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(54) **CLOSED WATER BOILER**

(57) Provided is a water boiler is provided which comprises: a tank for water storage; a flow control assembly for controlling water intake and output; a heating assembly located within the tank for heating the water contained in the tank. The tank comprises a lower body, an upper

body, and a leak-tight assembly for sealing a contact portion of the lower body and the upper body. The leak-tight assembly secures the upper body and the lower body, so that the upper body and the lower body can be seal without being welded.

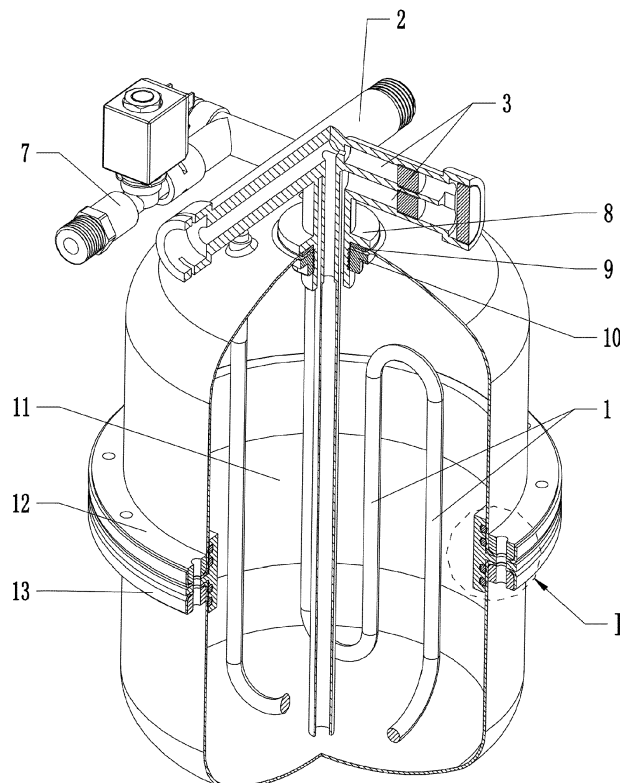


FIG. 2

Description

TECHNICAL FIELD

[0001] The subject matter herein relates to the technical field of water heater, especially to a closed water boiler.

BACKGROUND

[0002] The water boiler is designed and developed to satisfy people's need for drinking boiler water. It is equipment that converts electric energy or combustion of other fuels into heat and therefore boil the water. Most of the water boilers on the market today are open water boilers. Open boilers cannot boil the water in a temperature exceed 100°C because of the atmospheric pressure.

[0003] In some prior arts, there are also some closed water boilers. Those boilers generally have a leak-tight water tank. In the process of heating water, the boiling point of the water contained in the water tank is increased by more than 100°C by increasing the air pressure within the water tank. Because the water tank needs to withstand a higher pressure, the water tank is often made of metal. In this case, the water tank is directly welded by two metal vessels. Welding process may cause some heavy metal residual in the vessel, which could affect the health of drinker. Accordingly, the inventors have made this application after studying the existing technology.

SUMMARY

[0004] The present disclosure provides a novel closed water boiler, aiming to modify the tank of closed water boilers and addressing the problem of causing heavy metal because of welding.

[0005] Accordingly, the present disclosure provides a closed water boiler. The water boiler comprises: a tank for water storage; a flow control assembly for controlling water intake and output; a heating assembly located within the tank for heating the water contained in the tank. The tank comprises a lower body, an upper body arranged above the lower body, and a leak-tight assembly for sealing a contact portion of the lower body and the upper body.

[0006] The lower body and the upper body together form a cavity for water storage. The leak-tight assembly comprises a support member, a first seal member, and a second member. The support member may be an annular geometry. The support member comprises a vertical section which is annular, and a horizontal section which is attached to a periphery of the vertical section. The vertical section is fitted into the cavity. The horizontal section is inserted between the upper body and the lower body. The horizontal section is located at middle of the periphery of the vertical section, and therefore separates the vertical section into an upper vertical section and a

lower upper vertical. The upper vertical section is fitted into the upper body, while the lower vertical section is fitted into the lower body. The first seal member is fitted over the upper vertical section and the second seal member is fitted over the lower vertical section, so that the first seal member is disposed between the upper body and the upper vertical section while the second seal member is disposed between the lower body and the lower vertical section.

[0007] The first seal member is configured to seal the upper vertical section and the upper body. The second seal member is configured to seal the lower vertical section and the lower body.

