Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The present disclosure relates generally to a water pump and, more specifically, to a water pump comprising a reservoir.

Background

Engines such as internal combustion engines comprise an engine block and a cooling circuit for cooling the engine block and the various parts included therein such as pistons and drive shafts. A water pump will be included in the cooling circuit for circulating a coolant through the cooling circuit.

A water pump will comprise a drive shaft extending through a pump housing, which shaft is born by a bearing and sealed against the housing by a seal. At a side internal to the housing an impeller will be connected to the shaft, whereas to the opposite side of the shaft a pulley or drive wheel will be connected for driving the impeller. When the engine is driven the shaft will be rotated by the pulley, forcing the coolant through the cooling circuit by the impeller. A small amount of the coolant will be forced from the cooling circuit past the seal, lubricating the seal, bearing and shaft. To prevent the coolant from being spilled over the engine a weep reservoir may be provided, collecting the coolant passing the seal. An evaporation hole may be provided, connecting the weep reservoir with the environment. Since the water pump will be provided at a relatively hot side of the engine, the coolant will evaporate from the weep reservoir through the evaporation hole.

In European Patent Application 1 748 193 (the "193 application") a water pump is described having such a configuration. In this known water pump the weep reservoir is formed in a frontal part of the water pump housing. It has a cylindrical shape and has an open front end, closed off by a plug. A channel extends from the area around the shaft and seal into the reservoir for draining coolant passing the seal into the reservoir. An evaporation opening is provided above the plug, connecting the reservoir with the environment, shielded by the pulley.

Although the reservoir of the "193 application can collect coolant to be evaporated, the volume of the reservoir is limited by the depth and cross section of the reservoir defined by the cast part. Coolant collected in the reservoir may spill through the evaporation hole in the liquid phase, for example when the engine is moved in any direction, when the engine is tilted or when the engine is not heated properly to a temperature sufficient for evaporating the coolant at a sufficient rate. This means that coolant may leak from the reservoir in liquid form and spill onto the engine or any surrounding surface. This can lead to corrosion and pollution or give the false impression that the water pump or cooling circuit is not operating properly. Furthermore, in order to provide for a reservoir large enough, the casting may be complicated and require a relatively large amount of metal, leading to undesirable manufacturing costs and weight and a large overall size of the pump housing. Moreover, for different engines a different size of weep reservoir may be required, leading to a number of pump housings, identical except for the size of the weep reservoir.

The international application published as WO 02/064958 A discloses an internal combustion engine with a direct camshaft driven coolant pump, the cooling pump comprising a reservoir for accumulating coolant from a seal assembly through a slot in the pump housing and evaporating the coolant through one or more vents. The reservoir is a separate component from the housing and secured thereto in operative relation. The reservoir may be constructed of a different material than the material used for the housing of the cooling pump. In case the seal assembly fails and coolant completely fills up the reservoir, coolant will fill up the space around the seal, and can escape through an overflow hole provided there.

The disclosed water pump is directed to address at least one of the problems set forth above.

Summary of the Invention

In one aspect, the disclosure is directed to a water pump. The water pump includes a pump housing and a reservoir. A first portion of the reservoir can be provided in the pump housing. A second portion of the reservoir is made as a separate part. The second portion has an internal volume that is in fluid communication with the first portion.

In another aspect, the present disclosure is directed to a set of a pump housing and a reservoir part. The pump housing comprises a first portion of a reservoir. The reservoir part forms a second portion of the reservoir and is made as a separate part from the pump housing and has an internal volume.

In still another aspect, the present disclosure is directed to a method of pumping fluid. The method includes drawing a fluid into a pump housing and pressurizing the fluid in the housing. At least part of the fluid is directed to a seal and bearing, whereby at least part of the fluid is forced past the seal. At least part of that fluid is collected in part of a reservoir coupled to the pump housing. At least the part of the reservoir in which the fluid is collected is heated and the fluid collected therein is evaporated.

Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

Brief Description of the Drawings

Fig. 1 is a frontal elevation view of a water pump; Fig. 2 is a cross sectional view of the water pump of fig. 1 taken along the line A - A;
Detailed Description

Referring to Fig. 1 and 2, an exemplary embodiment of the current disclosure shows a water pump 1 attached to the frontal side 2 of an engine block 3, only part of which is shown. The engine block can be of an engine of any type, such as an internal combustion engine running on for example gas, diesel, natural gas, kerosene or bio fuel. In this disclosure reference will be made to a water pump 1 although other liquids and mixtures than water can and normally may be pumped with the water pump, such as but not limited to glycol and glycol solutions and other commonly available coolant fluids. The water pump 1 has a pump housing 4 which can be cast from metal such as iron, aluminum, magnesium or steel or alloys thereof. The pump housing 4 is provided with a number of openings 5 through which it can be bolted to the engine block 3. A cover 6 is provided on the pump housing 4, closing an open side 7 of the pump housing 4. At least one opening 8 is provided in the pump housing 4 allowing fluid communication between part of a coolant circuit 9 in the engine block 3 and an inner volume of the pump housing 4.

At a side 11 of the pump housing 4 a bearing housing 12 is provided. A shaft 13 extends through the bearing housing 12 and is born in the bearing housing 12 by a bearing assembly 14. A primary seal assembly or seal 15 is provided in the pump housing 4, sealing at one side against the shaft 13 and at the opposite side against the pump housing 4. The seal 15 is provided between the inner volume 10 and the bearing assembly 14. At the side of the bearing assembly 14 facing away from the seal 15 a toothed wheel 16 is provided on the shaft 13. The toothed wheel 16 is or can be brought into engagement with a drive mechanism (not shown) for rotating the shaft 13. In an embodiment the drive mechanism can comprise a shaft such as but not limited by a cam shaft, crank shaft or an auxiliary shaft, having a toothed wheel engaging the toothed wheel 16. In another embodiment a drive wheel such as a pulley can be attached to the shaft 13 at an end facing away from the engine block 3, outside the pump housing 4, for driving the pump 1 for example by a belt which belt can in an embodiment be driven by a pulley attached to a shaft such as a crank shaft of the engine 3. In an embodiment such belt can also drive a dynamo. Within the inner volume 10 of the pump housing 4 an impeller 17 mounted to the shaft 13. The impeller 17 is enclosed in a pump chamber 18 in the pump housing 4. An inlet 19 is provided in the pump housing 4, in fluid communication with the pump chamber 18. The opening 8 opens into the pump chamber 18.
shown a sealant such as a glue can be provided between the inner side wall 41 of the rim portion 30 and the outside of the wall 27 between the open end 35 and the rim 38. In such embodiment the rim portion 30 can form a first coupling 42 and the wall part 43 of the second portion 31 between the rim 38 and the open end 35 can form a second coupling 44.

[0020] A channel 45 extends between an inlet end 46 at the reservoir 24 and an outlet end 47 in a surface of the pump housing 4. The outlet end 47 can form or be in communication with an evaporation opening 48. In the detail shown in Fig. 3 the outlet end 47 is positioned in a recess 49 in the face 50 of the pump housing 4 behind the cover 6. The recess 49 opens to a side 51 of the pump housing 4 and defines the evaporation opening 48. The channel 45 can have a longitudinal axis 52 extending at an angle $\alpha$ relative to a longitudinal axis 53 of the first portion 25. The angle $\alpha$ is preferably such that the channel 45 runs slightly upward in the direction of the outlet end 47 and can for example be between about 90 and 110 degrees. The inlet end 46 of the channel 45 can be close to or even directly adjacent to the top face 28. Alternatively the inlet opening 46 can be in the top face 28. In general the inlet opening can be above the lower most part of the reservoir 24, preferably above the end wall 35 of the second portion 31 and more preferably above the second portion 31.

[0021] As is shown in Fig. 2 a ventilation channel 54 can be provided at an upper part of the pump housing 4, connecting the space 22 with the environment 55 of the pump housing. Ventilation channel 54 can extend substantially vertically from the space 22 to a top 56 of the pump housing 4 and can extend as a tangent of the space 22.

