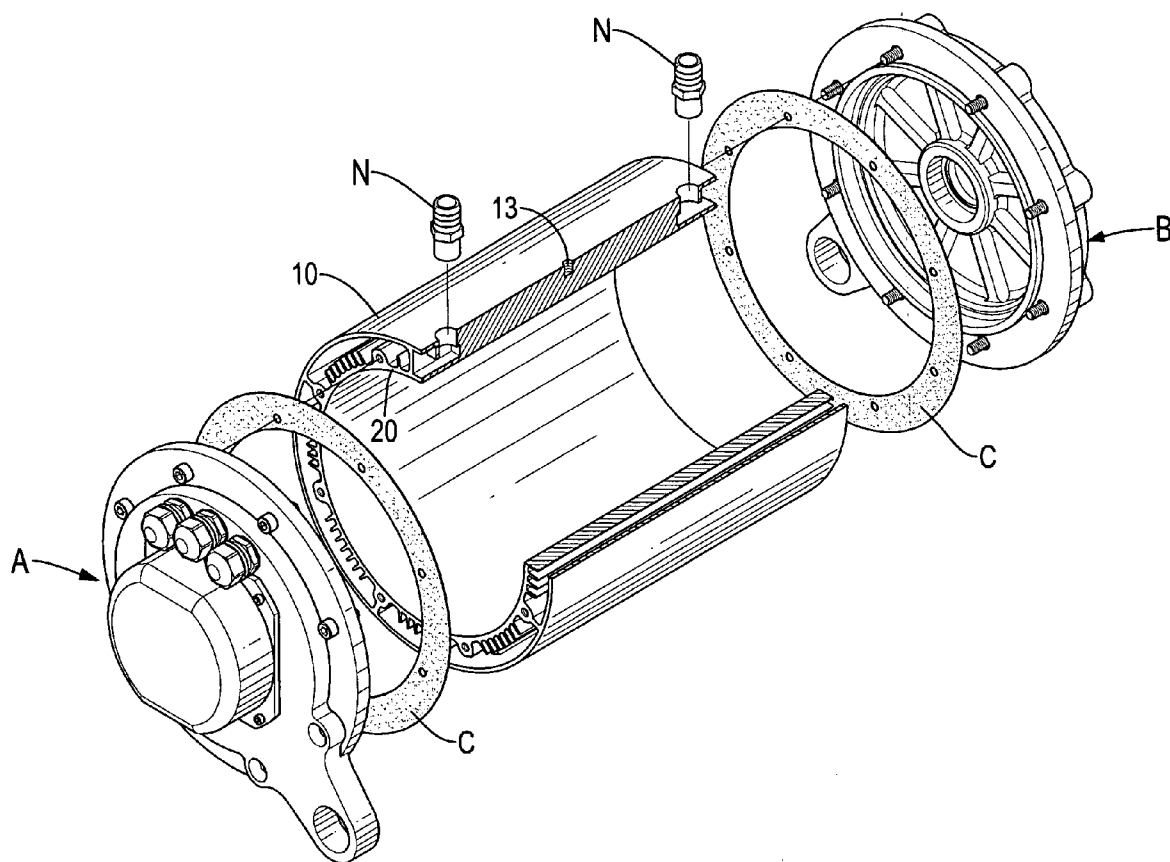




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(19) **United States**(12) **Patent Application Publication**
Chang et al.(10) **Pub. No.: US 2012/0318479 A1**(43) **Pub. Date: Dec. 20, 2012**(54) **LIQUID COOLED MOTOR ASSEMBLY AND
COVER THEREOF****Publication Classification**(51) **Int. Cl.**
F28D 15/00 (2006.01)(52) **U.S. Cl.** **165/104.19**(57) **ABSTRACT**

A liquid cooled motor assembly and a cover thereof. The cover of the liquid cooled motor assembly has an outer cylinder, an inner cylinder, a channel and multiple fins. The inner cylinder is mounted in and connected securely with the outer cylinder. The channel is zigzag and is formed between the inner cylinder and the outer cylinder. The fins are mounted securely on an outer surface of the inner cylinder. With the fins mounted on the outer surface of the inner cylinder, water can dissipate heat from the fins quickly and a dissipating efficiency is enhanced.