[0008] In some embodiments, the flow control assembly comprises a flow control member. The flow control member comprises an inflow section for intaking water; a first extend section attached to the inflow section and extended to the cavity; a second extend section fitted over the first extend section and extended to the cavity; a hot water outflow section in communication with the second extend section; a mix section attached to the inflow section; and a warm water outflow section attached to the mix section.

[0009] The mix section comprises a cold water passage; a hot water passage in communication with the second extend section; and a mix passage in communication with the cold water passage and the hot water passage. The warm water outflow section is in communication with the mix passage. A depth of the first extend section being within the cavity is greater than the depth of the second extend section being within the cavity.

[0010] The first extend section is used for introducing water from the outside into the cavity. The second extend section is used for leading the hot water within the cavity to the outside. The hot water outflow section is configured for outflowing hot water. The mix section is used for mixing the water coming from the inflow section and the hot water from the second extend section, and therefore forming a mix water. The warm water outflow section is used for output the mix water.

[0011] In some embodiments, the flow control member comprises a limit section attached to the second extend section and located on the upper body. The flow control assembly comprises a sealing washer fitted over the second extend section and disposed between the limit section and the upper body; and a lock nut in threaded connection with the second extend section and located within the cavity. The lock nut is used for connecting the limit section and the upper body, so that the sealing washer between the limit section and the upper body can be secured tightly. The sealing washer is used for sealing the connection between the flow control member and the upper body.

[0012] In some embodiments, an upper flange is arranged around a first mouth of the upper body, while a lower flange is arranged around a second mouth of the lower body. The upper flange is in connection with the lower flanged by a bolt.

[0013] In some embodiments, the tank comprises an upper washer disposed on the upper flange; and a lower washer disposed on the lower flange. The bolt passes through the upper washer, the upper flange, the horizontal section, the lower flange, and the lower washer respectively.

[0014] In some embodiments, the first seal member may be at least one seal ring fitted over the vertical section. The second seal member may be at least one seal ring fitted over the vertical section.

[0015] In some embodiments, the water boiler comprises a temperature detecting member inserted into the cavity. The temperature detecting member is used for detecting a temperature of the hot water within the cavity.

[0016] In some embodiments, the flow control assembly comprises an electromagnetic valve attached to the hot water outflow section. The electromagnetic valve is configured for controlling an on-off function of the hot water outflow section.

[0017] In some embodiments, the inflow section comprises a first end and a second end opposite to and in communication with the first end. The first end is an inlet end for intaking water, while the second end is a safe end for connecting to a decompression valve. The inlet end and the safe end are both connected to and in communication to the first extend section. The water boiler comprises the decompression valve attached to the safe end.

[0018] By using the described technical solution, the present disclosure can at least achieve the following technical effects.

[0019] The closed water boiler provided by the present disclosure comprises a tank for water storage. The tank comprises an upper body, a lower body, and a leak-tight assembly. The leak-tight assembly comprises a support member having a vertical section and a horizontal section, a first seal member, and a second seal member. The horizontal section is located between the upper body and the lower body, while the vertical section is located within the cavity formed by the upper body and the lower body. The first seal member is fitted over the vertical section and arranged between the vertical section and an inner wall of the upper body, so that the support member and the upper body can be tightly sealed. The second seal member is fitted over the vertical section and arranged between the vertical section and an inner wall of the lower body, so that the support member and the lower body can be tightly sealed. Namely, the leak-tight assembly can tightly seal a connection between the support member and the upper body, and a connection between the support member and the lower body. Meanwhile, the described technical solution eliminates the use of welding to secure the upper body and the lower body, and in some certain avoids the heavy metals being introduced into the tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In order to more clearly illustrate the technical solutions of the embodiments of the present disclosure, the drawings to be used in the embodiments will be briefly described below. It should be understood that the following drawings show only certain embodiments of the present disclosure, and therefore it should not be seen as a limitation on the scope, and those skilled in the art can obtain other related drawings according to the drawings within the spirit of the scope.

Fig. 1 is a perspective view of a water boiler according to one embodiment of the present disclosure.

Fig. 2 is a schematic cross-sectional view of the water boiler according to one embodiment of the present disclosure.

Fig. 3 is an exploded view of the water boiler according to one embodiment of the present disclosure.

Fig. 4 is a schematic cross-sectional view of a flow control member according to one embodiment of the present disclosure.

Fig. 5 is a partial enlarged view of I portion as shown in Fig. 2.

