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Speck et al.

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[54] **CIRCULATING PUMP**

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[58] **Field of Search**.....415/121, 53, 196, 197, 200, 415/199 R, 201, 215, 213

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[57] **ABSTRACT**

This disclosure teaches a pump especially suitable for use in conveying liquids which contain fibrous components or other components which may clog pumps. The pump has a suction part and a pressure part both joined fixedly to an intermediate part to form a suction chamber and a pressure chamber respectively. The suction chamber is provided with a filter removable via a filter opening with a transparent cover plate. An impeller and a hard disk are mounted in the pressure part and are removable via an impeller opening provided in the suction part.

8 Claims, 2 Drawing Figures

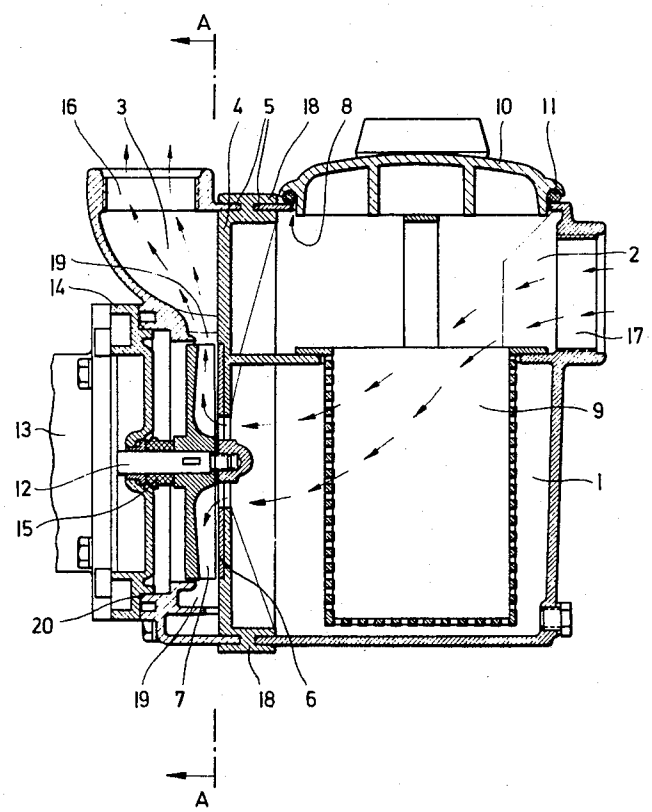
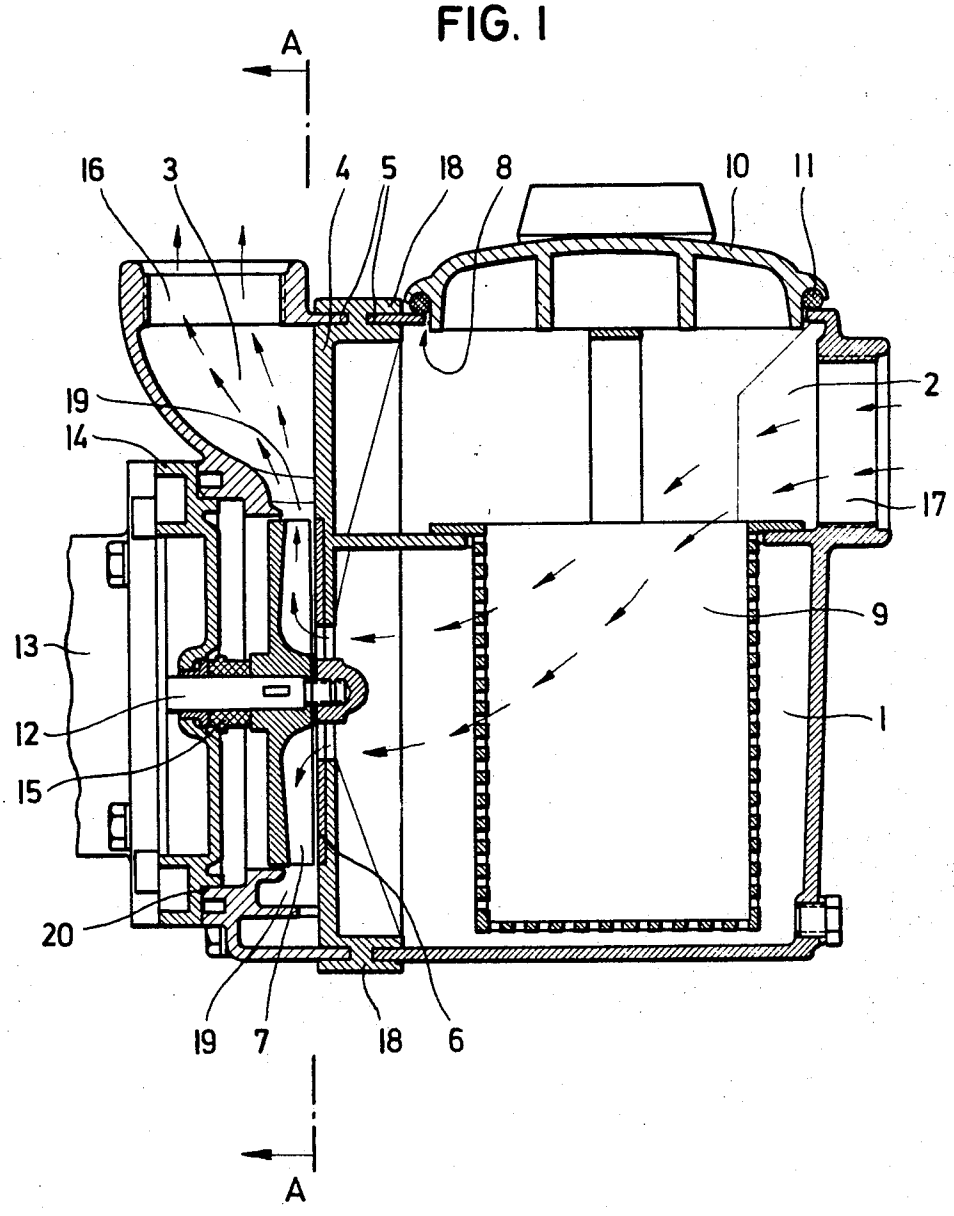
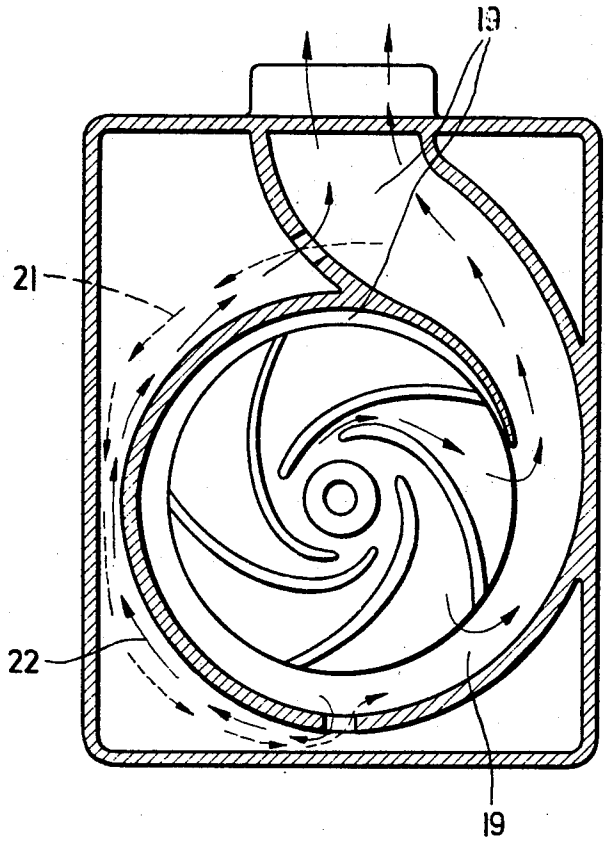


