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(54) **Liquid cooling pump**

(57) A liquid-cooling pump has a casing device (10), a driving device (20) and an impeller (30). The casing device (10) has an inlet (111) and an outlet (112). The driving device (20) is mounted in the casing device (10) and has an oil seal (22a) and a shaft seal (22b). The oil seal (22a) and the shaft seal (22b) are adjacent to the outlet (112). The impeller (30) is adjacent to the outlet

(112). Therefore, the oil seal (22a) and the shaft seal (22b) adjacent to the outlet (112) are under negative pressure to prevent the oil seal (22a) and the shaft seal (22b) from being directly impacted by water. Then, a tightness degree between the shaft (21) and the shaft seal (22b) is reduced and can prevent an abrasion between the shaft (21) and the shaft seal (22b) and increase the waterproof effect.

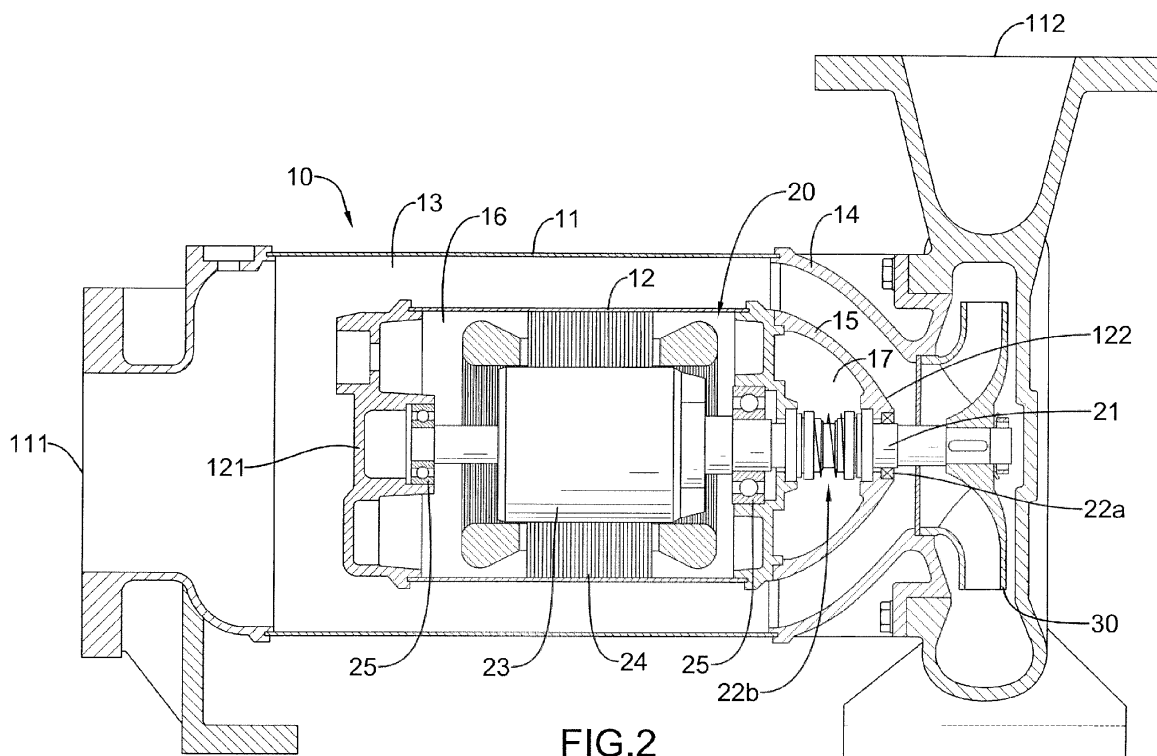


FIG.2

Description

[0001] This application claims the benefit of the Taiwan patent application No. 100217953, filed on September 26, 2011, the disclosure of which is incorporated herein in its entirety by reference.

1. Field of the Invention

[0002] The present invention relates to a liquid-cooling pump, and more particularly to a liquid-cooling pump to reduce an abrasion and having good heat dissipation.

2. Description of the Prior Art(s)

[0003] With reference to Fig. 5, a conventional pump has a shell 90. A chamber 91 is defined in the shell 90. The shell 90 has an inlet 92 and an outlet 93 which are both in communication with the chamber 91. A shaft 94 is mounted in the shell 90 and extends into the chamber 91. An impeller 95 is mounted on the shaft 94 at the chamber 91 and is controlled by a motor 97. A shaft seal 96 and a waterproof washer are mounted on the shaft 94 and abut against the chamber 91.