Reference Number

[0021] 1-heating assembly; 2-inflow section; 3-mix section; 4-temperature detecting member; 5-warm water outflow section; 6-tank; 7-hot water outflow section; 8-limit section; 9-sealing washer; 10-lock nut; 11-cavity; 12-upper flange; 13-lower flange; 14-electromagnetic valve; 15-inlet end; 16-safe end; 17-first plug; 18-flow control member; 19-upper washer; 20-upper body; 21-first seal member; 22-second seal member; 23-support member; 24-leak-tight assembly; 25-lower body; 26-lower washer; 27-heating member; 28-vertical section; 29-horizontal section; 30-cold water passage; 31-hot water passage; 32-mix passage; 33-first extend section; 34-second extend section.

DETAILED DESCRIPTION OF THE INVENTION

[0022] The present disclosure will be further described in detail below with reference to the drawings and specific embodiments, in order to better understand the objective, the technical solution and the advantage of the present disclosure. It should be understood that the specific embodiments described herein are merely illustrative and are not intended to limit the scope of the disclosure.

[0023] In the description of the present disclosure, it is to be understood that the terms "center", "longitudinal", "transversal", "vertical", "horizontal", "top", "bottom", "inside", "outside", and other terms related to position re-

relationship or orientation relationship are based on the position or orientation relationship shown in the drawings, and are merely for the convenience of describing the present disclosure, rather than indicating or implying that the device or component referred to has a specific orientation or position, or is constructed and operated in a specific orientation. Therefore, it should not be construed as limitation to the invention.

[0024] Moreover, the terms "first" and "second" are used for descriptive purposes only and are not to be construed as indicating or implying a relative importance or implicitly indicating the number of technical features indicated. Thus, features defining "first" and "second" may include one or more of the features either explicitly or implicitly.

[0025] In the present invention, the terms "connected", "attached", "secured" and the like shall be understood broadly, and may be either a fixed connection, a detachable connection, formed in one piece, unless otherwise explicitly defined. The connection can be mechanical connection, or electrical connection; directly connected or indirectly connected through an intermediate medium. The connection may be an internal communication of two elements or the interaction of two elements. The specific meanings of the above terms in the present disclosure can be understood by those skilled in the art.

[0026] In the present invention, a first feature "on" or "under" a second feature may include direct contact of the first and second features, and may also include an indirect contact of the first and second features but instead through another features, unless otherwise specifically defined.

[0027] The present disclosure will be specified in conjunction with the drawings and the detailed embodiments in follows.

[0028] As shown in Fig. 1, Fig. 2, Fig. 3, and Fig. 5, a novel closed water boiler is provided. The water boiler comprises a tank 6 for water storage; a flow control assembly for controlling water intake and output; a heating assembly 1 for heating the water contained in the tank 6. The tank 6 comprises a lower body 25, an upper body 20 arranged above the lower body 25, and a leak-tight assembly 24 for sealing a contact portion of the lower body 25 and the upper body 20.

[0029] The lower body 25 and the upper body 20 together form a cavity 11 for water storage. The leak-tight assembly 24 comprises a support member 21, a first seal member 22, and a second member 23. The support member 21 may be an annular geometry having a "—" shaped side sectional view. The support member 23 comprises a vertical section 28 which is annular, and a horizontal section 29 which is attached to a periphery of the vertical section 28. The vertical section 28 is fitted into the cavity 11. The horizontal section 29 is located between the upper body 20 and the lower body 25. The horizontal section 29 is located at middle of the periphery of the vertical section 28, and therefore separates the vertical section 28 into an upper vertical section and a lower upper ver-

tical. The upper vertical section is fitted into the upper body 20, while the lower vertical section is fitted into the lower body 25. The first seal member 21 is fitted over the upper vertical section and the second seal member 22 is fitted over the lower vertical section, so that the first seal member 21 is disposed between the upper body 20 and the upper vertical section while the second seal member 22 is disposed between the lower body 25 and the lower vertical section.

[0030] The first seal member 21 is configured to seal the upper vertical section and the upper body 20. The second seal member 22 is configured to seal the lower vertical section and the lower body 25. In some embodiments, the upper body 20 and the lower body 25 are made of titanium alloy. It is conceivable that the upper body comprises an upper cavity with an opening mouth, and the lower body comprises a lower cavity with an opening mouth. The cavity 11 is a cylindrical chamber formed by the upper cavity and the lower cavity. The support member is an annular geometry. Four slots may be arranged around a periphery of the vertical section 28. The first seal member 21 may comprise two O-rings arranged over two of the slots, while the second seal member 22 may comprise two O-rings arranged over the other two of the slots. Namely, in this embodiment, four O-rings are provided to fit over the four slots. In some embodiments, the tank comprises at least one bolt passing through the upper body 20, the horizontal section 29, and the lower body 25. Said bolt secures the upper body 20 and the lower body 25 to the horizontal section 29 tightly and ensures the vertical section 28 provide support within the cavity 11.