[0022] The inner volume $V_1$ of the first portion 25 can for example be between about 0 and 12 cubic centimeter (cc), preferably between about 0 and 6 cc. In a preferred embodiment the first volume $V_1$ can be between about 2 and 5 cc. The second volume $V_2$ can for example be between about 1 and 12 cc, preferably between about 1 and 10 cc, more preferably between about 1 and 8 cc. In a preferred embodiment the second volume $V_2$ can be between about 2 and 5 cc. The total volume $V$ of the reservoir 24 can for example be between about 5 and 20 cc, preferably between about 6 and 15 cc. In a preferred embodiment the volume $V$ can be between about 7 and 14 cc. The internal volume $V_1$ of the first portion can be defined by the volume enclosed within the part of the wall 27 extending between the top face 28 and the shoulder 39. The internal volume $V_2$ of the second portion 25 can then be defined by the volume enclosed within the outer wall thereof. In this disclosure the word about has to be understood as meaning that at least a deviation of 10% of any given value is also disclosed, unless specifically indicated otherwise.

[0023] With a pump housing 4 of a given configuration, for example as shown in fig. 1 - 3, different second portions 31 can be used, as long as they have a second coupling 44 that can be coupled with the first coupling 43 of the first portion 25. This means that different second portions 25 having different internal volumes $V_2$ can be used with the pump housing 4 for providing reservoirs 24 having different volumes $V$, shapes and/or dimensions. Furthermore, second portions 25 made of different materials and or using different techniques can be used. Any one of the second portions 25 and a pump housing 4 can form a set 57 allowing the formation of a reservoir with a specific size and configuration, suitable to for example a specific engine or use.

[0024] In an embodiment the volume $V$ of the reservoir can be almost entirely formed by the volume $V_2$ of the second portion 25. The rim portion 30 will then be directly adjacent the top face 28.

[0025] In a further embodiment the reservoir may have a longitudinal axis 34 extending substantially parallel to the shaft 13, providing for easy casting. In an embodiment the first and/or second portion can be non symmetrical or non cylindrical, or can for example be somewhat bottle shaped, having a neck portion formed by the second coupling 44 and a wider body, formed by the portion between the coupling 44 and the end wall 34, which can provide for a larger volume $V$ with a shorter overall length $L_1$.

Industrial Applicability

[0026] During the operation of the water pump 1 the shaft 13 is driven rotating within the bearing 15. This may be effected by a gearing between a rotating shaft (not shown) of the engine 3 and the toothed wheel 16. The shaft 13 rotates the impeller 17 in the pump chamber 18, which is at least partly filled with coolant. By the rotation of the impeller 17 coolant is drawn into the pump chamber 18 from the coolant circuit 9, through the inlet 19, and is pressurized in the chamber 18. Most of the pressurized coolant may then be forced out of the chamber 18 by the impeller 17. Part of the coolant is forced past the seal 15 into the space 22 between the bearing assembly 14 and the seal 15, lubricating the seal 15, the bearing assembly 14 and the shaft 13 at least to some extend. The coolant that has passed the seal 15 and entered the space 22 can be drained from the space 22 through the channel 20 and be collected in the reservoir 24. This prevents the coolant to be spilled directly on the engine or into the environment, preventing corrosion or pollution and preventing an unfounded belief that the engine, especially the water pump 1 would be leaking. This could stop for example unnecessary stopping of the engine and thus loss of operation time, undue repair or replacement of the water pump and general annoyance for the users. Moreover, if coolant were spilled in liquid form it could also lead to interference with for example engine management, which could also lead to for example loss of operation time and avoidable repairs and costs. 

[0027] In an exemplary embodiment as shown in the drawings, coolant that has passed the seal 15 and is collected in the reservoir 24 will for the most part be col-
lected in the lower part of the reservoir, which is formed by the second portion 31. Since the reservoir 24 can be mainly positioned near a front end of the engine or at least near the engine at a relatively hot position when the engine is running, heat from the engine 3 will heat up the reservoir 24 and the coolant collected therein. This coolant can therefore evaporate and escape from the reservoir in gaseous phase, through the channel 45 and the evaporation opening 48, passing the recess 48.

