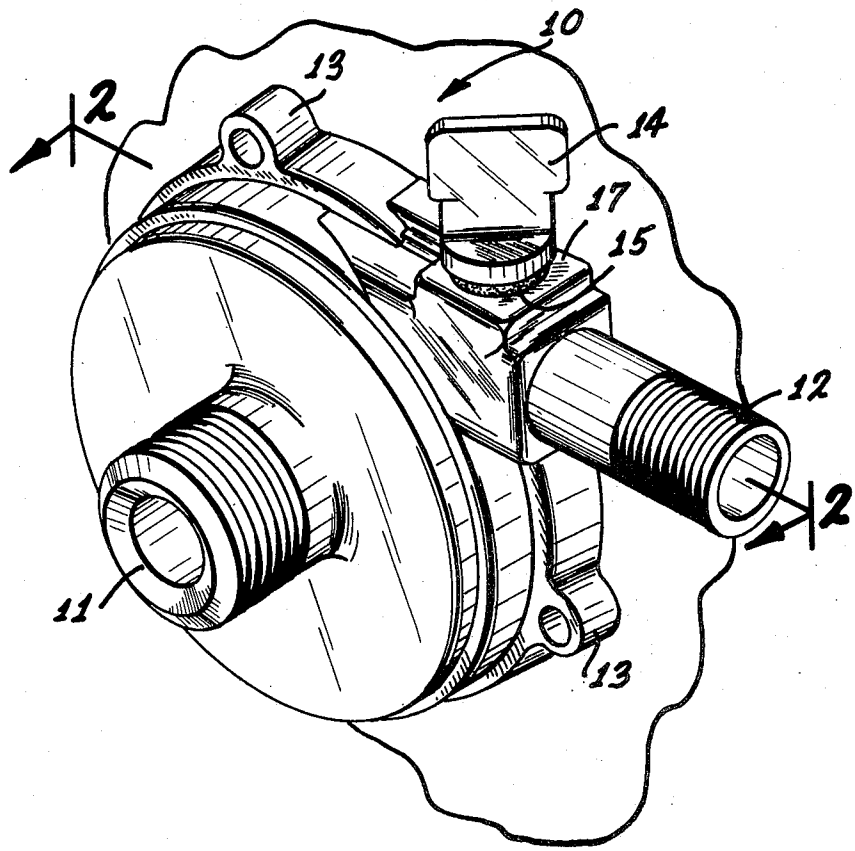
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Attorney—Gerald L. Price

[57] **ABSTRACT**

An impeller or rotor housing having an integral provision for selectively regulating the flow of fluid from a centrifugal or axial-flow fluid pump. A baffle mounted on the housing is selectively interposed and removed from the path of fluid. The baffle is sized and shaped in accordance with the design limits of the particular pump it is installed on whereby the rate of fluid flow when the baffle is in its maximum flow restricting position will be sufficient to prevent damage and erosive wear to the pump as a result of overloading the motor, heat or running dry.