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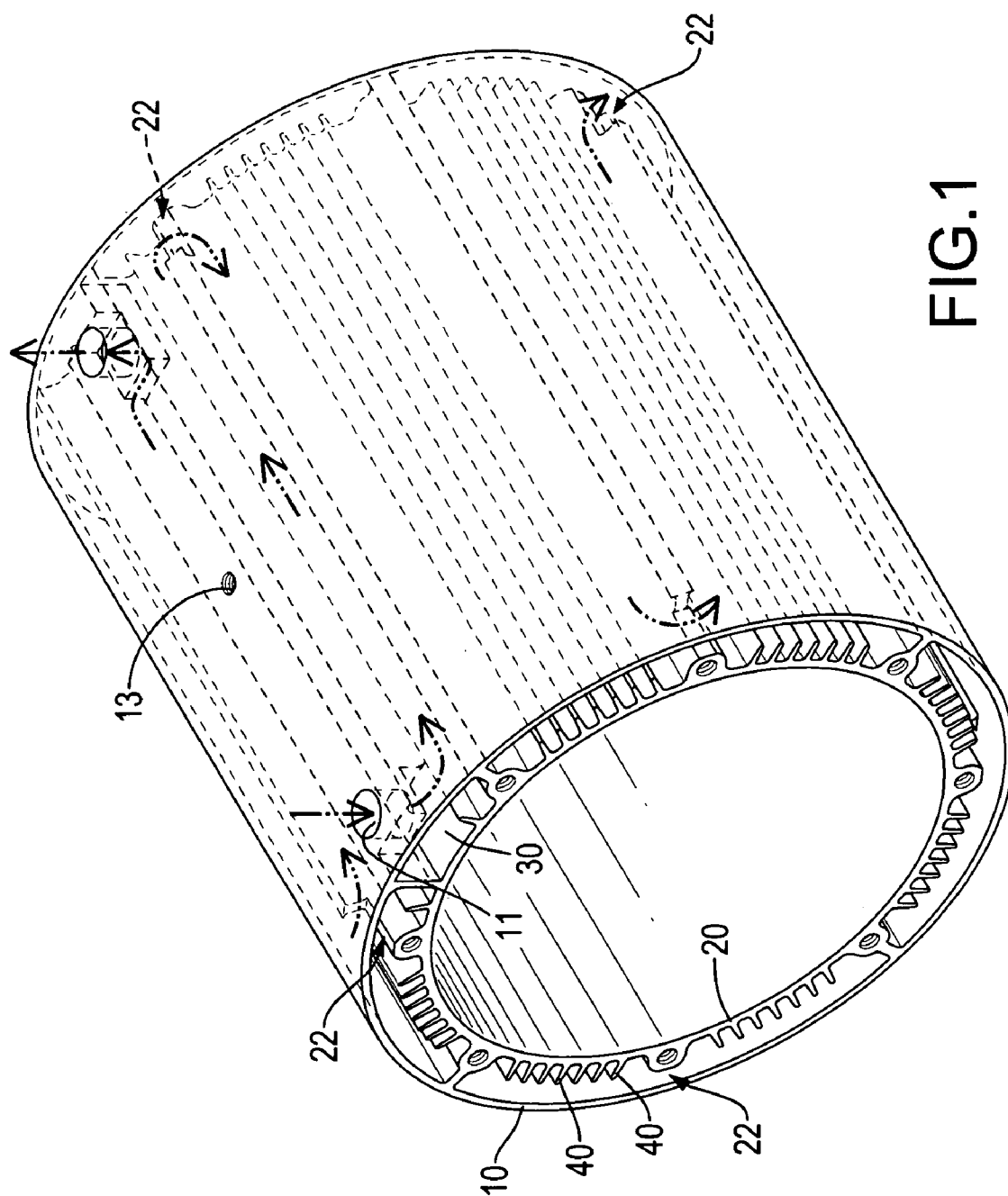