FIG. 1



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FIG. 2



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CIRCULATING PUMP

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a pump and especially to a circulating pump for conducting water through a filter for use in a swimming pool.

2. Description of the Prior Art

It is known to cast pump housings in one piece with cores provided to define two chambers, i.e. a suction chamber and a compression chamber as they are required for conventional circulating pumps. Such a casting process, however, is expensive. Furthermore, quantity production can be carried out only with relatively corrodable materials. Manufacture of such pumps using materials which do not corrode, for use in swimming pool applications, is not possible because of economic reasons.

In addition the conventional pump housings are usually bolted. As a result thereof, distortion and/or buckling of the housing may occur due to expansion or to pressure surges which may be introduced by water hammer.

Attempts have been made to provide circulating pumps which can be produced in an economical manner, which are rust proof, corrosion resistant, and which are of simple design. However, these attempts have been of limited success heretofore.

SUMMARY OF THE INVENTION

Accordingly, one object of the present invention is to provide a corrosion-resistant circulating, normal, or self-priming pump, suitable for swimming pool applications, of simple design which can be manufactured inexpensively. The circulating pump according to the present invention is provided with a housing which is formed from two parts, namely a suction part and a pressure part. Between these two parts there is provided an intermediate part. The suction part and the pressure part are joined to the intermediate part in a non-detachable manner and without packing or sealing elements in a substantially distortion-resistant arrangement. The pump housing, as well as an impeller, the filter, and a cover plate (which can be removed for cleaning) are all made of corrosion-resistant material, preferably a suitable plastic and/or corrosion-resistant metallic material.

According to one advantageous embodiment of the present invention, the suction part and the pressure part are inserted into circular grooves provided in the intermediate part. Suction part, pressure part, and intermediate part may also be joined to each other by cementing and/or by welding.

A removable filter is inserted into an opening which is provided in the suction part of the pump housing. Said opening can be closed by a cover plate for cleaning. The cover plate may consist of transparent material so that the degree to which the filter is clogged, can be determined from the outside. In order more readily to be cleaned, the impeller is preferably designed as a vane-type impeller without a cover plate.

According to another embodiment of the present invention there is a non-rotating hard disk of resin impregnated glass fibers (such as heat-stabilized polyamide **6,6** reinforced by 25 percent of glass fiber) mounted in the pressure part of the pump casing opposite the impeller. Other glass-reinforced thermoplastics and metals may be used also in this service.

The motor which drives the impeller may form a structural unit with said impeller or it may be fastened to the pump housing by means of a mounting flange. The motor may be of the water or liquid meter type with mechanism and indicator operating wet, i.e., a submerged water meter or, respectively, as a water or liquid meter type with mechanism and indicator operating dry. When using such a liquid meter type motor, the mounting flange serves as a support for the bearing ring and packing which seals a suitably arranged driving shaft.

It is an especially advantageous feature of the pump according to this invention that the impeller and the filter can be exchanged without having to dismantle the pump housing. The pump according to this invention thus represents a light weight, rust proof, corrosion resistant circulating pump, especially useful for swimming pools that can be manufactured readily and economically and can be installed and/or removed conveniently. When using plastic material in its construction, this pump produces considerably less noise than those used heretofore. This pump also has a longer service life than those used heretofore.

Other objects of this invention and advantageous features thereof will become apparent as the description proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be described hereinafter in greater detail by referring to the attached drawing in which

FIG. **1** illustrates a preferred circulating pump according to the present invention in cross-sectional view and

FIG. **2** is a cross-sectional view taken along line A—A of FIG. **1**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawing, pump housing **1** is constructed essentially of three parts, namely suction part **2** which embraces a suction chamber, pressure part **3** which embraces a pressure chamber, and intermediate part **4**. Said intermediate part **4** connects the suction part with the pressure part. Intermediate part **4** is joined to said suction part **2** and said pressure part **3** in a manner resistant to distortion and without the use of packing elements. The parts to be joined, i.e. suction part **2** and pressure part **3**, are inserted into two slots or grooves **5** which are provided opposite each other in peripheral rim **18** of intermediate part **4**. Parts **2** and **3** are firmly joined to intermediate part **4** by cementing (for example using joined plastic dissolved in ethyl ketone) and/or by welding. Any other suitable connecting technique can be used, provided the cemented (or welded) joints have a strength of at least 80 percent to 90 percent of the extruded or otherwise formed materials.

Such a construction results in a homogeneous stress distribution so that plastics of the acrylonitrile-butadiene-styrene polymer type (such as one with a tensile breaking strength of not less than 420 kp/sq.m. at 23° C. according to ASTM/D 638–61 T, a bending

strength with no breaking at 23° C. according to ASTM/D 790–61, and a Young's Modulus at 23° C. 22000 kp/cm² according to ASTM/D 636–61 T) can be used for the housing. The tensile strength of said acrylonitrile-butadiene-styrene polymer type thermoplastics is of the magnitude whereby a self-supporting pump housing of uniform stress resistance provides optimums from both structural and economic points of view. Other suitable thermoplastics, which are capable sufficiently of being connected, can also be used.

Hard disk **6** is provided in pressure part **3** at the zone of maximum wearing stress located in front of vane-type open impeller **7**. This zone is dimensioned so that its service life corresponds to that of the rest of the pump. Hard disk **6** is preferably made of a polyamide impregnated glass fiber, such as heat-stabilized polyamide **6,6** reinforced by 25 percent of glass fibers. Other glass-reinforced thermoplastics and metals may also be used for this service. Thus, hard disk **6** is resistant to wear. All the parts of the pump which are in contact with water can be made economically and if desired of corrosion-resistant materials. The pressure part **3** is also provided with a peripheral volute **19** for delivering water to outlet **16**.