2 Claims, 4 Drawing Figures



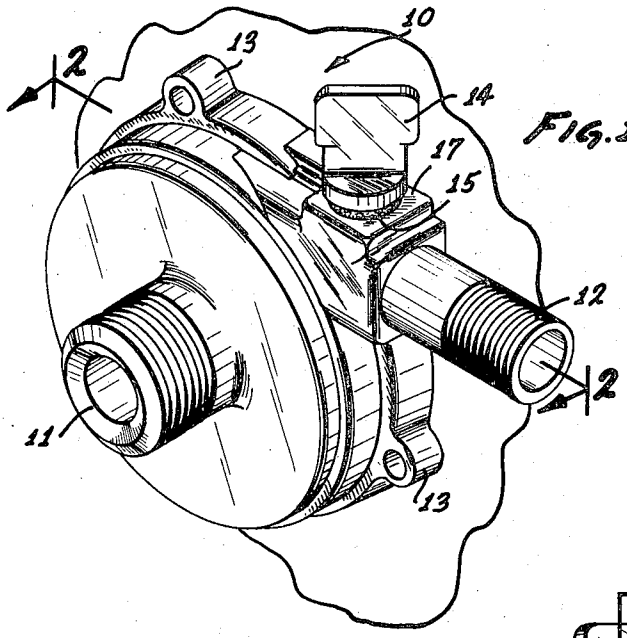


FIG. 1

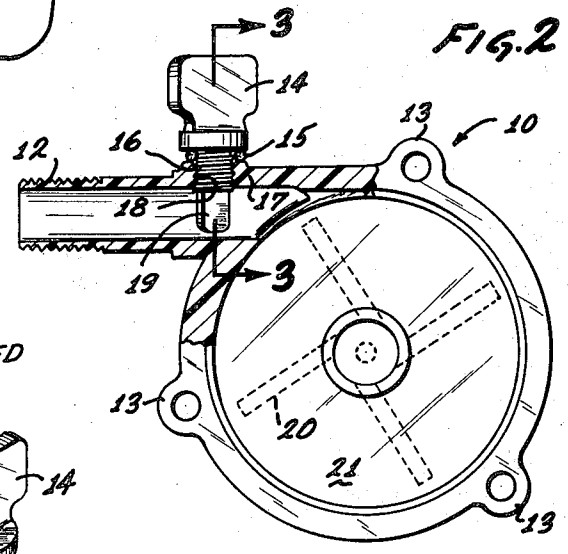


FIG. 2

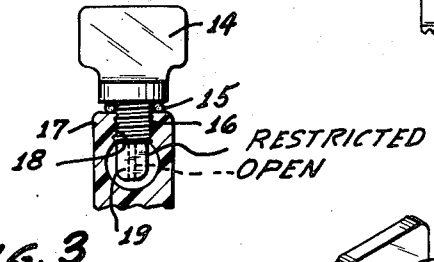


FIG. 3

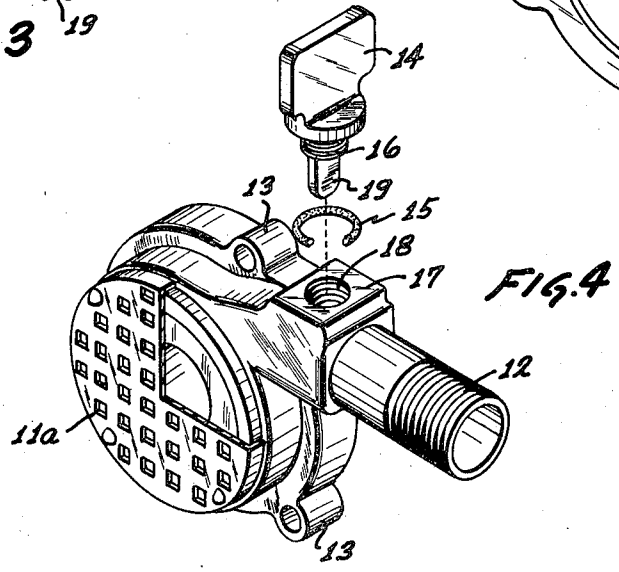


FIG. 4

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PUMP IMPELLER HOUSING WITH INTEGRAL FLOW REGULATOR

BACKGROUND OF THE INVENTION

The present invention relates generally to fluid pumps and more particularly, to an improved impeller or rotor housing for centrifugal and axial-flow types of fluid pumps with incorporate integral flow adjustment compatable with the particular characteristics of the associated pump.

Centrifugal and axial-flow fluid pumps are utilized for innumerable industrial, commercial and residential applications and accordingly are available or can be provided in a wide range of sizes and designs depending primarily on the capacity and pressure requirements of the particular application. Size, power requirements and/or limitations and the particular fluid to be pumped also are factors to be considered in pump selection.

A common characteristic of both centrifugal and axial-flow pumps is that if either of these types of pumps are designed to operate at optimum efficiency at a constant speed with respect to power input requirements usually expressed in horsepower and head output requirements usually expressed in feet of water, the restriction of the flow of fluid through the pump results in an increased load requirement on the motor driving the pump.

Accordingly, if the flow of a particular centrifugal or axial-flow pump is restricted so as to increase the load on the motor beyond the design parameters of the motor, the motor will overheat and very likely damage the windings or interior structure. In addition, if the flow of fluid through the pump is restricted to the point where substantially shut-off conditions exist, the absence of a flow of fluid in the impeller or rotor housing combined with the heat buildup from the overloaded motor results in the breakdown or damage to the shaft seal between the motor and impeller or rotor housing which can seriously damage the pump.

While it is possible to design centrifugal and axial-flow pumps with oversized motors and special bearings and seals that can readily handle a substantially restricted flow situation, the cost of providing such features would be prohibitive for many applications such as, for example, low cost pumps for water fountains, waterfalls and fish tanks which are becomming very widely used in homes and offices as a part of the decor.

Accordingly, it is the general aim of the present invention to provide a new and improved impeller or rotor housing for centrifugal and axial-flow fluid pumps which incorporates integral apparatus for flow adjustment that can restrict the fluid flow only within the design parameters of the associated pump.

It is another object of the invention to provide a device of the type described which is relatively low in cost, which adds relatively few parts compared to similar conventional pumps, and which eliminates the need for the installation of a valve or other type of flow restricting device as heretofore required with conventional pumps.

These and other objects and advantages of the invention will appear from the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an exemplary impeller housing for a centrifugal pump embodying the features of the present invention;

FIG. 2 is a sectional view, taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view, taken substantially along the line 3—3 of FIG. 2; and

FIG. 4 is a perspective view illustrating a modified impeller housing embodying the features of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

While the present invention is susceptible of various modifications and alternative constructions, the illustrative embodiments shown in the drawings will herein be described in detail, however, it should be understood that it is not intended to limit the invention to the particular forms disclosed.

Referring now to FIG. 1, an exemplary impeller housing for a centrifugal pump (the motor and motor housing of same not being shown) generally indicated at **10**, is illustrated, the housing including an inlet channel **11** provided with a threaded end for the attachment of standard pipe and tubing, an outlet channel **12** also externally threaded for the same purpose and a plurality of ears **13** for attaching the overall impeller housing **10** to the pump or motor housing (not shown). As shown in FIG. 2, the impeller **20** is sized and mounted on a shaft driven by the pump motor (not shown) so as to freely rotate within the interior **21** of the impeller housing **10** so as to expell fluid entering through inlet channel **11**, from outlet channel **12** at an increased head.