FIG. 1

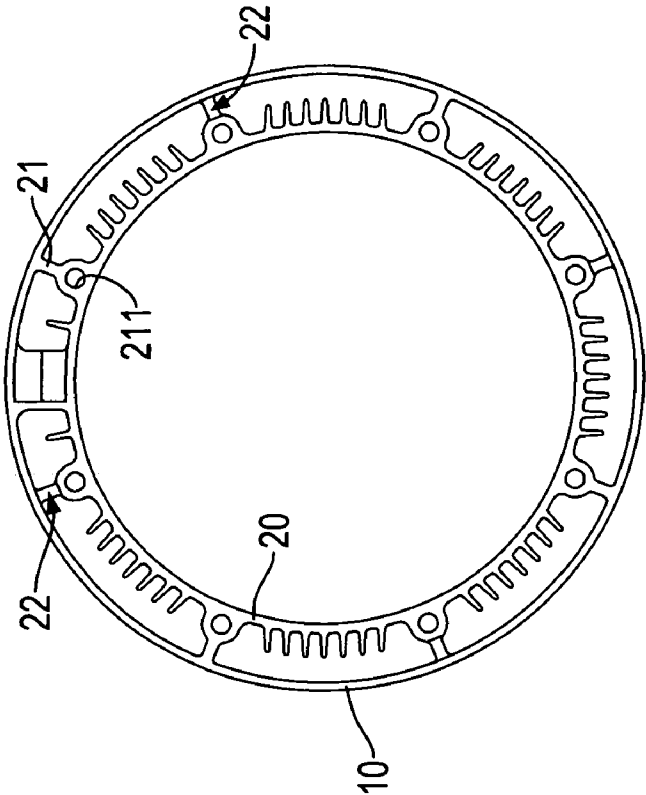


FIG.2

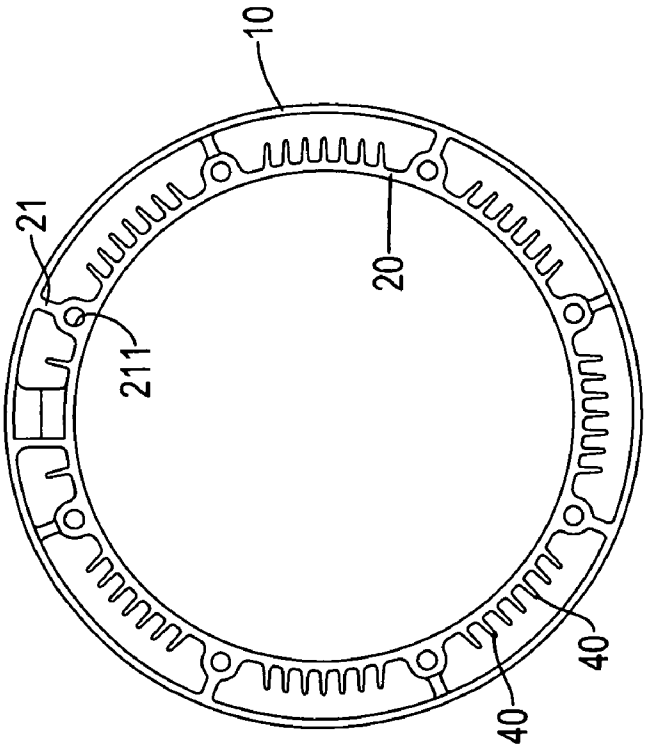
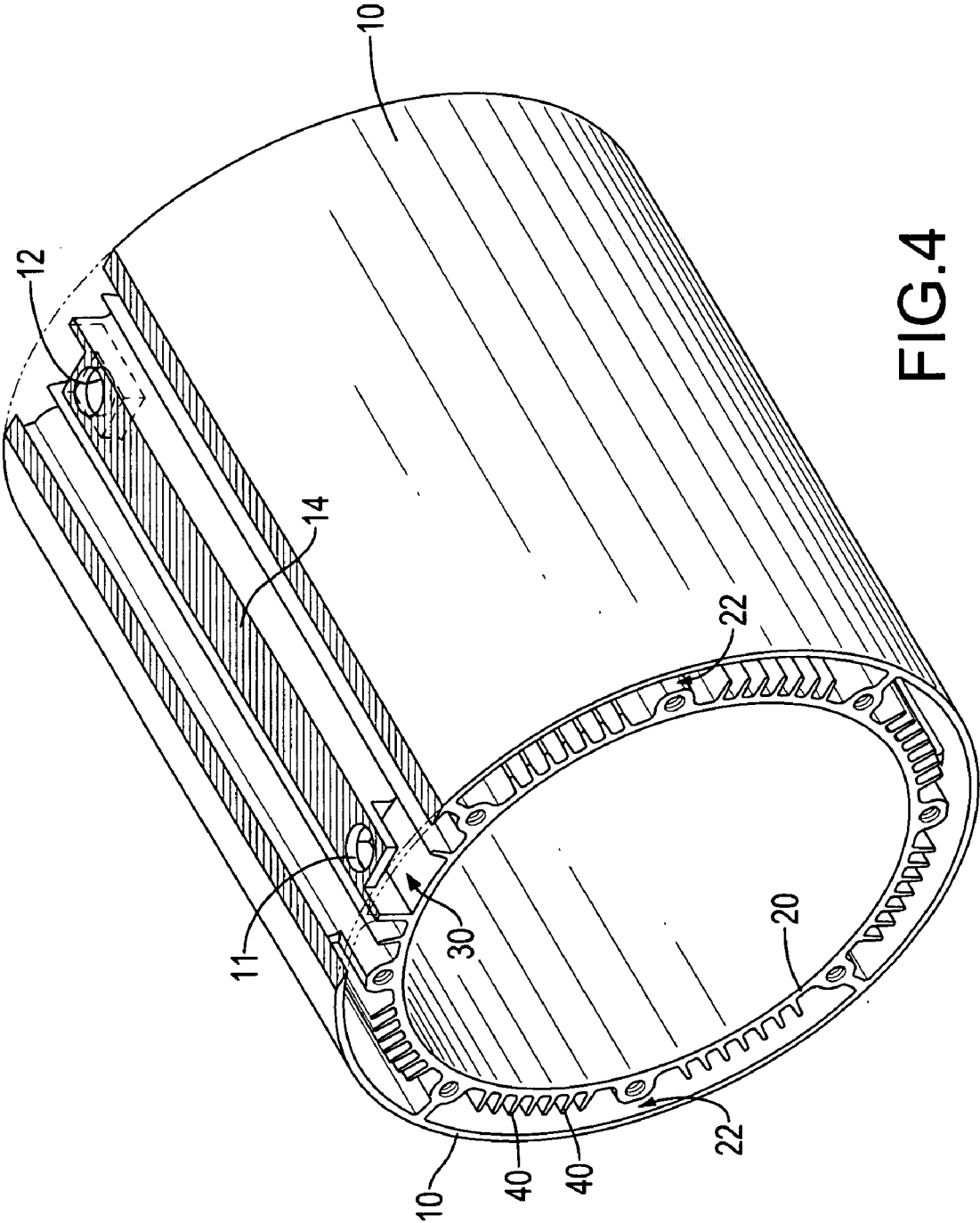