Opening **8** is provided in suction part **2** of pump housing **1**. Filter **9** is inserted into suction part **2** through opening **8**. Cover plate **10** which closes opening **8** and which can be removed for cleaning suction part **2** is preferably made of a transparent material (such as plexiglass) so as to accommodate inspection of the degree of clogging of filter **9** from the outside as well as inspection of the pumping operation. Sealing of housing **1** and cover plate **10** is achieved by O-shaped ring **11**. Another O-shaped ring **20** is provided in the stuffing assembly. As seen in FIG. **2**, dashed arrows **21** illustrate suction and solid arrows **22** illustrate pressurizing.

The disadvantage encountered with conventional circulating pumps which are provided with a closed box-type impeller is that in this application they tend to become choked quite readily. This tendency is reduced by employing a vane-type impeller with rearwardly leaning radial vanes according to the present invention. A non-rotating hard disk **6** is attached to intermediate part **4**. Hard disk **6** is replaceable and is of considerably harder material than impeller **7**. This feature is of importance for a proper functioning of the pump because vane-type impeller **7** can be replaced more readily than the non-rotating hard disk **6**.

Impeller **7** is connected with motor **13** by means of shaft **12**. Motor **13** can be of the water meter type with mechanism and indicator operating wet or of said type operating dry. When using a dry operating motor **13** which is attached to pressure part **3** of the pump housing by means of flange **14**, a slide ring packing **15** must be used.

The specific construction of the pump according to the present invention renders it possible readily to pull out motor **13** and shaft **12** with impeller **7** from pump housing **1** whereby neither pressure connection **16** nor suction connection **17** need be dismantled from the pipe system. Likewise filter **9** can be removed from the pump housing by simply removing cover plate **10**.

Because plastic materials are here used for the housing, even at subfreezing temperatures the pump housing will not be damaged although filled with water that freezes therein.

We claim:

1. A self-priming circulating pump especially suited for use with a swimming pool and comprising in combination:

a housing which includes an intermediate part, a suction part that encloses a suction chamber and connectable via an intake to a source of water, a pressure part enclosing a pressure chamber and provided with a discharge;

the intermediate part provided with a suction groove and a pressure groove, the suction part defining a tongue mountable in the suction groove for joining the suction part rigidly to the intermediate part, the pressure part defining a tongue mountable in the pressure groove for joining the pressure part rigidly to the intermediate part;

the suction part provided with a filter opening, a filter arranged in the suction chamber for passage of the water therethrough, a filter-opening cover engageable to the suction part about the filter opening for passage of the filter therethrough;

an impeller journalled for rotation in the housing and operatively arranged for receiving the water from the suction chamber and pressurizing it, drive means connected to the impeller for turning it;

the pressure part provided with a peripheral volute arranged substantially within the pressure chamber and positioned about the impeller and in flow communication with the discharge;

the impeller including a plurality of rearwardly leaning vanes defining channels therebetween and arranged for flow communication with the suction chamber and for delivering the liquid to the volute;

the pressure part provided with an impeller opening for accommodating passage of the impeller therethrough, the pressure part having a flange about the impeller opening and adapted for mounting of the drive means thereon;

the volute having a first port remote from the discharge and communicating in flow series with the pressure chamber and the discharge having a second port communicating in flow series with the pressure chamber whereby a portion of the water circulates through the pressure chamber between said ports.

2. The pump of claim **1** with

the intermediate part a plate having a continuous raised rim at its peripheral margin,

the suction groove and the pressure groove formed in the raised rim.

3. The pump of claim **2** with

the impeller in a plane substantially parallel to the plate and arranged for rotation about an axis normal thereto,

a disk made of a material substantially harder than the impeller and mounted on the plate in proximity with the impeller,

the impeller opening adapted to pass the disk.

4. The pump of claim **3** with the filter-opening cover made of a transparent material.

5. The pump of claim **4** with

the circular plate and the disk each defining an opening axial relative the impeller,

the impeller having an axial inducer penetrating through the opening of the circular plate and the disk into the suction chamber.

6. The pump of claim 5 with the drive means and the impeller organized as a structural unit.

7. The pump of claim 3 wherein the disk is mounted opposite the impeller in the pressure chamber.

8. The pump of claim 7 with the disk made of glass-fiber reinforced plastic.

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