[0031] As shown in Fig. 2 and Fig. 5, the first seal member 21 seals the connection between the support member 23 and the upper body 20 by being fitted over the vertical section 28 and located between the vertical section 28 and an inner wall the upper body 20; the second seal member 22 seals the connection between the support member 23 and the lower body 25 by being fitted over the vertical section 28 and located between the vertical section 28 and an inner wall the lower body 25. It is conceivable that the leak-tight assembly 24 can seal a connection between the support member 23 and the upper body 20, and also a connection between the support member 23 and the lower body 25. The described technical solution eliminates the use of welding to secure the upper body and the lower body, and in some certain avoids the heavy metals being introduced into the tank. In some other embodiments, the first seal member 21 and the second seal member 22 each may be one or more O-rings. In that case, the vertical section 28 may be provided with equivalent slots around the outer periphery.

[0032] As shown in Figs. 1-4, in some embodiments, the flow control assembly comprises a flow control member 18. The flow control member 18 comprises an inflow section 2 for intaking water; a first extend section 33 attached to the inflow section 2 and extended to the cavity

11; a second extend section 34 fitted over the first extend section 33 and extended to the cavity 11; a hot water outflow section 7 in communication with the second extend section 34; a mix section 3 attached to the inflow section 2; and a warm water outflow section 5 attached to the mix section 3. As shown in Fig. 4, the mix section 3 comprises a cold water passage 30 in communication with the inflow section 2; a hot water passage 31 in communication with the second extend section 34; and a mix passage 32 in communication with the cold water passage 30 and the hot water passage 31. The warm water outflow section 5 is in communication with the mix passage 32. As shown in Fig. 3, a depth of the first extend section 33 being within the cavity 11 is greater than the depth of the second extend section 34 being within the cavity 11. It is to be understood that the first extend section 33 is used for introducing water from the outside into the cavity 11. The second extend section 34 is used for leading the hot water within the cavity 11 to the outside. The hot water outflow section 7 is configured for outputting the hot water. The mix section 3 is used for mixing the water coming from the inflow section 2 and the hot water from the second extend section 34, and therefore forming a mix water. The warm water outflow section 5 is used for output the mix water. As shown in Figs. 2 and 4, the mix section 3 comprises a pipeline having two passages. Each of the two passages comprises a through hole at one end. The through hole is in communication with the outside. The hot water outflow section is in communication with the through hole. Additionally, the flow control assembly further comprises a first plug 17 attached to the through hole. The first plug 17 is in seal fit to the through hole. The first plug 17 can avoid the water passing through the mix section 3 from leaking out. As shown in Figs. 2 and 3, the heating assembly 1 comprises a heating member 27 passing through the upper body 20 and being extended into the cavity 11. The heating member 27 may be a resistance heating element. The heating assembly 1 and the upper body 20 may be welded by Ni paste.

[0033] As shown in Figs. 2 and 4, in some embodiments, the first extend section 33 extends deeper within the cavity 11 than the second extend section 34, so the cold water from the first section 33 will enter a lower part of the cavity 11. The second extend section 34 is in communication with an upper part of the cavity 11, so the water outflow from the second extend section 34 will be hot water heated by the heating assembly 1. As shown in Fig. 4, in some embodiments, the first extend section 33 and the second extend section 34 are homocentric, wherein the second extend section 34 is fitted over the first extend section 33. Water from outside can be introduced to the cavity 11 by the inflow section 2 and the first extend section 33, while the hot water heated by the cavity 11 can be lead to the hot water outflow section 7 and the hot water passage 31 from a gap between the first extend section 33 and the second extend section 34, more specifically between a outer wall of the first extend

section 33 and an inner wall of the second extend section 34. By this design, the described water boiler can output both hot water and warm water. In some embodiments, the mix water out from the warm water outflow section 5 may have a temperature about 65 °C. Such mix water can be used for bathing directly.

[0034] As shown in Figs. 2-4, in some embodiments, the flow control member 18 comprises a limit section 8 configured on the second extend section 34 and supported on the upper body 20. The flow control assembly comprises a sealing washer 9 and a lock nut 10. The sealing washer 9 is fitted over the second extend section 34 and is located between the limit section 8 and the upper body 20. The lock nut 10 is in thread connection to the second extend section 34 and disposed within the cavity 11. The lock nut 10 is configured for making the limit section 8 and the upper body 20 both abutted against the sealing washer 9. The sealing washer 9 is configured for sealing the connection between the flow control member 18 and the upper body 20. In some embodiments, the limit section 8 may be an annular sheet secured on the second extend section 34.