[0028] In an embodiment the second portion 31 can have a heat capacity substantially lower than the first portion 25. This can lead to the effect that even at relatively low engine temperatures the second portion 31 can be heated enough to make the coolant collected therein evaporate.

[0029] A water pump 1 according to this disclosure can be used with any type of engine and in any type of vehicle or machine. It has been recognized that some engines, vehicles or machines desire a larger reservoir than other engines, vehicles or machines. For example, when a machine or vehicle is used on terrain leading to large elevations or on rough surfaces or even at accelerations or decelerations of the engine, a smaller reservoir of the prior art may lead to spilling of liquid coolant through an evaporation opening. Even if the volume of this prior art reservoir would be sufficient to hold all coolant collected therein when the engine would be stationary. Increasing the overall size and volume of such known reservoir integrated in the pump housing might solve such problem to some limited extend, but would lead to an unnecessarily large, expensive and heavy water pump, which would be hard to manufacture, if at all possible.

[0030] Embodiments of a water pump 1 according to this disclosure can be manufactured by any method of manufacturing, for example casting a pump housing 4 which includes the first portion 25 of the reservoir 24 as an integral part. The first portion 25 can be relatively shallow, which enables easy and secure, exact manufacturing. The first portion 25 can moreover be relatively small in diameter, allowing positioning thereof in a part of the pump housing 4 being relatively narrow in width. Nevertheless the overall volume V of the reservoir can be made relatively large, using a second portion 31. Furthermore, a set 57 of a pump housing 4 and a second portion 31 can be chosen on the basis of for example the intended use of the water pump and of the vehicle or machine in which an engine 3 has to be used bearing the water pump 1. For example when it is expected that the engine or a vehicle or machine equipped therewith will be used on rough terrain or at steep elevations a second portion 31 can be chosen having a relatively large volume V2, resulting in a large overall volume. If the same or another type of engine, machine or vehicle will normally be used on a smooth surface or stationary, without any significant elevation, a smaller second portion 31 may be sufficient, reducing the overall volume, weight and cost of such water pump 1.

[0031] Although the preferred embodiments of this invention have been described herein, improvements and modifications may be incorporated without departing from the scope of the following claims.

### Claims

1. A water pump for attachment to an engine block, comprising:
   - a pump housing (4); and
   - a weep reservoir (24) having first and second portions (25, 31), the first portion (25) of the reservoir (24) being provided in the pump housing (4) and the second portion (31) of the reservoir (24) having an internal volume in fluid communication with the first portion (25), wherein the first portion (25) is cast with the pump (4) housing, the second portion (31) of the reservoir (24) is a part made separate from the pump housing, and the reservoir (24) is connected to a space (22) between a bearing assembly (14) and a seal (15) of the water pump by a channel (20).

2. The water pump of claim 1, wherein the second portion (31) is made of at least one of sheet metal and plastic.

3. The water pump of claim 1 or claim 2, wherein the first portion (25) includes an opening (29) and a first coupling (42) and the second portion (31) is provided with a second coupling (44) that cooperates with the first coupling (42) and that retains the second portion (31) in position at the opening (29).

4. The water pump as in claim 3, wherein the first and second couplings (42, 44) are designed for at least one of a press fit connection and a sealant connection.

5. The water pump as in any one of claims 1-4, wherein the second portion (31) is manufactured by forging.

6. The water pump as in any one of claims 1-4, wherein the second portion (31) is manufactured by molding.

7. The water pump as in any one of claims 1-6, wherein the first portion (25) has a first volume (V1) and the second portion (31) has a second volume (V2).

8. The water pump as in any one of claims 1-7, further including an evaporation opening (48) provided at a level above a lower end of the second portion (31), preferably above the second portion (31).