FIG.3



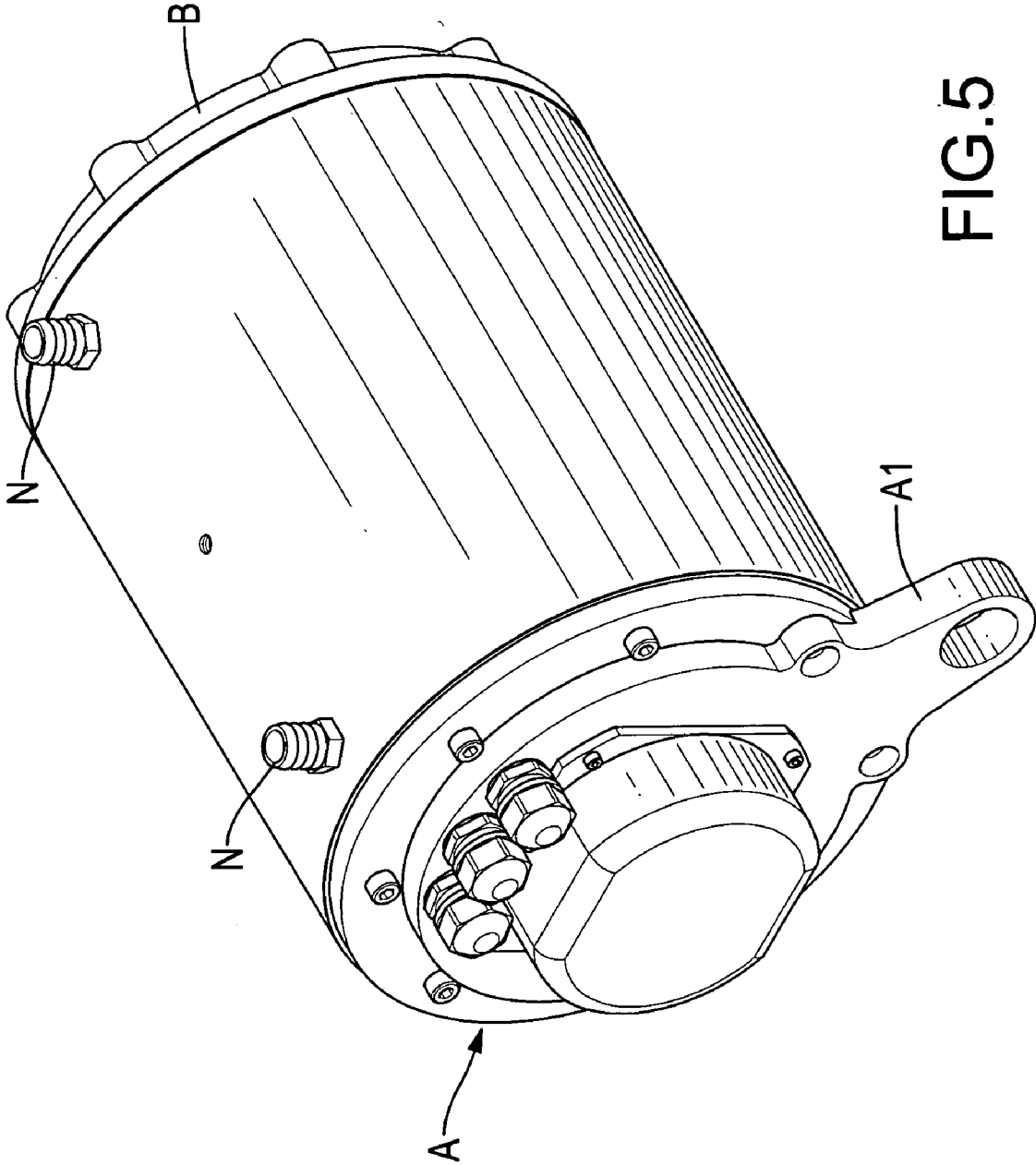


FIG.5

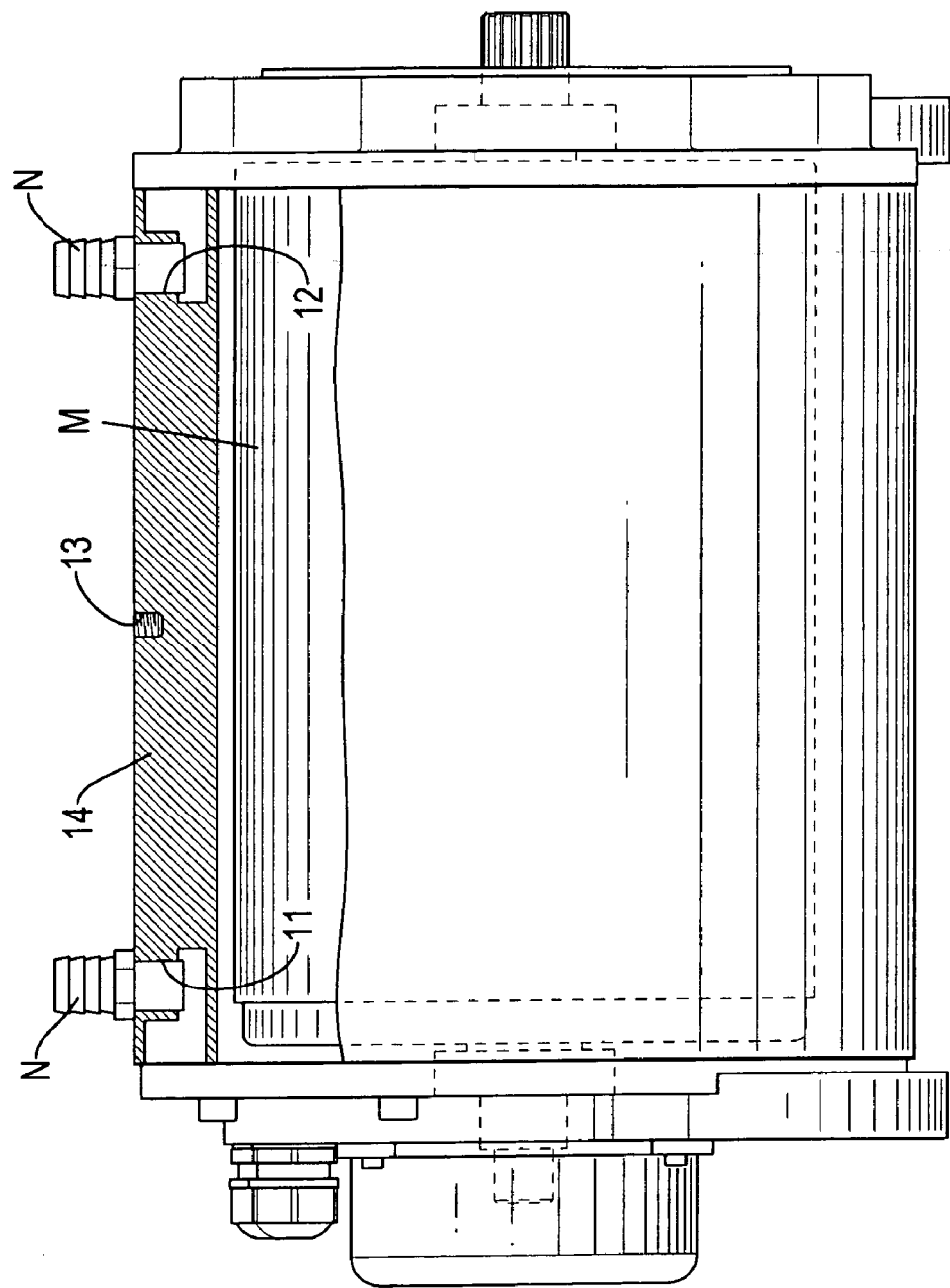


FIG.6

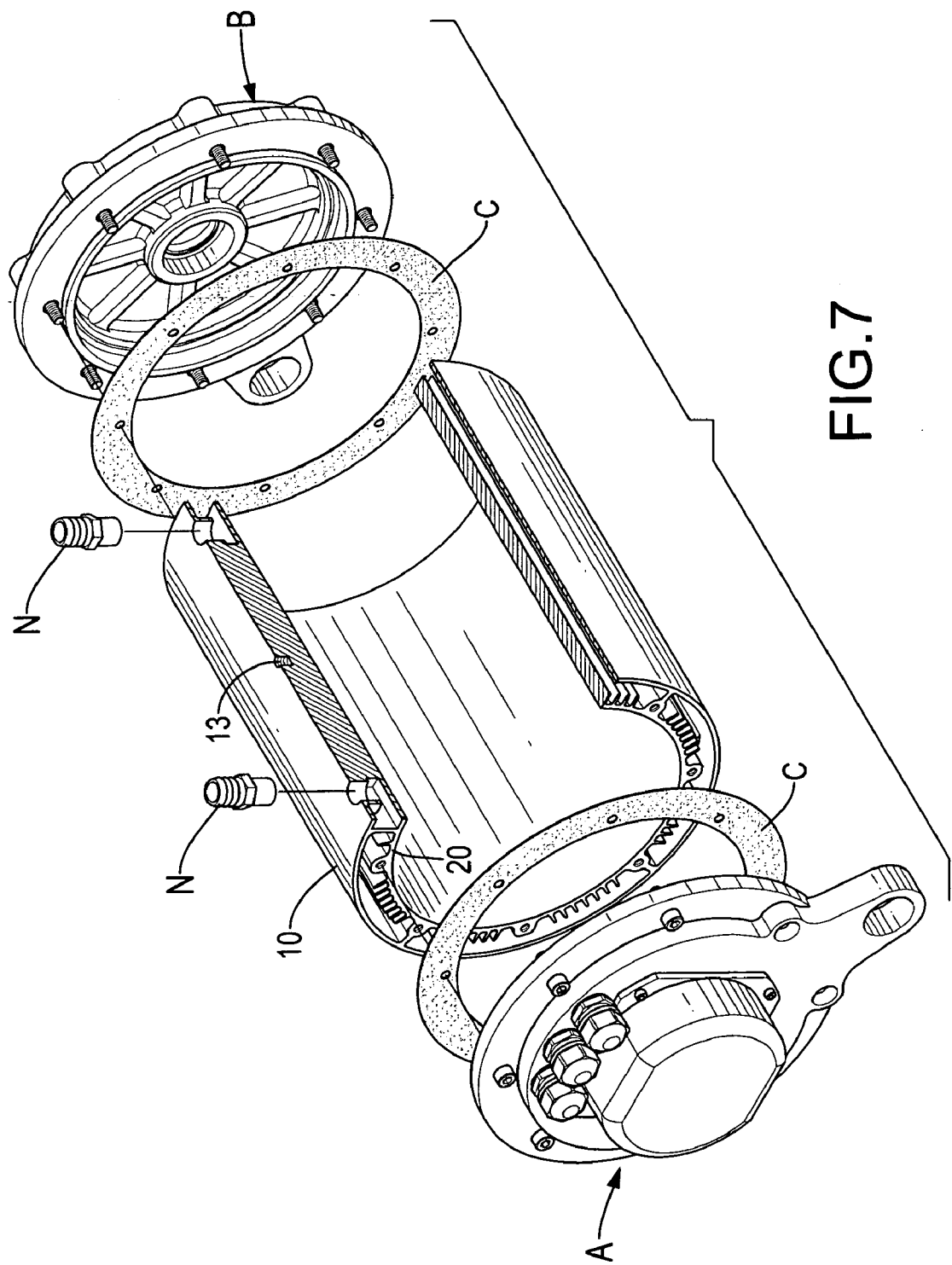


FIG.7

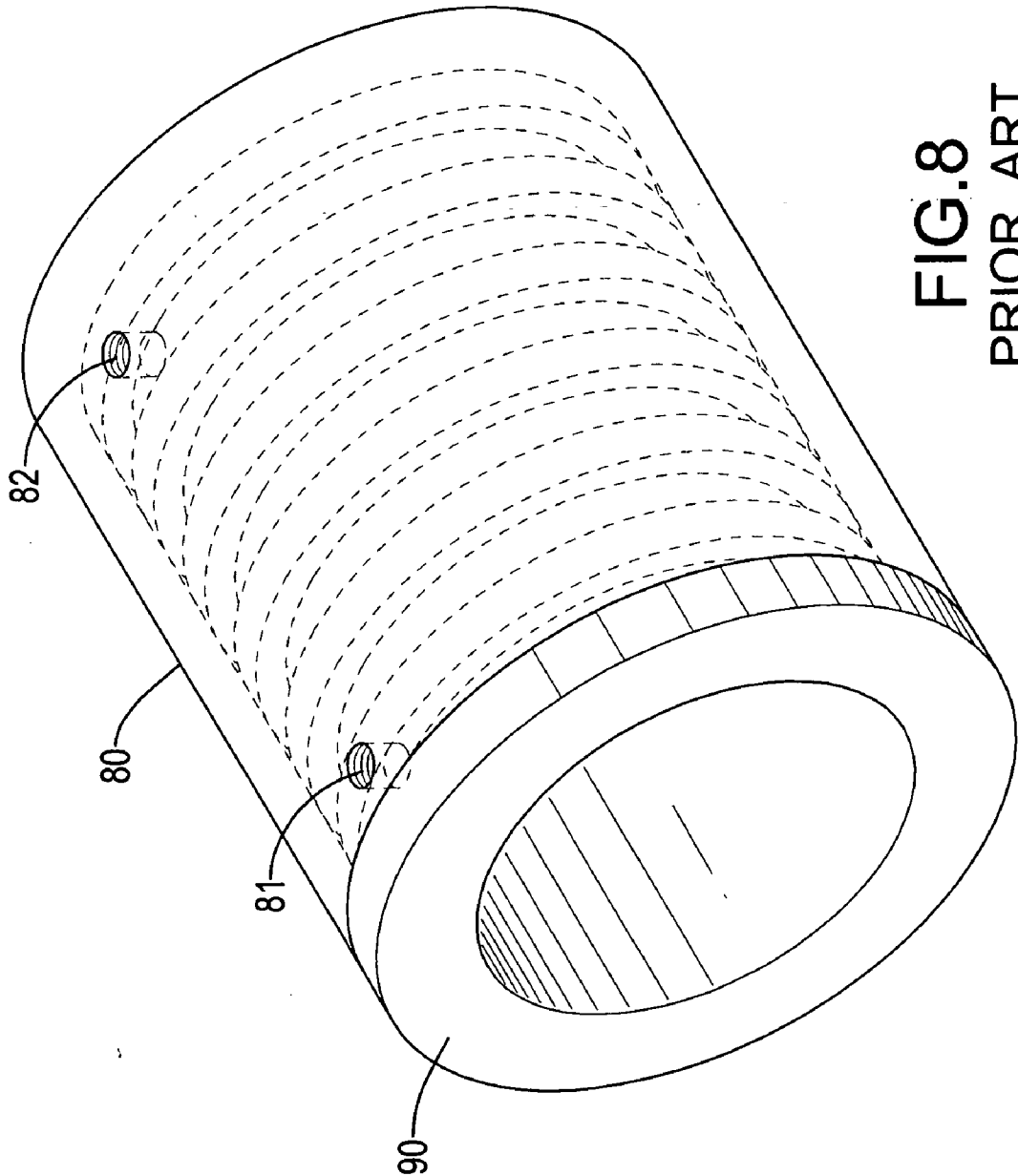


