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Ask

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[54] **SELF-PRIMING HIGH-PRESSURE PUMP**

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[52] **U.S. Cl.** ..... **415/53,** 415/53 T, 415/204, 415/213 T

[51] **Int. Cl.** **F04d 5/00**

[58] **Field of Search** ..... 415/53, 53 T, 204, 415/213 T

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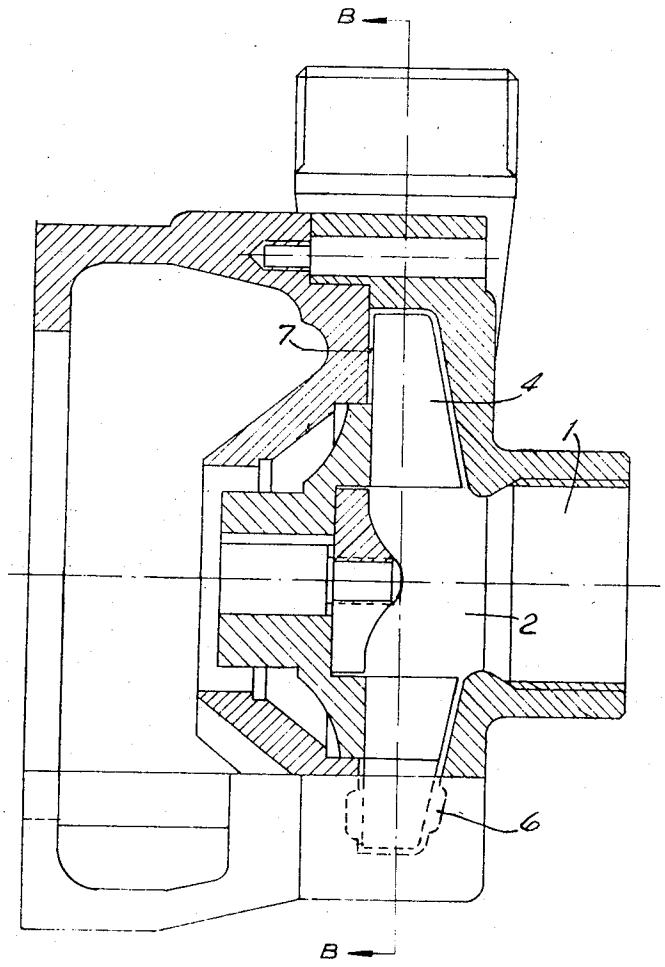
[57] **ABSTRACT**

The outlet of the pump housing has an increasing area and extends as a side-channel into the pump housing around a part of the periphery of the rotating impeller in such a way that direct communication exists between the side-channel and the inlet of the pump housing.