9. The water pump as in any one of claims 1-8, wherein
the first portion (25) has an internal volume (V1) between about 0 and 12 cc, preferably between about 0 and 6 cc and more preferably between 2 and 5 cc.

10. The water pump of claim 9, wherein the internal volume (V) of the reservoir (24) is between about 5 and 20 cc, preferably between about 6 and 15 cc and more preferably between 7 and 14 cc.

11. The water pump of any one of claims 1-10, wherein the second portion (31) has a lower heat capacity than the pump housing (4).

12. A set of a water pump according to anyone of claims 1 to 11, comprising a first portion (25) of a weep reservoir (24), and second portions (31) of the weep reservoir (24), the second portions (24) each being a part made separate from the pump housing, which can be coupled with the first portion (24).

13. The set of claim 12, wherein the second portions (31) are made of at least one of sheet metal and plastic.

14. The set of claim 12 or 13, wherein the second portions (31) have different internal volumes (V2).

15. A method of pumping fluid, comprising:

- drawing in fluid into a pump housing (4);
- pressurizing the fluid;
- directing at least part of the fluid past a seal (15);
- collecting at least part of the fluid passing the seal (15) in a second portion (31) of a reservoir (24) coupled to the pump housing (4); and
- heating the second portion (31) of the reservoir (24) and evaporating the collected fluid, wherein the reservoir (24) comprises a first (25) and the second portion (31), wherein the first portion (25) is cast with the pump housing (4) and the second portion (31) is provided as a part made separate from the pump housing, the second portion (31) of the reservoir (24) having an internal volume in fluid communication with the first portion (25), and the reservoir (24) is connected to a space (22) between a bearing assembly (14) and a seal (15) of the water pump by a channel (20), and the fluid is fed from the space (22) into the reservoir (24) through said channel (20).

16. The method of claim 15, wherein the second portion (31) of the reservoir (24) made of at least one of sheet metal and plastic having a heat capacity lower than the pump housing.

17. Engine, comprising:

a coolant circuit;

a water pump according to any of claims 1 to 11 included in the coolant circuit, the pump housing having at least one evaporation opening in fluid communication with the reservoir.

18. The engine of claim 17, wherein the at least one evaporation opening is provided at a side of the pump housing facing away from the coolant circuit.

**Patentansprüche**


2. Wasserpumpe gemäß Anspruch 1, wobei der zweite Teil (31) wenigstens aus einem Metallblech und/oder aus Kunststoff hergestellt ist.


4. Wasserpumpe gemäß Anspruch 3, wobei die ersten und zweiten Kupplungsteile (42, 44) für wenigstens eine Presspassverbindung und/oder eine Dichtverbindung ausgebildet sind.

5. Wasserpumpe gemäß einem der Ansprüche 1 - 4, wobei der zweite Teil (31) mittels eines Schmiedeverfahrens hergestellt wurde.


7. Wasserpumpe gemäß einem der Ansprüche 1 - 6, wobei der erste Teil (25) ein erstes Volumen (V1) und der zweite Teil (31) ein zweites Volumen (V2)
aufweist.

8. Wasserpumpe gemäß einem der Ansprüche 1 - 7, weiter umfassend eine Verdunstungsöffnung (48), die auf einem Niveau oberhalb des unteren Endes des zweiten Teils (31) und vorzugsweise oberhalb dem zweiten Teil (31) ausgebildet ist.

9. Wasserpumpe gemäß einem der Ansprüche 1 - 8, wobei der erste Teil (25) ein inneres Volumen (V1) zwischen im Wesentlichen 0 und 12 cm³, vorzugsweise zwischen 0 und 6 cm³, und im Besonderen zwischen 2 und 5 cm³, aufweist.

10. Wasserpumpe gemäß Anspruch 9, wobei das innere Volumen (V) des Reservoirs (24) zwischen 5 und 20 cm³, vorzugsweise zwischen 6 und 15 cm³, und im Besonderen zwischen 7 und 14 cm³, beträgt.

11. Wasserpumpe gemäß einem der Ansprüche 1 - 10, wobei der zweite Teil (31) eine geringere Wärmekapazität als das Pumpengehäuse (4) aufweist.