[0035] As shown in Figs. 3 and 5, in some embodiments, an upper flange 12 is arranged around a first mouth of the upper body 20, while a lower flange 13 is arranged around a second mouth of the lower body 25. The tank 6 further comprises an upper washer 19 disposed on the upper flange 12, a lower washer 20 disposed on the lower flange 13, and a plurality of bolts. The plurality of bolt pass through the upper washer 19, the upper flange 12, the horizontal section 29, the lower flange 13, and the lower washer 26 respectively, so that the upper body 20 is attached to the lower body 25 with the horizontal section 29 being secured therebetween. In some embodiments, the upper washer 19 and the lower washer 20 can make the connection between the upper body 20 and the lower body 25 more stable.

[0036] As shown in Fig. 3, in some embodiments, the water boiler comprises a temperature detecting member 4 inserted into the cavity 11. The temperature detecting member 4 is used for detecting a temperature of the hot water within the cavity 11. The flow control assembly comprises an electromagnetic valve 14 attached to the hot water outflow section 7. The electromagnetic valve 14 is configured for controlling an on-off function of the hot water outflow section 7. The electromagnetic valve 14 is used for controlling an on and off state of the hot water outflow section 7. Additionally, in some embodiments, the inflow 2 comprises a first end 15 and a second end 16 opposite to and in communication with the first end 15. The first end 15 is an inlet end for intaking water, while the second end 16 is a safe end for connecting to a decompression valve. The inlet end 15 and the safe end 16 are both connected to and in communication to the first extend section 33. The water boiler comprises the decompression valve (not shown) attached to the safe end. When the temperature of the water within the cavity 11 is too high because of overheat, the decom-

pression valve can decompress the cavity, and therefore ensure the safe of the water boiler.

[0037] In some other embodiments, the upper flange 12, the lower flange 13, and the horizontal section 29 may be connected together by bolts without the use of the upper washer 19 and the lower washer.

[0038] The above are merely embodiments of the present disclosure and are not intended to limit the present disclosure. Any modifications, equivalent replacements, and improvements made within the spirit and principle of the present disclosure may be made by one of ordinary skill in the art and shall be comprised in the protection of the present disclosure.

Claims

1. A water boiler comprises

a tank (6) for water storage; a flow control assembly for controlling water intake and output;

a heating assembly (1) located within the tank (6) for heating the water contained therein; **characterized in that**

the tank (6) comprises a lower body (25), an upper body (20) arranged above the lower body (25), and a leak-tight assembly (24) for sealing a contact portion of the lower body (25) and the upper body (20); the lower body (25) and the upper body (20) together form a cavity (11) for water storage; the leak-tight assembly (24) comprises a support member (23), a first seal member (21), and a second seal member (22); the support member (23) is an annular geometry which comprises a vertical section (28), and a horizontal section (29) which is attached to a periphery of the vertical section (28); the vertical section (28) is fitted into the cavity (11); the horizontal section (29) is inserted between the upper body (20) and the lower body (25);

the horizontal section (29) is located at middle of the periphery of the vertical section (28), and therefore separates the vertical section (28) into an upper vertical section and a lower upper vertical; the upper vertical section is fitted into the upper body (20), while the lower vertical section is fitted into the lower body (25); the first seal member (21) is fitted over the upper vertical section and the second seal member (22) is fitted over the lower vertical section, so that the first seal member (21) is disposed between the upper body (20) and the upper vertical section while the second seal member (22) is disposed between the lower body (25) and the lower vertical section; the first seal member (21) is configured to seal the upper vertical section and the upper body (20); the second seal member (22) is configured to seal the lower vertical section and the lower body (25).

2. The water boiler according to claim 1, **characterized in that** the flow control assembly comprises a flow

control member (18); the flow control member comprises an inflow section (18) for intaking water; a first extend section (33) attached to the inflow section (18) and extended to the cavity (11); a second extend section (34) fitted over the first extend section (33) and extended to the cavity (11); a hot water outflow section (7) in communication with the second extend section (34); a mix section (3) attached to the inflow section (2); and a warm water outflow section (5) attached to the mix section (3);

the mix section (3) comprises a cold water passage (30) in communication with the inflow section (2); a hot water passage (31) in communication with the second extend section (34); and a mix passage (32) in communication with the cold water passage (30) and the hot water passage (31); the warm water outflow section (5) is in communication with the mix passage (32); a depth of the first extend section (33) being within the cavity (11) is greater than the depth of the second extend section (34) being within the cavity (11);

the first extend section (33) is used for introducing water from the outside into the cavity (11). The second extend section (34) is used for leading the hot water within the cavity (11) to the outside; the hot water outflow section (7) is configured for outputting the hot water; the mix section (3) is used for mixing the water coming from the inflow section (2) and the hot water from the second extend section (34), and therefore forming a mix water; the warm water outflow section (5) is used for outputting the mix water.