FIG. 8
PRIOR ART

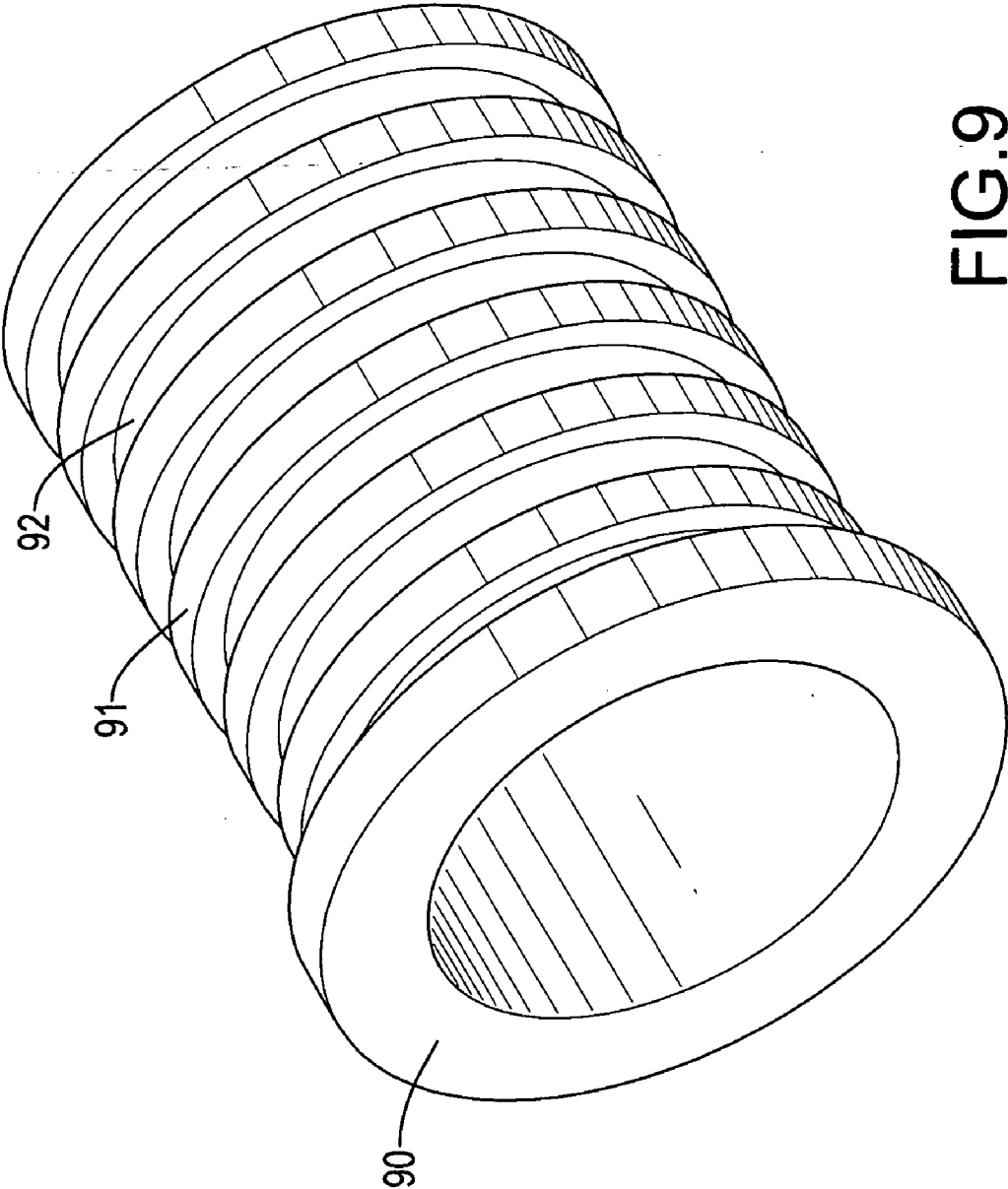


FIG. 9
PRIOR ART

LIQUID COOLED MOTOR ASSEMBLY AND COVER THEREOF

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a liquid cooled motor assembly and a cover thereof, and more particularly to a liquid cooled motor assembly and a cover thereof which have an enhanced dissipating efficiency.