12. Set aus Wasserpumpen gemäß einem der Ansprüche 1-11, mit einem ersten Teil (25) eines Tropfreservoirs (24) und zweiten Teilen (31) des Tropfreservoirs (24), wobei die zweiten Teile (24) jeweils getrennt vom Pumpengehäuse gehäuse (4) gekoppelt werden können.

13. Set gemäß Anspruch 12, wobei die zweiten Teile (31) wenigstens aus einem Metallblech und/oder Kunststoff hergestellt sind.

14. Set gemäß Anspruch 12 oder 13, wobei die zweiten Teile (31) ein unterschiedliches inneres Volumen (V2) aufweisen.

15. Verfahren zum Pumpen eines Fluides, mit folgenden Schritten:
   - Einziehen des Fluides in ein Pumpengehäuse (4);
   - Unterdrucksetzen des Fluides;
   - Lenken wenigstens eines Teils des Fluides gegen eine Dichtung (15);
   - Sammeln wenigstens eines Teils des Fluides, das die Dichtung (15) passiert in einem zweiten Teil des Reservoirs (24), das an das Pumpengehäuse (4) gekoppelt ist; und
   - Beheizen des zweiten Teils (31) des Reservoirs (24) und Verdampfen des gesammelten Fluides, wobei das Reservoir (24) einen ersten (25) und zweiten Teil (31) aufweist, wobei der erste Teil mit dem Pumpengehäuse (4) gegossen und der zweite Teil als ein vom Pumpengehäuse getrennt hergestellter Teil zur Verfügung gestellt ist, wobei der zweite Teil des Reservoirs (24) ein inneres Volumen aufweist, das in Fluidkommunikation mit dem ersten Teil (25) steht, und wobei das Reservoir (24) mittels eines Kanals (20) mit einem Freiraum (22) zwischen einer Lageranordnung (14) und einer Dichtung (15) der Wasserpumpe verbunden ist, und wobei das Fluid über den Kanal (20) vom Freiraum (22) in das Reservoir (24) eingeleitet wird.


17. Motor, mit:
   - einem Kühlkreislauf;
   - einer Wasserpumpe gemäß einem der Ansprüche 1-11, die in den Kühlkreislauf integriert ist, wobei das Pumpengehäuse wenigstens eine Verdampfungsoffnung aufweist, die in Fluidkommunikation mit dem Reservoir steht.

18. Motor gemäß Anspruch 17, wobei die wenigstens eine Verdampfungsoffnung an einer Seite des Pumpengehäuses anordnet ist, die vom Kühlkreislauf weg zeigt.

Revendications

1. Pompe à eau destinée à être fixée sur un bloc-moteur, comprenant :
   - un boîtier de pompe (4); et
   - un réservoir d’évacuation (24) ayant des premières et seconde parties (25, 31), la première partie (25) du réservoir (24) étant prévue dans le boîtier de pompe (4) et la seconde partie (31) du réservoir (24) ayant un volume interne en communication de fluide avec la première partie (25), dans laquelle la première partie (25) est moulée avec le boîtier de pompe (4), la seconde partie (31) du réservoir (24) est une partie réalisée séparément du boîtier de pompe, et le réservoir (24) est raccordé à un espace (22) entre un ensemble de palier (14) et un joint d’étanchéité (15) de la pompe à eau par un canal (20).

2. Pompe à eau selon la revendication 1, dans laquelle
la seconde partie (31) est réalisée avec au moins une tôle et du plastique.

3. Pompe à eau selon la revendication 1 ou la revendication 2, dans laquelle la première partie (25) comprend une ouverture (29) et un premier couplage (42) et la seconde partie (31) est prévue avec un second couplage (44) qui coopère avec le premier couplage (42) et qui retient la seconde partie (31) en position au niveau de l’ouverture (29).

4. Pompe à eau selon la revendication 3, dans laquelle les premier et second couplages (42, 44) sont conçus pour au moins l’un parmi un raccordement à ajustement avec serrage et un raccordement d’agent d’étanchéité.