3. The water boiler according to claim 2, **characterized in that** the flow control member (18) comprises a limit section (8) attached to the second extend section (34) and located on the upper body (20); the flow control assembly comprises a sealing washer (9) fitted over the second extend section (34) and disposed between the limit section (8) and the upper body (20); and a lock nut (10) in threaded connection with the second extend section (34) and located within the cavity (11); the lock nut (10) is used for connecting the limit section (8) and the upper body (20), so that the sealing washer (9) between the limit section (8) and the upper body (20) is secured tightly; the sealing washer (9) is used for sealing the connection between the flow control member (18) and the upper body (20).

4. The water boiler according to claim 1, **characterized in that** an upper flange (12) is arranged around a first mouth of the upper body (20), while a lower flange (13) is arranged around a second mouth of the lower body (25); the upper flange (12) is in connection with the lower flange (13) by a bolt.

5. The water boiler according to claim 4, **characterized in that** the tank (6) comprises an upper washer (19)

disposed on the upper flange (12); and a lower washer (26) disposed on the lower flange (13); the bolt passes through the upper washer (19), the upper flange (12), the horizontal section (29), the lower flange (13), and the lower washer (26) respectively. 5

6. The water boiler according to claim 1, **characterized in that** the first seal member (21) is at least one seal ring fitted over the vertical section (28); the second seal member is at least one seal ring fitted over the vertical section (28). 10

7. The water boiler according to claim 1, **characterized by** further comprising a temperature detecting member (4) inserted into the cavity (11); the temperature detecting member (4) is used for detecting a temperature of the hot water within the cavity (11). 15

8. The water boiler according to claim 2, **characterized in that** the flow control assembly comprises an electromagnetic valve (14) attached to the hot water outflow section (7); the electromagnetic valve (14) is configured for controlling an on-off function of the hot water outflow section (7). 20

9. The water boiler according to claim 2, **characterized in that** the inflow section (2) comprises a first end (15) and a second end (16) opposite to and in communication with the first end (15); the first end (15) is an inlet end for intaking water, while the second end (16) is a safe end for connecting to a decompression valve; the inlet end (15) and the safe end (16) are both connected to and in communication to the first extend section (33); the water boiler comprises the decompression valve attached to the safe end (16). 25 30 35

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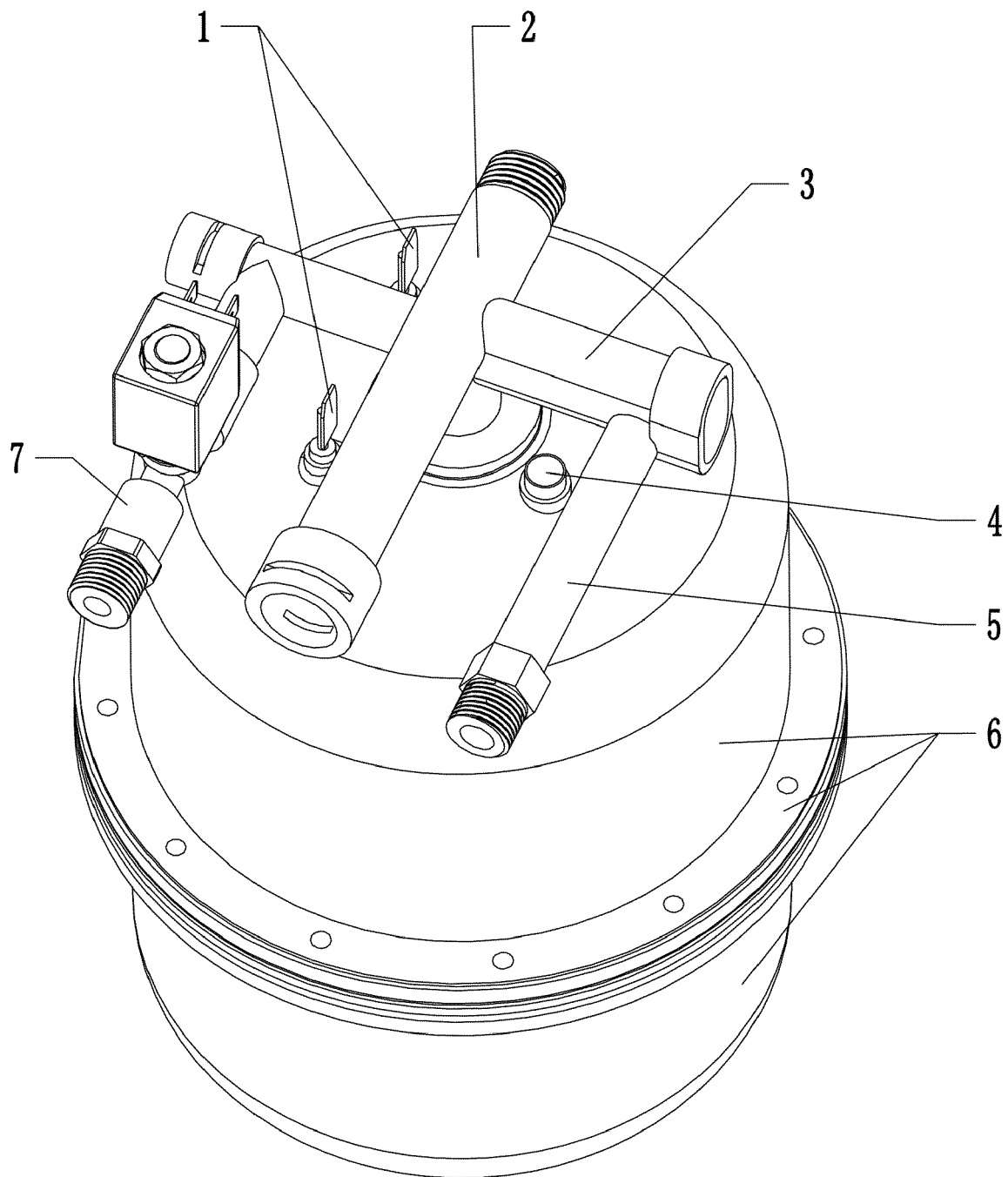