[0004] When the motor 97 is driving, the impeller 95 is rotated by the shaft 94, and water flows through the impeller 95 and generates a centrifugal vortex. With reference to Fig. 6, water flows in the chamber 91 via the inlet 92 and then flows out via the outlet 93. Water in the chamber 91 generates a hydraulic pressure by the centrifugal vortex to push water to flow to a destination. While the hydraulic pressure is high, the shaft seal 96 is pressed to generate a gap, and then water is infiltrated through the gap. Thus, the shaft seal 96 is tightly mounted on the shaft 94 to avoid the gap between the shaft seal 96 and the shaft 94. The seal tightness between the shaft seal 96 and the shaft 94 is enhanced to increase a waterproof effect of the pump.

[0005] However, the shaft seal 96 tightly mounted on the shaft 94 causes an abrasion between the shaft seal 96 and the shaft 94. The hydraulic pressure is high and presses the shaft seal 96, and then a gap between the shaft 94 and the shaft seal 96 is formed to cause water infiltration, damage the pump, and reduce the waterproof effect.

[0006] To overcome the shortcomings, the present invention tends to provide a liquid-cooling pump to mitigate or obviate the aforementioned problems.

[0007] The main objective of the invention is to provide a liquid-cooling pump to reduce an abrasion and increase the waterproof effect.

[0008] The liquid-cooling pump has a casing device, a driving device and an impeller. The casing device has an outer shell, an inner shell and a channel. The outer shell has an inlet, an outlet and an outer guiding cap. The inlet and the outlet are mounted respectively at two sides of the outer shell. The outer guiding cap is adjacent to the outlet. The inner shell is mounted in the outer shell and

has an inner guiding cap, a first end, a second end, an assembling chamber and an oil chamber. The inner guiding cap is corresponding to the outer guiding cap. The first end is defined in the inner shell and is adjacent to the inlet of the outer shell. The second end is defined in the inner guiding cap and is adjacent to the outlet of the outer shell. The assembling chamber is defined in the inner shell. The oil chamber is defined in the inner shell and is adjacent to the second end of the inner shell. The channel is defined between the outer shell and the inner shell.

[0009] The driving device is mounted in the inner shell and has a rotor and a stator mounted in the assembling chamber of the inner shell, and has a shaft, an oil seal and a shaft seal. The shaft is connected with the rotor and extends out of the second end of the inner shell. The oil seal is mounted on the shaft adjacent to the second end of the inner shell. The shaft seal is mounted on the shaft and adjacent to the second end of the inner shell. The impeller is mounted on the shaft of the driving device and is located at the channel, and the impeller is adjacent to the second end of the inner shell and the outlet of the outer shell.

[0010] The oil seal and the shaft seal are adjacent to the second end of the inner shell that is under a negative pressure condition. Thus, water flowing through the channel does not directly impact the oil seal and the shaft seal, and the hydraulic pressure applied to the oil seal and the shaft seal are low. A tightness degree between the shaft and the shaft seal is reduced and can prevent an abrasion between the shaft and the shaft seal and increase the waterproof effect. Furthermore, water flowing through the channel can absorb the heat generated by the driving device to provide good heat dissipation.

IN THE DRAWINGS:

[0011]

Fig. 1 is a front view of a liquid-cooling pump in accordance with the present invention;

Fig. 2 is a front view in partial section of the liquid-cooling pump in Fig. 1;

Fig. 3 is an operational front view in partial section of the liquid-cooling pump in Fig. 1 showing a flow path in the liquid-cooling pump;

Fig. 4 is an enlarged front view in partial section of the liquid-cooling pump in Fig. 1 showing the shaft seal;

Fig. 5 is a front view in partial section of a conventional pump in accordance with the prior art; and Fig. 6 is an operational front view in partial section of the conventional pump in Fig. 5.

[0012] With reference to Figs. 1 and 2, a liquid-cooling pump in accordance with the present invention comprises a casing device 10, a driving device 20 and an impeller 30.

[0013] The casing device 10 has an outer shell 11, an inner shell 12 and a channel 13. The outer shell 11 has an inlet 111 and an outlet 112 formed respectively at two sides of the outer shell 11 and has an outer guiding cap 14 adjacent to the outlet 112. The inner shell 12 is mounted in the outer shell 11. The inner shell 12 has an inner guiding cap 15, a first end 121, a second end 122, an assembling chamber 16 and an oil chamber 17. The inner guiding cap 15 is corresponding to the outer guiding cap 14. The first end 121 is defined in the inner shell 12 and is adjacent to the inlet 111 of the outer shell 11. The second end 122 is defined in the inner guiding cap 15 and is adjacent to the outlet 112 of the outer shell 11. The assembling chamber 16 is defined in the inner shell 12. The oil chamber 17 is defined in the inner shell 12 and is adjacent to the second end 122 of the inner shell 12. The channel 13 is defined between the outer shell 11 and the inner shell 12. Furthermore, the inner guiding cap 15 tapers inwardly towards the second end 122 of the inner shell 12.