[0003] 2. Description of Related Art

[0004] With reference to FIGS. 8 and 9, a conventional cover of a liquid cooled motor assembly has an outer cylinder 80 and an inner cylinder 90. The outer cylinder 80 has an inlet 81 and an outlet 82. The inlet 81 and the outlet 82 are respectively formed in the outer cylinder 80. The inner cylinder 90 is inserted into the outer cylinder 80 and has an outer surface, an axial space, a guiding section 91 and a channel 92. The axial space of the inner cylinder 90 enables a motor device to be mounted in. The guiding section 91 is spiral and is formed on and protrudes from the outer surface of the inner cylinder 90. The channel 92 is formed between the inner cylinder 90 and the outer cylinder 80 and communicates with the inlet 81 and the outlet 82.

[0005] Waste heat is generated by the motor device and is conducted to the inner cylinder 90. Water poured from the inlet 81 flows through the channel 92, dissipates heat of the inner cylinder 90 and flows out from the outlet 82.

[0006] Although the conventional cover can dissipate waste heat, a dissipating efficiency of the conventional cover is insufficient and needs to be improved.

[0007] To overcome the shortcomings, the present invention tends to provide a liquid cooled motor assembly and a cover thereof to mitigate the aforementioned problems.

SUMMARY OF THE INVENTION

[0008] The main objective of the invention is to provide a liquid cooled motor assembly and a cover thereof, which have an enhanced dissipating efficiency. The cover of the liquid cooled motor assembly has an outer cylinder, an inner cylinder, a channel and multiple fins. The inner cylinder is mounted in and connected securely with the outer cylinder. The channel is zigzag and is formed between the inner cylinder and the outer cylinder. The fins are mounted securely on an outer surface of the inner cylinder. With the fins mounted on the outer surface of the inner cylinder, water can dissipate heat from the fins quickly and a dissipating efficiency is enhanced.

[0009] Other objects, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is an operational perspective view of a cover of a liquid cooled motor assembly in accordance with the present invention;

[0011] FIG. 2 is a front view of the cover of a liquid cooled motor assembly in FIG. 1;

[0012] FIG. 3 is a rear view of the cover of a liquid cooled motor assembly in FIG. 1;

[0013] FIG. 4 is a perspective view in partial section of the cover of a liquid cooled motor assembly in FIG. 1;

[0014] FIG. 5 is a perspective view of a liquid cooled motor assembly in accordance with the present invention;

[0015] FIG. 6 is an enlarged side view in partial section of the liquid cooled motor assembly in FIG. 5;

[0016] FIG. 7 is a partially exploded perspective view in partial section of the liquid cooled motor assembly in FIG. 6;

[0017] FIG. 8 is a perspective view of a conventional cover of a liquid cooled motor assembly in accordance with the prior art; and

[0018] FIG. 9 is a perspective view of a conventional inner cylinder of the cover in FIG. 8.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0019] With reference to FIGS. 1 to 4, a cover of a liquid cooled motor assembly in accordance with the present invention comprises an outer cylinder 10, an inner cylinder 20, a channel 30 and multiple fins 40.

[0020] The outer cylinder 10 has an inner surface, an inlet 11, an outlet 12, a hanging hole 13 and a block section 14.

[0021] The inlet 11, the outlet 12 and the hanging hole 13 are radially formed in the outer cylinder 10 and are located on a line parallel to an axis of the outer cylinder 10. The hanging hole 13 is located between the inlet 11 and the outlet 12 and is threaded. With the hanging hole 13, the cover of a liquid cooled motor assembly in accordance with the present invention can be hung.

[0022] With further reference to FIG. 6, the block section 14 is formed on and protrudes from the inner surface of the outer cylinder 10, is beam-shaped, extends along a line parallel to the axis of the outer cylinder 10, is located between the inlet 11 and the outlet 12 and is connected securely with the inner cylinder 20. Accordingly, the block section 14 can prevent water from flowing directly from the inlet 11 to the outlet 12.

[0023] With reference to FIGS. 1 to 3, a diameter of the inner cylinder 20 is smaller than that of the outer cylinder 10. The inner cylinder 20 is mounted inside the outer cylinder 10 and has an axial space, two opposite ends, a length, an outer surface, multiple elongated connecting sections 21 and multiple breaches 22.

[0024] The connecting sections 21 are integrally formed on and protrude from the outer surface of the inner cylinder 20 at intervals and are connected securely with the outer cylinder 10.

[0025] Each connecting section 21 has a length, an end, two opposite end surfaces and two threaded holes 211. The length of each connecting section 21 is the same as that of the inner cylinder 20. The threaded holes 211 are respectively formed in the end surfaces of each connecting section 21. Each connecting section 21 is linear and extends along a line parallel to an axis of the inner cylinder 20.

[0026] The breaches 22 are respectively formed at the ends of the connecting sections 21 except at the threaded holes 211. The adjacent two of the breaches 22 are respectively located at the ends of the inner cylinder 20. The breaches 22 are located above the threaded holes 211 relative to the axis of the inner cylinder 20. The breaches 22 may be located below the threaded holes 211 relative to the axis of the inner cylinder 20 and the present invention does not limit the locations of the breaches 22.

[0027] Each connecting section 21 may be curved and an axial length of each connecting section 21 is the same as that

of the inner cylinder 20. The cover of a liquid cooled motor assembly does not limit the formats of the connecting sections 21.

[0028] With reference to FIGS. 1 to 4, the channel 30 is zigzag and is formed between the outer cylinder 10 and the inner cylinder 20.