Fig. 1

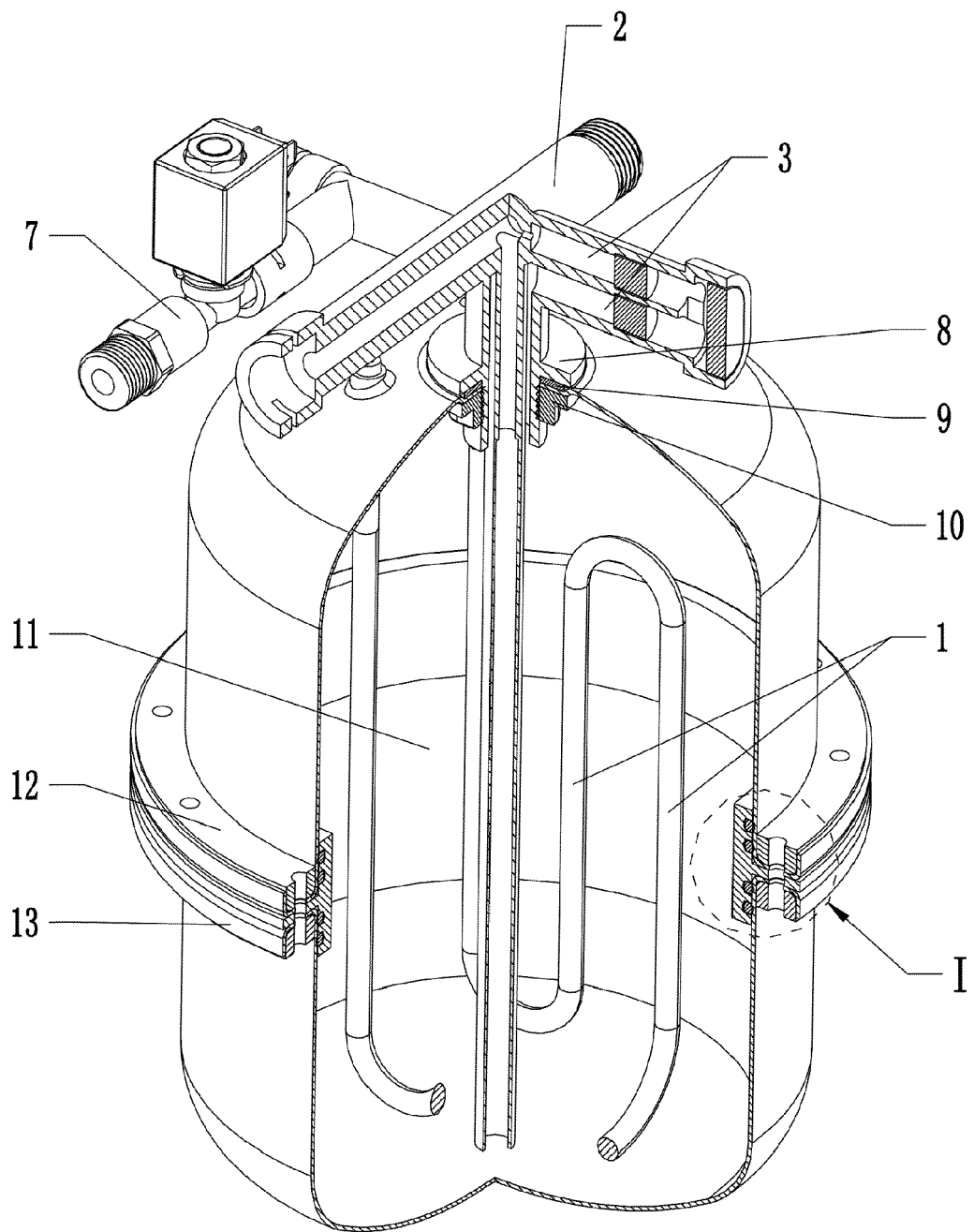