[0014] The driving device 20 is mounted in the inner shell 12. The driving device 20 has a rotor 23, a stator 24, a shaft 21, an oil seal 22a and a shaft seal 22b. The rotor 23 is mounted in the assembling chamber 16 of the inner shell 12. The stator 24 is mounted in the assembling chamber 16 of the inner shell 12 and is mounted around the rotor 23. The shaft 21 is connected with the rotor 23 and extends out of the second end 122 of the inner shell 12. The oil seal 22a is mounted on the shaft 21 and is adjacent to the second end 122 of the inner shell 12. The shaft seal 22b is mounted on the shaft 21 and is adjacent to the second end 122 of the inner shell 12. The oil seal 22a prevents water in the channel 13 from flowing into the oil chamber 17. The shaft seal 22b prevents oil in the oil chamber 17 from infiltrating into the assembling chamber 16.

[0015] The impeller 30 is mounted on the shaft 21 of the driving device 20 and is located at the channel 13, and the impeller 30 is adjacent to the second end 122 of the inner shell 12 and the outlet 112 of the outer shell 11. Furthermore, a direction of a vane of the impeller 30 is opposite to a direction of a vane of the conventional pump.

[0016] With reference to Fig. 4, the shaft seal 22b is mounted on the shaft 21. The shaft seal 22b has a first seat 40, a second seat 41, a third seat 42, a fourth seat 43 and a spring 44. The first seat 40 is circular and is mounted on the shaft 21 and has an inner surface and a first friction surface 45. The first friction surface 45 is formed on the inner surface of the first seat 40 and faces the shaft 21. The second seat 41 is mounted on the shaft 21 and is adjacent to the first seat 40. The third seat 42 is circular and is mounted on the shaft 21 and adjacent to the oil seal 22a and has an inner surface and a second friction surface 46. The second friction surface 46 is formed on the inner surface of the third seat 42 and faces the shaft 21. The fourth seat 43 is mounted on the shaft 21 and is adjacent to the third seat 42. The spring 44 is

mounted on the shaft 21 and two ends of the spring 44 respectively abut against the second seat 41 and the fourth seat 43. Thus, a lubricant can flow through the first friction surface 45 and the second friction surface 46 to lubricate. The spring 44 can push the second seat 41 and fourth seat 43 to enhance the sealing tightness. Furthermore, the shaft seal 22b is adjacent to the second end 122 of the inner shell 12 that is under negative pressure condition, so the hydraulic pressure applied to the shaft seal 22b is low.

[0017] With reference to Fig. 3, when the liquid-cooling pump is driven, the shaft 21 is rotated by the rotor 23 and drives the impeller 30 to rotate and to generate a centrifugal vortex to draw water. Water flows into the channel 13 via the inlet 111, and then water flows to the second end 122 via the outer guiding cap 14 and the inner guiding cap 15, and water is further drawn out of the outlet 112 by rotation of the impeller 30.

[0018] Accordingly, the inlet 111 and the outlet 112 are respectively mounted at two sides of the outer shell 11, and the first end 121 of the inner shell 12 faces the inlet 111 of the outer shell 11. Therefore, the first end 121 of the inner shell 12 can bear more hydraulic pressure regardless of waterproofness of the first end 121 of the inner shell 12. The oil seal 22a and the shaft seal 22b are adjacent to the second end 122 of the inner shell 12 that is under a negative pressure condition. Therefore, the oil seal 22a and the shaft seal 22b are not directly impacted by water flowing in the channel 13 and do not bear a hydraulic pressure of the centrifugal vortex generated by the impeller 30. Thus, the hydraulic pressure applied to the oil seal 22a and the shaft seal 22b are lower than the hydraulic pressure applied to the first end 121. Then, a tightness degree between the shaft 21 and the shaft seal 22b is reduced and can prevent an abrasion between the shaft 21 and the shaft seal 22b and increase the waterproof effect. Furthermore, water flowing through the channel 13 around the inner shell 12 can absorb the heat generated by the driving device 20 to provide good heat dissipation.

