Title: WATER PUMP (CIRCULATION PUMP) USING NO RETAINER

Abstract: A water pump using no retainer, including: a first casing (10) including a plurality of coils (12) fixed at the interior thereof and a first protrusion unit formed at one side; a second casing including a second protrusion unit (21) for supporting a bearing (42) at one side thereof, a cylindrical unit (20) connected with the second protrusion unit, a discharge pipe (25) formed at an opposite portion and made of nonmagnetic iron, and assembled with the first casing (10) by a bolt; an axis (40) having a core (41) inserted into the cylindrical unit (21) of the second casing; an impeller (50) fixed by the bolt while inserting into the casing; a third casing (30) including a suction pipe (71), and assembled by the bolt and the nut; and, bearing holder (64) which is assembled in the third casing (30) and supported by the bearing hole for engaging the bearing.
WATER PUMP (CIRCULATION PUMP) USING NO RETAINER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a water pump (circulation pump) using no retainer.

2. Description of the Related Art

Generally, it is necessary to use a water pump for the sake of moving the fluid such as the water or the oil from any place to other place. However, a conventional water pump has a retainer assembled at both sides of an impeller. Here, the above retainer prevents the fluid such the water or the oil which penetrates the water pump from being leaked out to the exterior of the water pump as well as supports the axis. However, since the retainer has not good durability, it can use for the long time. Accordingly, according as the retainer becomes to be tired and old, the fluid penetrating the water pump is leaked out. Also, since the retainer operates the friction force to the axis, the load is generated and consumption of the energy is generated. Further, when the retainer becomes old, the vibration and the noise are caused in the case of rotating the axis. As well, water leakage is generated. Therefore,
an old retainer must be frequently replaced with a new retainer and at this time, the water pump must be stopped, so that it is not economic to use it. That is, the conventional water pump has many problems in that it is not economic on account of several reasons as described above, the pumping efficiency is lowered, and the water leakage is caused accordingly. Also, the conventional water pump uses the impeller made of casting. Thus, it has many problems in that the weight of the impeller is heavy, the consumption of the energy is increased, the number of vanes of the impeller is less than six, and the pumping efficiency is not excellent. Furthermore, since the conventional water pump uses heavy impeller, the durability of the retainer is reduced.

**BRIEF DESCRIPTION OF THE DRAWINGS**

A more complete appreciation of this invention, many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings, in which like reference symbols indicate the same or similar elements components, wherein,

FIG. 1 is a side view for reference according to the present invention:

FIG. 2 is a sectional view illustrating the construction of the present invention:

FIGs. 3 and 4 are sectional views illustrating lines 1-1 and 2-2
of FIG. 2:

FIG. 5 is a separated side view illustrating impeller according to the present invention; and,

FIG. 6 is a side view illustrating a bearing holder according to the present invention.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention for solving the above problems to provide a water pump using no retainer.

It is another object of the present invention to provide a water pump using an impeller assembled with iron plate instead of an impeller made of casting.

These and other objects can be achieved according to the present invention with a water pump using no retainer, comprising: a first casing including a plurality of coils fixed at the interior thereof and a first protrusion unit formed at one side; a second casing including a second protrusion unit for supporting a bearing at one side thereof, a cylindrical unit connected with the second protrusion unit, a discharge pipe formed at an opposite portion and made of nonmagnetic iron, and assembled with the first casing by a bolt; an axis having a core inserted into the cylindrical unit of the second casing; an impeller foxed by the bolt while inserting into the casing; a third casing including a suction pipe, and
assembled by the bolt and the nut: and, bearing holder which is assembled in the third casing and supported by the bearing hole for engaging the bearing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, a preferred embodiment of the present invention will be in detail explained with reference to the accompanying drawings. Further, in the following description, the necessary description for understanding the present invention are set forth to provide a more thorough understanding of the present invention. It is noted that a detailed description of known functions and constructions unnecessarily obscuring the subject matter of the present invention has been omitted in the following description for clarity.

FIG. 1 is a side view for reference according to the present invention, where first, second, and third casings is cylindrical, totally. A discharge pipe is protruded at the upper portion of the second casing and a suction pipe is formed at the side surface of the third casing, thereby being capable of sucking the fluid. Also, the first, second, and third casings are assembled by bolts or bolts and nuts with one another.

FIG. 2 is a sectional view illustrating the construction of the
present invention, where a coil 12, an axis 40, and a core 41 have the construction similar to/same as that of a conventional motor and an impeller 50 is assembled at the axis like the construction of the conventional motor. However, the present invention has characteristics including no retainer. That is, while being only supported by bearings 42 and 43, the axis 40 is rotated. Also, the bearing 42 is fixed at the inside of the second casing and the bearing 43 is fixed at a bearing holder 60 assembled at the inside of the third casing. The bearings and the bearing holder are fixed by snapping, naturally.

The second casing is made of the nonmagnetic iron such as brass or bronze and plays the role on making the magnetic field between the core 41 and the coil 12. Here, now that there exists no tarnish on the nonmagnetic iron by the fluid such as the water flowing in the second casing, the durability of the present invention can be improved. Meanwhile, it is regardless to make the first casing and the third casing of the nonmagnetic iron.