In accordance with one of the important aspects of the present invention, provision is made for selectively restricting the flow of fluid from the outlet channel **12** of the impeller housing **10**. To accomplish this, an adjustable flow regulating control **14** (FIGS. 2, 3 and 4) including a baffle plate **19** rotatably mounted in the path of fluid passing through the interior of outlet channel **12** is provided at an enlarged portion **17** of the outlet channel **12**.

In the exemplary apparatus, the baffle plate **19** is interposed in the path of fluid passing through outlet channel **12** is rotatably mounted by virtue of the flow regulating control **14** being provided with a threaded portion **16** adapted to be inserted in threaded well **18** provided in the outlet channel **12** at the enlarged rectangular portion **17** provided for this purpose.

It will be readily apparent by referring further to FIGS. 2, 3 and 4 that only a turn of about 90 degrees is required of the flow regulating control **14** once it is threadably seated in the well **18** to fully rotate baffle plate **19** between its open and restricted position as depicted by full and broken lines in FIG. 3. In order to maintain the flow regulating control **14** in a seated condition in both the aforestated open and restricted positions and to prevent fluid leakage through the well **18**, an **0**-ring **15** is provided between the enlarged outlet portion **17** and the portion of the flow regulating control **14** external of the impeller housing **10**.

In conventional installations where it is desired to be able to regulate the fluid flow or where a flow rate less than that delivered by a particular pump is desired, various methods are employed to permanently or selectively restrict the output flow. The most common of these methods is the installation of a conventional valve, hose clamp, or passage of reduced diameter in the fluid conducting channel connected to the output side of the pump. While flow restrictions can also be accomplished at the input side of the pump, in many types of installation the pump is submersed in the fluid it is pumping so that the input side is not accessible. In FIG. **4**, a modified inlet channel **11***a* is provided on the exemplary impeller housing **10** which is intended for such submersible applications where the fluid enters directly into the inlet of the housing **10**.

From the foregoing discussion, it will be readily apparent that by employing various flow restricting methods not specifically designed for use with the particular pump being used, in addition to the added cost of having to provide separate flow restricting apparatus and installing same, damage and a substantial decrease in the operating life of the pump is likely to occur if the flow is diminished to a point where as previously brought out, an excessive loading is placed on the motor, or where the shaft seal between the motor and the impeller is operated at excessive heat and without adequate lubrication from the water in the impeller housing **10**.

In accordance with another important aspect of the present invention, provision is made for selectively restricting the flow of a centrifugal or axial-flow pump only within the operative limits of the pump to prevent damage or excessive wear from occurring as previously discussed. In furtherance of this aim, the baffle plate **19** (FIGS. **2** and **3**) of the flow regulating control **14** which is interposed in the path of fluid passing through outlet channel **12**, is sized and shaped so when it is positioned in its restricted position as depicted by full lines in FIG. **3**, the fluid flow will only be diminished within limits dictated by the design of the particular pump.

Thus, the present invention provides a pump of the centrifugal or axial-flow type with integral flow regulation within the design characteristic of the particular pump and accordingly eliminates the need for purchasing and installing additional flow regulating apparatus in a fluid moving application.

I claim:

1. In a motor driven centrifugal pump of the type adapted to be driven by a constant speed motor and which requires a minimum fluid flow therethrough in order to prevent the motor from running under dry and unloaded conditions and from overheating beyond the normal design limits of the pump, apparatus including:

a motor;

a motor housing in which said motor is mounted;

a centrifugal pump operatively connected to said motor and including an impeller adapted to be driven by said motor;

a pump housing in which said pump is confined, said housing defining an interior chamber sized and shaped so as to operatively accommodate said impeller;

inlet conduit means defining a path for fluid entering said interior chamber;

outlet conduit means defining a path for fluid exiting said interior chamber to an outlet, said outlet conduit including a well integral therewith adapted to receive said flow restricting means interposed in the path of fluid flow in said outlet conduit for reducing the rate of fluid flow from said outlet means;

said flow restricting means comprising a shaft rotatably mounted on said outlet conduit means and a baffle plate mounted on said shaft, said baffle plate being selectively movable between two extreme positions namely, a "restricted" position wherein said baffle plate is substantially perpendicular to the path of fluid flow and there being a clearance between said baffle plate and said outlet conduit permitting at least a minimum rate of fluid flow necessary to prevent the pump from overheating beyond its normal design limits, and an "open" position wherein said baffle plate is substantially parallel to the path of the fluid flow permitting maximum flow with minimum restriction, thereby insuring that fluid is present in said pump housing at all times for cooling at least a portion of said motor housing adjacent to said pump housing and thereby preventing damage to the pump as a result of overheating.

2. The apparatus as set forth in claim **1** wherein said baffle means further includes grippable means external of said housing secured to said shaft for rotating said shaft.

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