Claims

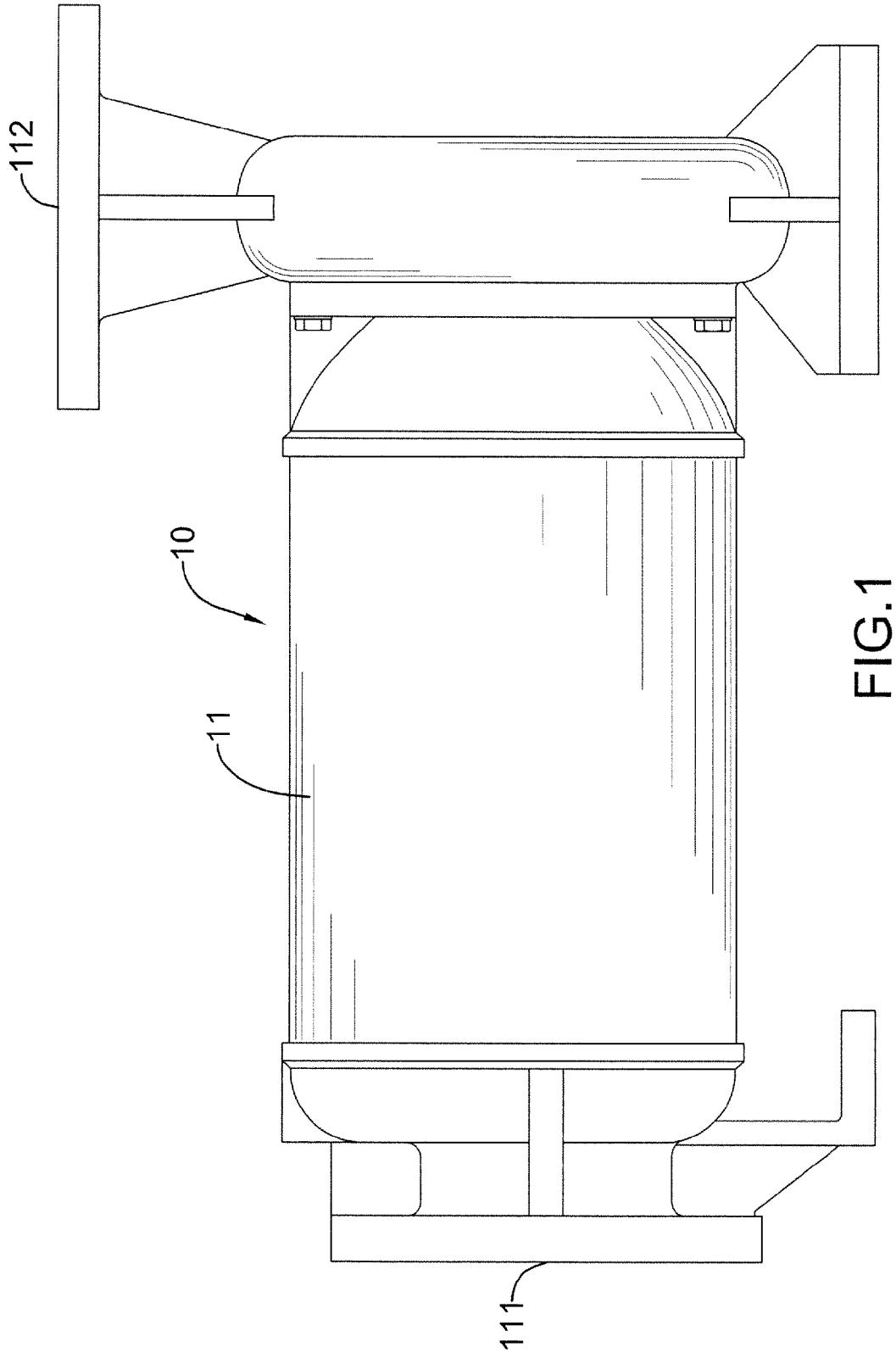
1. A liquid-cooling pump comprising a casing device (10), a driving device (20) and an impeller (30), and the liquid-cooling pump **characterized in that:**