[0029] The fins 40 are integrally mounted securely on the outer surface of the inner cylinder 20 except at the connecting sections 21.

[0030] Preferably, at least two fins 40 are located at each position between adjacent two connecting sections 21. Each fin 40 is linear and extends along a line parallel to the axis of the inner cylinder 20.

[0031] With reference to FIGS. 1 and 5, two nozzles N are respectively and securely mounted on the inlet 11 and the outlet 12. Water is poured from the inlet 11, flows through the channel 30 and the breaches 22, dissipates heat from the fins 40 and flows out from the outlet 12.

[0032] With reference to FIGS. 5 to 7, a liquid cooled motor assembly in accordance with the present invention has the cover, a first cab A, a second cab B, a washer kit C and a motor device M.

[0033] The first cab A and the second cab B are mounted securely on opposite ends of the cover by bolts and seal the channel 30 and the axial space of the inner cylinder 20. The first cab A has a stand section A1 radially formed on and protruding from the first cab A.

[0034] The washer kit C has a first washer and a second washer. The first washer is clamped between the first cab A and the cover. The second washer is clamped between the second cab B and the cover. With the washer kit C, water in the channel 30 can be prevented from leaking out.

[0035] The motor device M is mounted in the axial space of the inner cylinder 20 and has a shaft mounted through the second cab B.

[0036] The cover of the liquid cooled motor assembly in accordance with the present invention may not have the inlet 11 and the outlet 12. Instead, the nozzles N are respectively mounted on the first cab A and the second cab B. Water can be poured into the channel 30 via the nozzles N and dissipate heat.

[0037] From the above description, it is noted that the present invention has the following advantages:

[0038] 1. Enhanced Dissipating Efficiency:

[0039] With the fins 40 mounted on the outer surface of the inner cylinder 20, water can dissipate heat from the fins 40 quickly and a dissipating efficiency is enhanced.

[0040] 2. Prolonged Lifespan of the Liquid Cooled Motor Assembly:

[0041] Because the dissipating efficiency is enhanced, the motor device M is not overheated and a lifespan of the liquid cooled motor assembly is prolonged. Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A cover of a liquid cooled motor assembly, the cover comprising:

an outer cylinder;

an inner cylinder, mounted inside the outer cylinder and having

two opposite ends;

a length;

an outer surface; and

multiple elongated connecting sections formed on and protruding from the outer surface of the inner cylinder at intervals, connected securely with the outer cylinder, each connecting section having

a length the same as that of the inner cylinder;

an end; and

multiple breaches respectively formed at the ends of the connecting sections, wherein the adjacent two of the breaches are respectively located at the ends of the inner cylinder;

a zigzag channel formed between the outer cylinder and the inner cylinder; and

multiple fins mounted securely on the outer surface of the inner cylinder except at the connecting sections.

2. The cover of a liquid cooled motor assembly as claimed in claim 1, wherein each connecting section is linear and extends along a line parallel to an axis of the inner cylinder.

3. The cover of a liquid cooled motor assembly as claimed in claim 2, wherein at least two fins are located at each position between adjacent two connecting sections; and each fin is linear and extends along a line parallel to the axis of the inner cylinder.

4. The cover of a liquid cooled motor assembly as claimed in claim 3, wherein

the outer cylinder has

an inner surface;

an inlet radially formed in the outer cylinder and communicating with the channel;

an outlet radially formed in the outer cylinder and communicating with the channel; and

a block section formed on and protruding from the inner surface of the outer cylinder, being beam-shaped, extending along a line parallel to the axis of the inner cylinder, located between the inlet and the outlet and connected securely with the outer surface of the inner cylinder except at the connecting sections.

5. The cover of a liquid cooled motor assembly as claimed in claim 4, wherein the outer cylinder has a hanging hole radially formed in the outer cylinder and located between the inlet and the outlet.

6. A liquid cooled motor assembly comprising:

a cover having

a first end;

a second end opposite to the first end of the cover;

an outer cylinder;

an inner cylinder, mounted inside the outer cylinder and having

an axial space;

two opposite ends;

a length;

an outer surface; and

multiple elongated connecting sections formed on and protruding from the outer surface of the inner cylinder, connected securely with the outer cylinder, each connecting section having

a length the same as that of the inner cylinder;
an end; and
a breach formed at the end of the connecting section, wherein the adjacent two of the breaches are respectively located at the ends of the inner cylinder;
a zigzag channel formed between the outer cylinder and the inner cylinder; and
multiple fins mounted securely on the outer surface of the inner cylinder except at the connecting sections;
a motor device mounted inside the axial space of the inner cylinder;
a first cap mounted securely on the first end of the cover;
a second cap mounted securely on the second end of the cover, wherein the first cap and the second cap seal the channel and the axial space of the inner cylinder; and
a washer kit connected with the cover.

7. The liquid cooled motor assembly as claimed in claim 6, wherein each connecting section is linear and extends along a line parallel to an axis of the inner cylinder.

8. The liquid cooled motor assembly as claimed in claim 7, wherein at least two fins are located at each position between

adjacent two connecting sections; and each fin is linear and extends along a line parallel to the axis of the inner cylinder.

9. The liquid cooled motor assembly as claimed in claim 8, wherein

the outer cylinder has

an inner surface;

an inlet radially formed in the outer cylinder and communicating with the channel;

an outlet radially formed in the outer cylinder and communicating with the channel; and

a block section formed on and protruding from the inner surface of the outer cylinder, being beam-shaped, extending along a line parallel to the axis of the inner cylinder, located between the inlet and the outlet and connected securely with the outer surface of the inner cylinder except at the connecting sections.

10. The liquid cooled motor assembly as claimed in claim 9, wherein the outer cylinder has a hanging hole radially formed in the outer cylinder and located between the inlet and the outlet.

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