5. Pompe à eau selon l’une quelconque des revendications 1 à 4, dans laquelle la seconde partie (31) est fabriquée par forgeage.

6. Pompe à eau selon l’une quelconque des revendications 1 à 4, dans laquelle la seconde partie (31) est fabriquée par moulage.

7. Pompe à eau selon l’une quelconque des revendications 1 à 6, dans laquelle la première partie (25) a un premier volume (V1) et la seconde partie (31) a un second volume (V2).

8. Pompe à eau selon l’une quelconque des revendications 1 à 7, comprenant en outre une ouverture d’évaporation (48) prévue à un niveau au-dessus d’une extrémité inférieure de la seconde partie (31), de préférence au-dessus de la seconde partie (31).

9. Pompe à eau selon l’une quelconque des revendications 1 à 8, dans laquelle la première partie (25) a un volume interne (V1) compris entre environ 0 et 12 cc, de préférence compris entre environ 0 et 6 cc, et encore de préférence compris entre 2 et 5 cc.

10. Pompe à eau selon la revendication 9, dans laquelle le volume interne (V) du réservoir (24) est compris entre environ 5 et 20 cc, de préférence compris entre environ 6 et 15 cc et encore de préférence compris entre 7 et 14 cc.

11. Pompe à eau selon l’une quelconque des revendications 1 à 10, dans laquelle la seconde partie (31) a une capacité thermique inférieure au boîtier de pompe (4).

12. Ensemble d’une pompe à eau selon l’une quelconque des revendications 1 à 11, comprenant une première partie (25) d’un réservoir d’évacuation (24), et des secondes parties (31) du réservoir d’évacuation (24), les secondes parties (24) étant chacune une partie réalisée séparément du boîtier de pompe, qui peut être couplée à la première partie (24).

13. Ensemble selon la revendication 12, dans lequel les secondes parties (31) sont réalisées à partir d’au moins une tôle et du plastique.

14. Ensemble selon la revendication 12 ou 13, dans lequel les secondes parties (31) ont différents volumes internes (V2).

15. Procédé de pompage de fluide, comprenant les étapes consistant à :

- aspirer du fluide dans un boîtier de pompe (4) ;
- mettre le fluide sous pression ;
- diriger au moins une partie du fluide au-delà d’un joint d’étanchéité (15) ;
- collecter au moins une partie du fluide passant par le joint d’étanchéité (15) dans une seconde partie (31) d’un réservoir (24) couplée au boîtier de pompe (4) ; et
- faire chauffer la seconde partie (31) du réservoir (24) et faire évaporer le fluide collecté,
- dans lequel le réservoir (24) comprend une première (25) et la seconde partie (31), dans lequel la première partie (25) est moulée avec le boîtier de pompe (4) et la seconde partie (31) est prévue comme étant une partie réalisée séparément du boîtier de pompe, la seconde partie (31) du réservoir (24) ayant un volume interne en communication de fluide avec la première partie (25), et le réservoir (24) est raccordé à un espace (22) entre un ensemble de palier (14) et un joint d’étanchéité (15) de la pompe à eau, par un canal (20), et le fluide est amené de l’espace (22) dans le réservoir (24) en passant par ledit canal (20).

16. Procédé selon la revendication 15, dans lequel la seconde partie (31) du réservoir (24) réalisée avec au moins une tôle et du plastique ayant une capacité thermique inférieure au boîtier de pompe.

17. Moteur comprenant :

- un circuit de réfrigérant ;
- une pompe à eau selon l’une quelconque des revendications 1 à 11 incluse dans le circuit de réfrigérant ;
- un boîtier de pompe ayant au moins une ouverture d’évaporation en communication de fluide avec le réservoir.

18. Moteur selon la revendication 17, dans lequel la au moins une ouverture d’évaporation est prévue d’un côté du boîtier de pompe faisant face à distance au
circuit de réfrigérant.
REFERENCES CITED IN THE DESCRIPTION

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