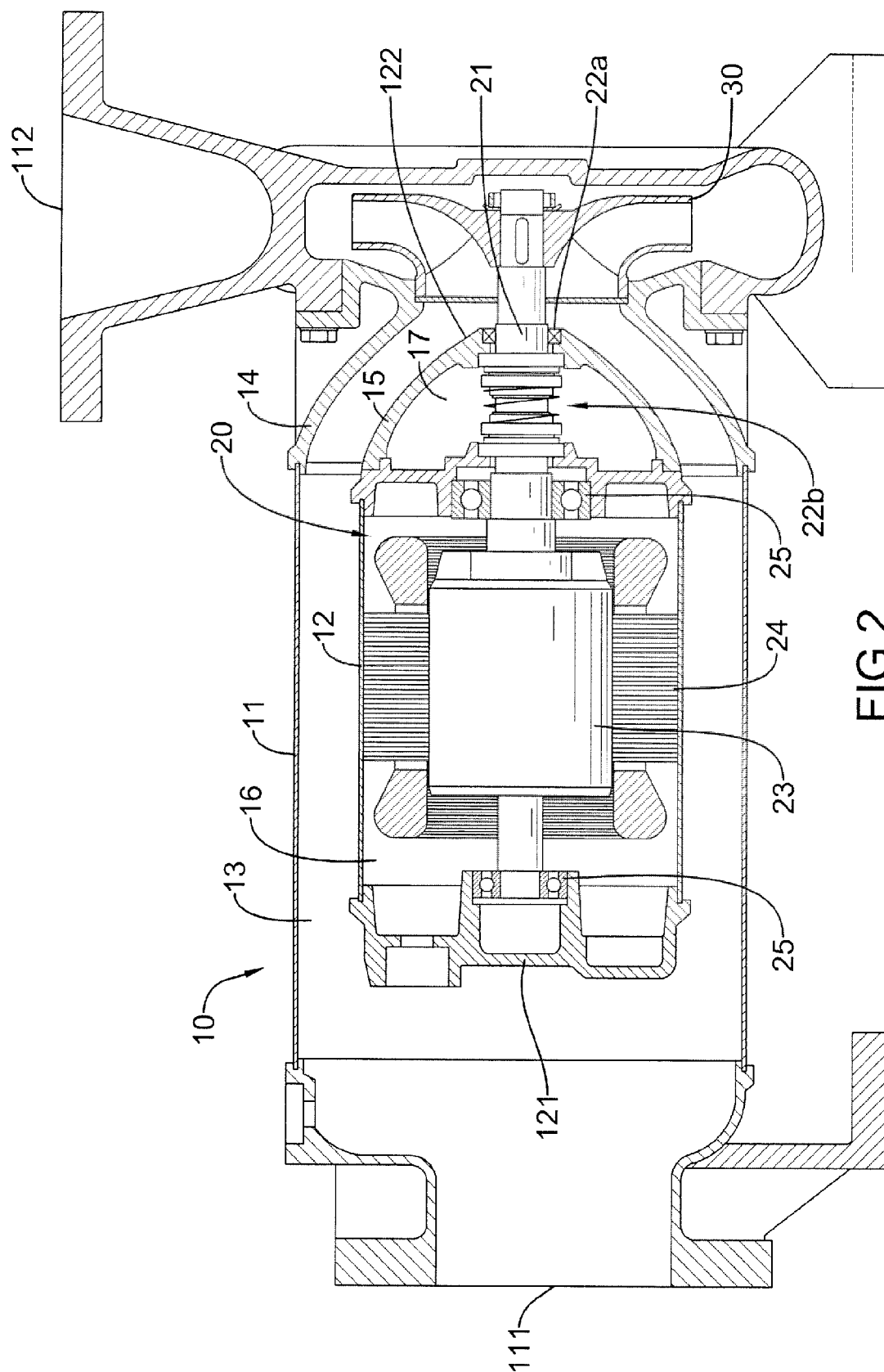
the casing device (10) has
 an outer shell (11) having an inlet (111) and an outlet (112) formed respectively at two sides of the outer shell (11), and having an outer guiding cap (14);
 an inner shell (12) mounted in the outer shell (11) and having
 an inner guiding cap (15) corresponding to the outer guiding cap (14); a first end (121) defined in the inner shell (12) and adjacent to the inlet