It is preferable to make the impeller 50 of the present invention of stainless plate having less than 1mm thickness. Also, the thickness of a side plate 51a having a boss 53a formed thereon is preferably thicker than that 51 positioned in opposite portion. A vane 54 of FIGs. 5 and 2 and two side plates 51 and 51a are assembled with one another by riveting method and the length of the vanes 54 is long and short, that is, various. Further, the vanes
54 are assembled by ones in turn. Now that the impeller made as
stated previously has very light weight than the casting material
and the number of the vanes are very many, the pumping
efficiency is shaped excellently in comparison with the casting
material in the range of being supplied with the equal energy.

The bearing holder 60 according to the present invention
comprises outer wheel and inner wheel as shown in FIG. 6 and
the bearing 43 is fixed at the inner wheel. Furthermore, a plurality
of holes 64 are formed between the inner wheek and the outer
wheel and the fluid inflowed through the suction tube of one third
casing is passed

As explained hereinbefore, when the power supply is applied to
the present invention, the axis 40 is rotated. Therefore, the fluid
for example the water is sucked through the suction pipe 31 and a
hole 64 of the bearing hoier, as well as discharged in a cylindrical
unit 21 of the second casing and the protrusion unit 22. At the
same time of that, the fluid is conveyed through the discharge pipe
23 of the second casing by the rotation of the impeller. That is,
while the fluid inflowed into the third and second casings are all
contacted to the impeller, the axis, the core, the bearing, and the
bearing holder, the axis and the core are rotated in the fluid. This
corresponds to the constructive features of the present invention
using no retainer.
As may be apparent from the foregoing, the present invention has the construction for pumping while rotating the axis, the core, and the impeller in the fluid without any retainer. Therefore, since the present invention uses on retainer and uses the impeller where the friction force is not applied to the axis, the weight is light, and the pumping efficiency is good, the pumping efficiency is increased in contrast with the conventional water pump as well as there are little water leakage. Conclusively, because the durability of the pump is largely improved and the noise and the vibration generated by the abrasion of the retainer are nearly removed, the driver can drive the car safely.

While there have been illustrated and described what are considered to be preferred embodiments of the present invention, it will be understood by those skilled in the art that various changes and modifications may be made, and equivalents may be substituted for elements thereof without departing from the true scope of the present invention. In addition, many modifications may be made to adapt a particular situation to the teaching of the present invention without departing from the central scope thereof. Therefore, it is intended that the present invention not be limited to the particular embodiments disclosed as the best mode contemplated for carrying out the present invention, but that the present invention includes all embodiments falling within the scope of the appended claims.
WHAT IS CLAIMED IS:

1. A water pump using no retainer, comprising:
   a first casing including a plurality of coils fixed at the interior thereof and a first protrusion unit formed at one side:
   a second casing including a second protrusion unit for supporting a bearing at one side thereof, a cylindrical unit connected with said second protrusion unit, a discharge pipe formed at an opposite portion and made of nonmagnetic iron, and assembled with said first casing by a bolt:
   an axis having a core inserted into said cylindrical unit of said second casing:
   an impeller fixed by said bolt while inserting into said casing:
   a third casing including a suction pipe, and assembled by said bolt and said nut; and,
   bearing holder which is assembled in said third casing and supported by said bearing hole for engaging said bearing.

2. The water pump as recited in claim 1, wherein said axis is rotated while being only supported by two bearings.

3. The water pump as recited in claim 1, wherein said impeller is comprised of:
   a first side plate having a hole formed at the center thereof, a plurality of holes for assembling vanes;
a second side plate having a boss formed at the center thereof and a plurality of holes for assembling said vanes; and,

said vanes having protrusion pins for engaging to said plurality of holes of said first side plates, where said protrusion pins are formed at upper and lower portions of said side plates.

4. The water pump as recited in claim 3, wherein said side plates and vanes are assembled with one another by riveting method.

5. The water pump as recited in claim 3, wherein said vanes are assembled to be radial, and long vanes and short vanes are assembled in turn.

6. The water pump as recited in claim 3, wherein the thickness of said side plates and said vanes are less than 1mm and said second side plate is heavier than the weight of said second side plate.

7. The water pump as recited in claim 1, wherein said bearing holder is comprised of:
   an outer wheel contacted with inner surface of said third casing;
   an inner wheel having a groove for inserting a bearing; and,
a plurality of holes between said outer wheel and said inner wheel.

8. The water pump as recited in claim 1, wherein the fluid inflowed through said suction pipe of said third casing into said second casing is discharged to said cylindrical unit and said protrusion unit of said second casing.
# INTERNATIONAL SEARCH REPORT

## CLASSIFICATION OF SUBJECT MATTER

**IPC**¹: F 04 D 13/06; F 04 D 29/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

**IPC**²: F 04 D; H 02 K

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**EPDOC, WPI, PAJ**

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>WO 87/00362 A1 (TURBANISCH) 15 January 1987 (15.01.87) totality, especially fig.1.</td>
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☐ Further documents are listed in the continuation of Box C.  
☒ See patent family annex.

* Special categories of cited documents:  
  "A" document defining the general state of the art which is not considered to be of particular relevance  
  "E" earlier application or patent but published on or after the international filing date  
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  "O" document referring to an oral disclosure, use, exhibition or other means  
  "P" document published prior to the international filing date but later than the priority date claimed

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Kohlmarkt 8-10; A-1014 Vienna  
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