2 Claims, 2 Drawing Figures



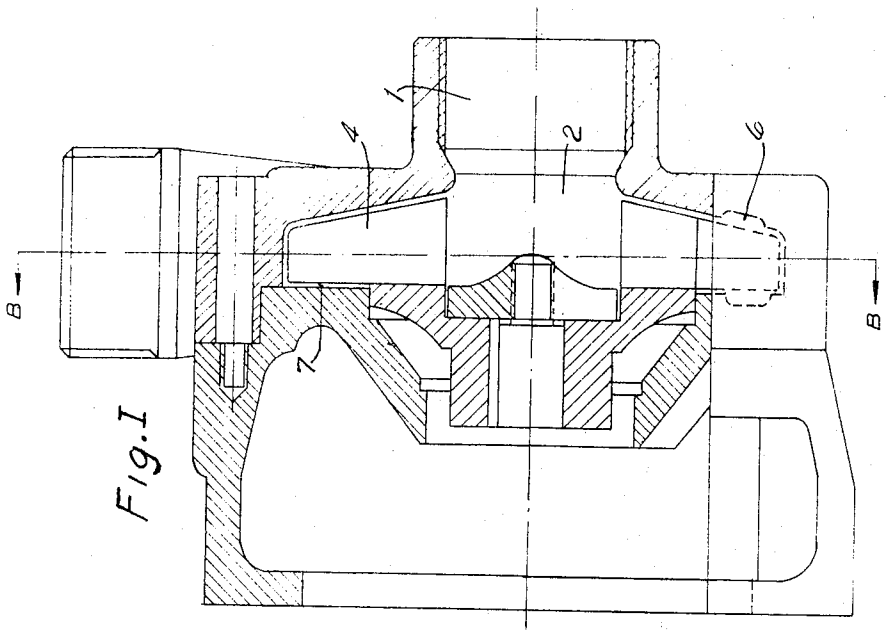


Fig. I

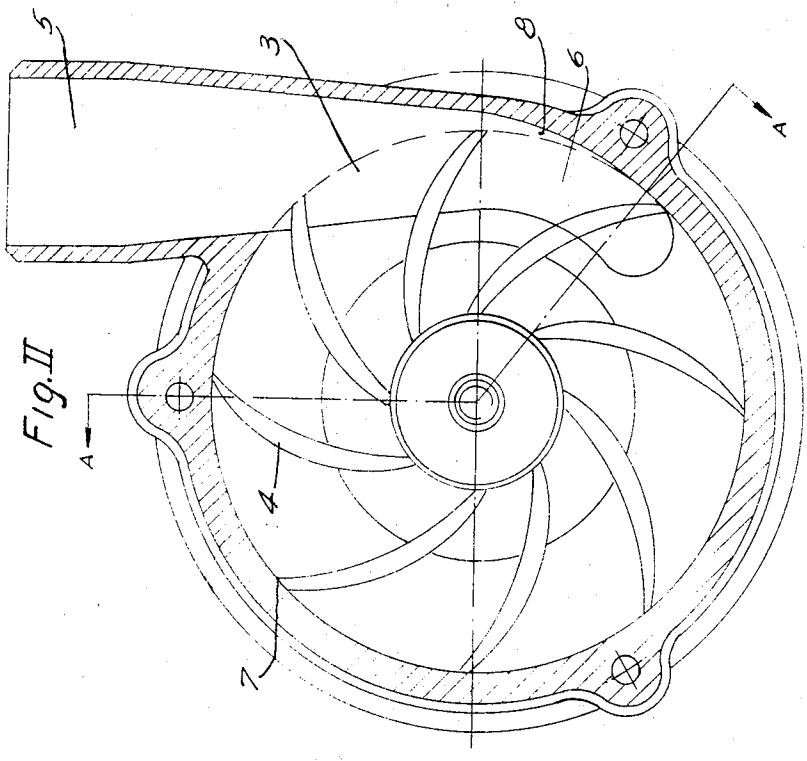


Fig. II

SELF-PRIMING HIGH-PRESSURE PUMP

Centrifugal pump is the usual name given to a pump with rotating impeller, a central inlet, and, surrounding the impeller, a pump housing with an outlet in the periphery. This type of pump is comparatively cheap and has a large capacity in relation to its size.

It has several disadvantages, however. It has a relatively low head and it lacks the capacity to evacuate a suction pipe or to pump air-mixed fluid.

Another type is the annular water pump in which both inlet and outlet are arranged in the pump housing. Such pumps have a high pressure, but have the disadvantage that they very quickly become worn and thereby lose head. This type of pump, therefore, is unsuited for use for polluted water.

The invention relates to a combination of these two types, whereby a pump is obtained which, in comparison with centrifugal pumps, has a very high head, is self-priming, has a high capacity in relation to its dimensions and, compared with the annular water pump, is comparatively insensitive to pollution.

The invention is described below with reference to the attached drawings.

FIG. **1** shows a longitudinal section through the pump and

FIG. **2** a section perpendicular to the section in FIG. **1.**

In the figures **1** denotes the inlet of the pump, **2** the inlet in the impeller, **3** the outlet opening in tee pump housing, **4** the blades of the impeller, **5** the pump outlet, **6** a side-channel arranged in the pump housing and directly passing into the pump outlet, while **7** and **8** denote the fit of the impeller in the pump housing at two different points.

When the impeller rotates, the end points of the blades **4** immediately adjacent to the inner wall of the pump housing move along the entire periphery except at the outlet opening **3.** The pumped medium is drawn into the centre of the pump at **1** and, as a result of the rotation, is thrown outwards between the blades **4** towards the periphery. The pumped medium is then carried forward by the blades with constantly rising velocity towards the side-channel **6** and then out through the outlet **5.**

With centrifugal pumps problems arise already at the suction into the impeller. The distance between the blades must be fairly small in order to prevent too great a volume flow through the pump. This causes problems, as the pump readily becomes clogged by solid particles. In the present invention the capacity of the channel in the pump housing is limited to the outlet opening. The channels of the impeller can thus be made large and voluminous, which reduces the risk of clogging of the pump and also of cavitation. The housing of centrifugal pumps is generally so dimensioned that it can receive considerably more water when the counter-pressure for the pump falls. This implies that centrifugal pumps, especially those with radial blades, always have a power consumption which exceeds their capacity. For the pump to cover the entire curve, therefore, it must be equipped with a motor which can cope with its maximum power consumption. This makes the cost of the entire motor-driven pump unit high.

With a high head for a centrifugal pump the spiral housing is too large for the pumped volume flow, so that the efficiency drops sharply since the diffusor is unable to cope with the water and convert its kinetic energy into pressure energy. Owing to the large pump housing, which lies entirely outside the impeller, the pump has a considerably greater weight than a pump according to the invention. In the present invention the problems associated with the spiral housing have been solved through the fact that it is simply eliminated. Instead, prior to the outlet, the pump has been given a short side-channel with gradually increasing volume. This side-channel gives the pump excellent self-priming properties, and the pump has been found to be able to absorb a large quantity of air in the water without, as centrifugal pumps normally do, losing its pumping capacity. As a result of the side-channel the same function is obtained at the periphery as in an ejector when the pumped medium is a mixture of gas and fluid, owing to direct communication between the ejector and the suction side of the pump between the impeller blades. The forced flow in the side-channel, with each blade acting on the water, ensures a high water velocity in the outlet which is converted to pressure by the diffusor. In this way a considerably higher pressure is obtained than with a centrifugal pump with the same impeller diameter and revolutions. The smaller outlet also limits the maximal volume flow which the pump can produce. The outlet opening from the impeller can therefore be limited to the desired size in such a way that the power consumption of the pump as function of the volume flow is almost identical for all heads, so that there is no risk of overloading of the motor. Through this design a very good result is obtained when the the same pump is to be used both as fire pump and bilge pump.

What is claimed is:

1. In a fluid pump having a pump housing, an impeller with centrifugal blades disposed for rotation within the housing, a fluid inlet communicating with a central region of the impeller, and a fluid outlet communicating with a peripheral region of the housing, the improvements characterized by:

a. the pump housing being substantially cylindrical

b. the fluid outlet being substantially tangential to the periphery of the housing, and

c. at least one arcuate channel in a side of the pump housing disposed adjacent the path of travel of the outer extremities of the centrifugal blades, said channel extending around a relatively small portion of the pump housing and fairing directly into the fluid outlet.

2. A fluid pump a defined in claim **1** wherein there are two arcuate channels of substantially the same configuration disposed in opposite sides of the pump housing.

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