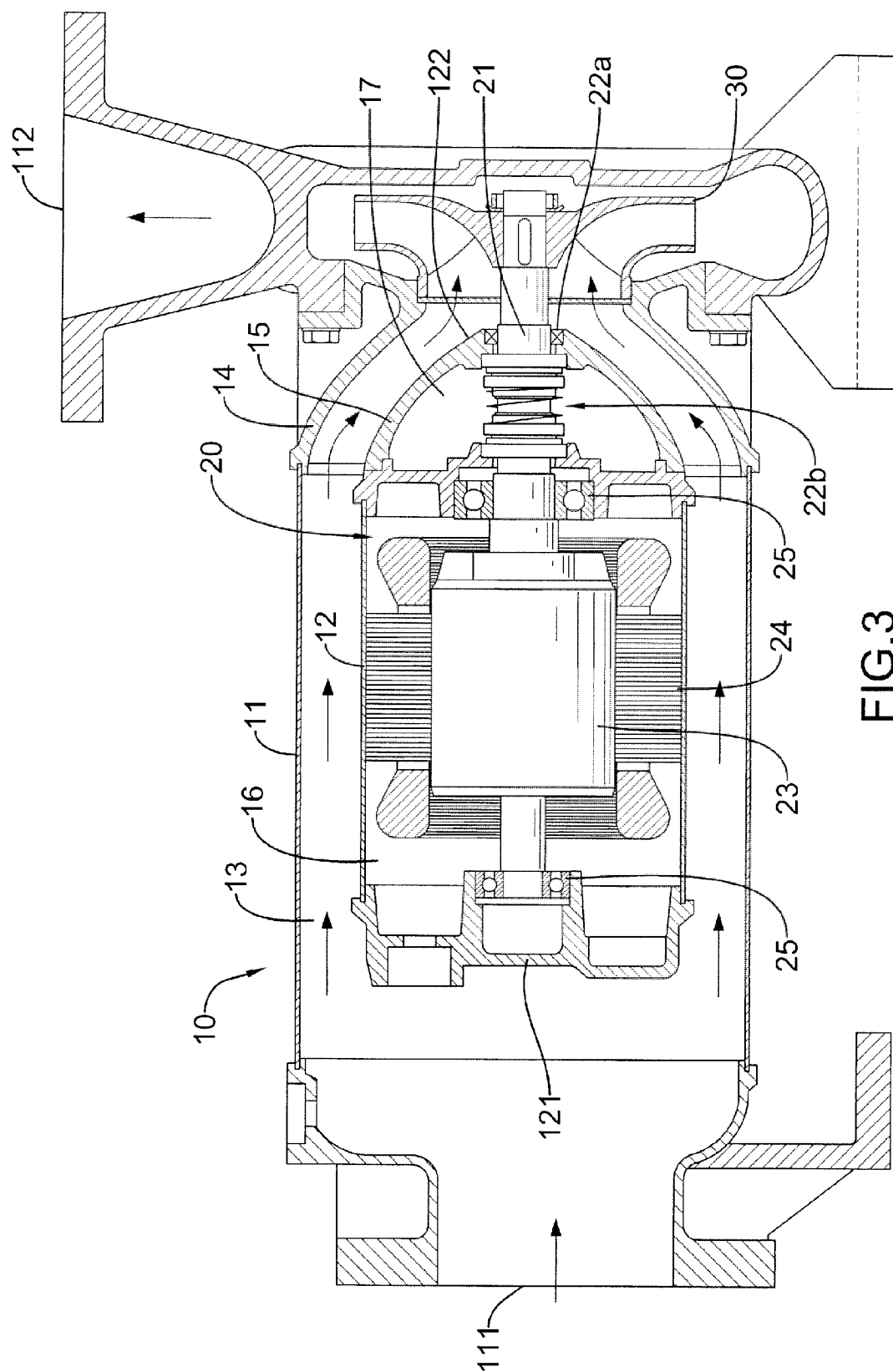
(111) of the outer shell (11);
 a second end (122) defined in the inner guiding cap (15) and adjacent to the outlet (112) of the outer shell (11);
 an assembling chamber (16) defined in the inner shell (12); and
 an oil chamber (17) defined in the inner shell (12) and adjacent to the second end (122) of the inner shell (12); and
 a channel (13) defined between the outer shell (11) and the inner shell (12);
 the driving device (20) is mounted in the inner shell (12) and has
 a rotor (23) mounted in the assembling chamber (16) of the inner shell (12);
 a stator (24) mounted in the assembling chamber (16) of the inner shell (12) and mounted around the rotor (23);
 a shaft (21) connected with the rotor (23) and extending out of the second end (122) of the inner shell (12);
 an oil seal (22a) mounted on the shaft (21) and adjacent to the second end (122) of the inner shell (12); and
 a shaft seal (22b) mounted on the shaft (21) and adjacent to the second end (122) of the inner shell (12); and
 the impeller (30) is mounted on the shaft (21) of the driving device (20) and is located at the channel (13), and the impeller (30) is adjacent to the second end (122) of the inner shell (12) and the outlet (112) of the outer shell (11).

2. The liquid-cooling pump as claimed in claim 1, wherein
 the shaft seal (22b) has
 a first seat (40) being circular and mounted on the shaft (21) and having
 an inner surface; and
 a first friction surface (45) formed on the inner surface of the first seat (40) and facing the shaft (21);
 a second seat (41) mounted on the shaft (21) and adjacent to the first seat (40);
 a third seat (42) being circular and mounted on the shaft (21) and adjacent to the oil seal (22a) and having
 an inner surface; and
 a second friction surface (46) formed on the inner surface of the third seat (42) and facing the shaft (21);
 a fourth seat (43) mounted on the shaft (21) and adjacent to the third seat (42); and
 a spring (44) mounted on the shaft (21) and abutting the second seat (41) and the fourth seat (43).

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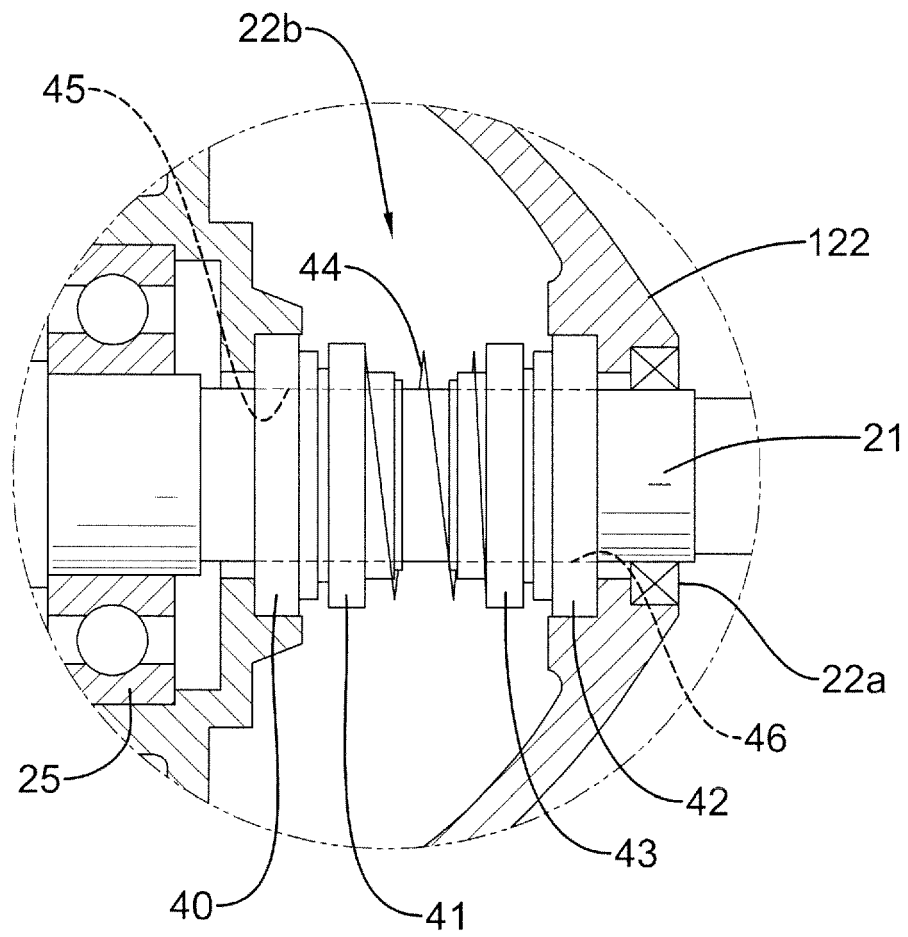
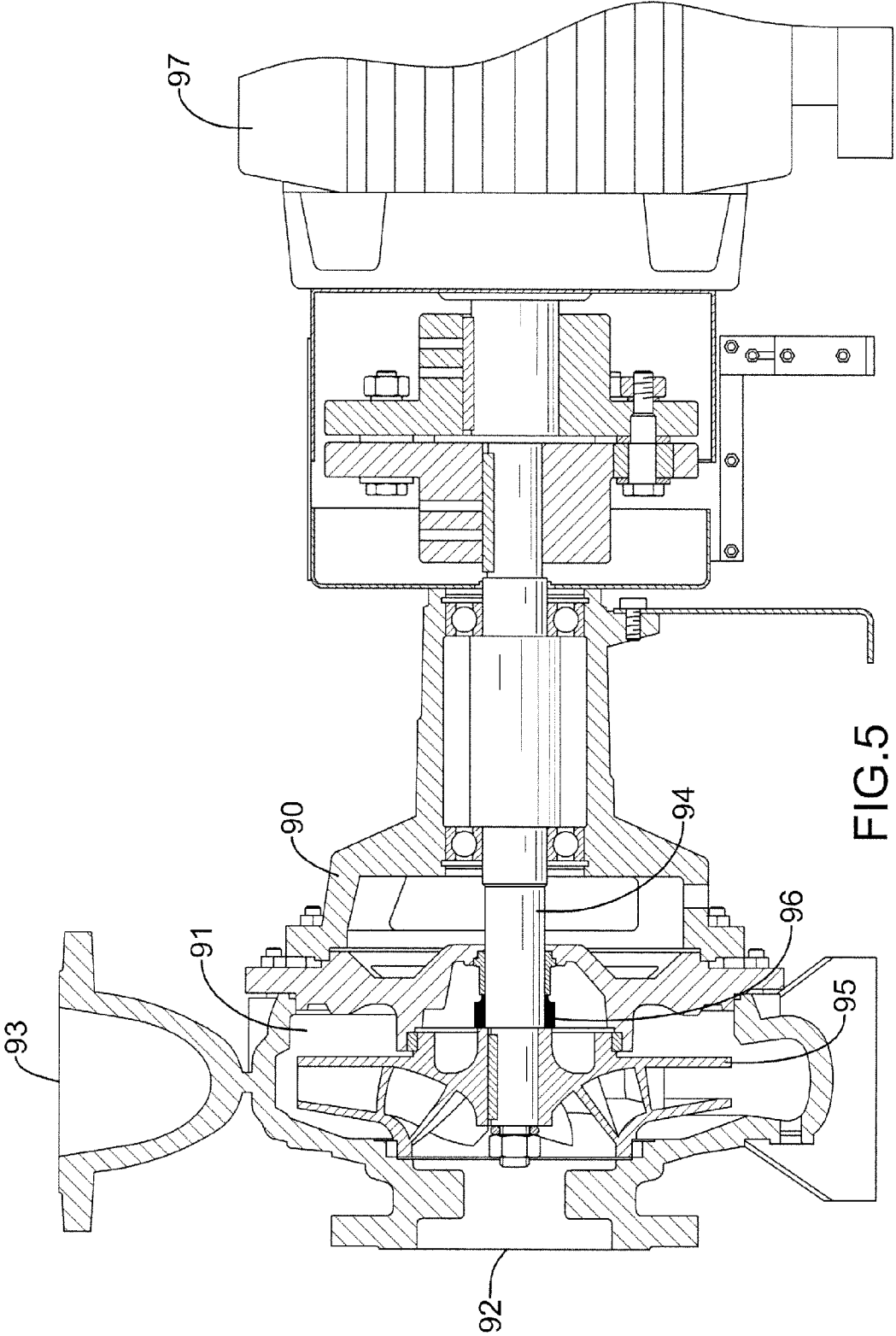


FIG.4



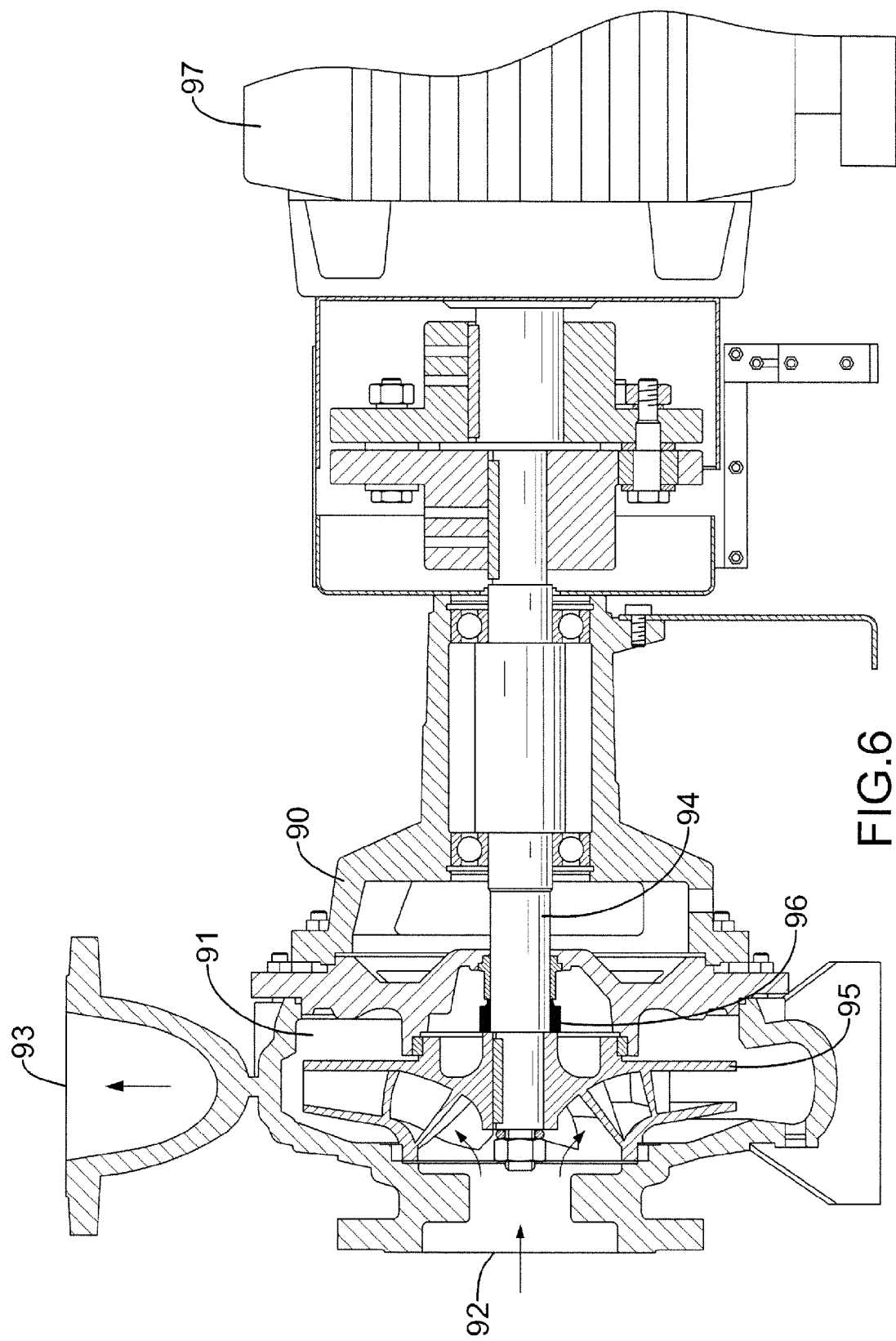


FIG.6
PRIOR ART

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- TW 100217953 [0001]