FIG. 2

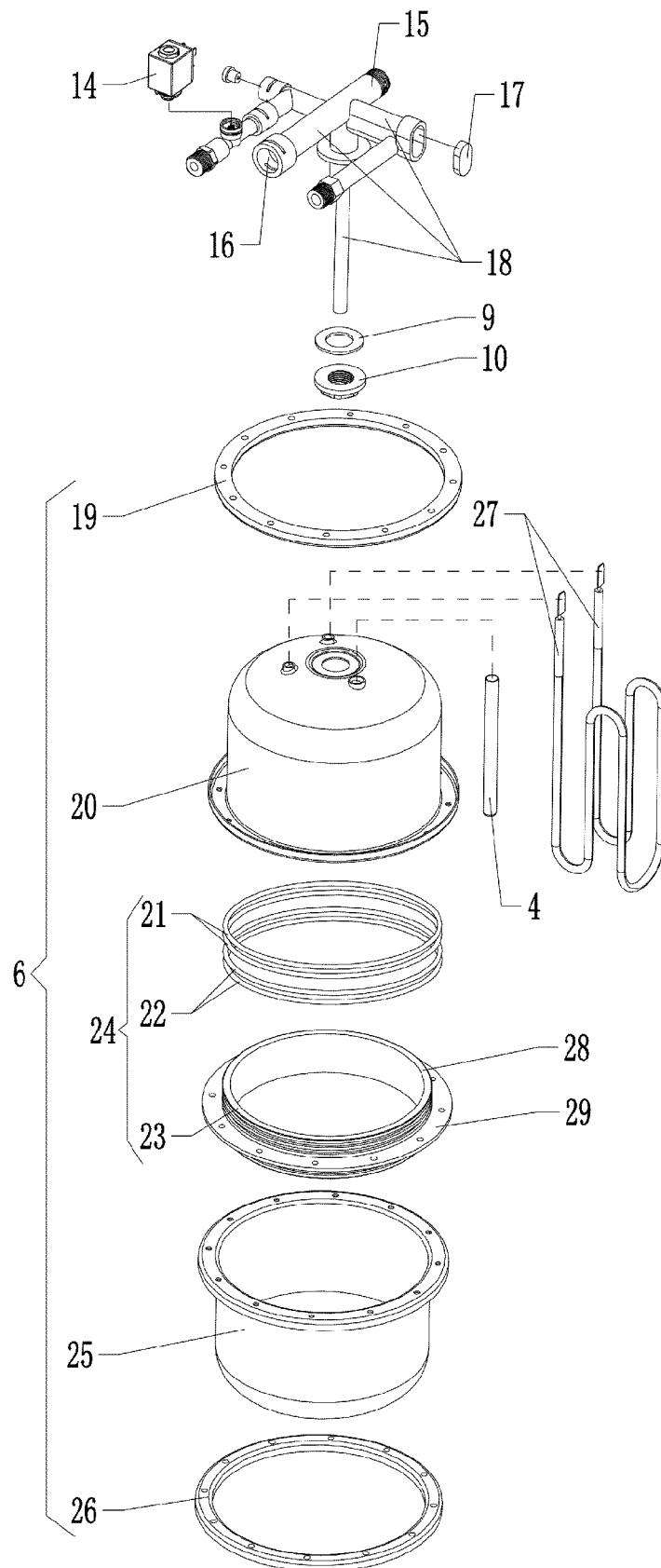


FIG. 3

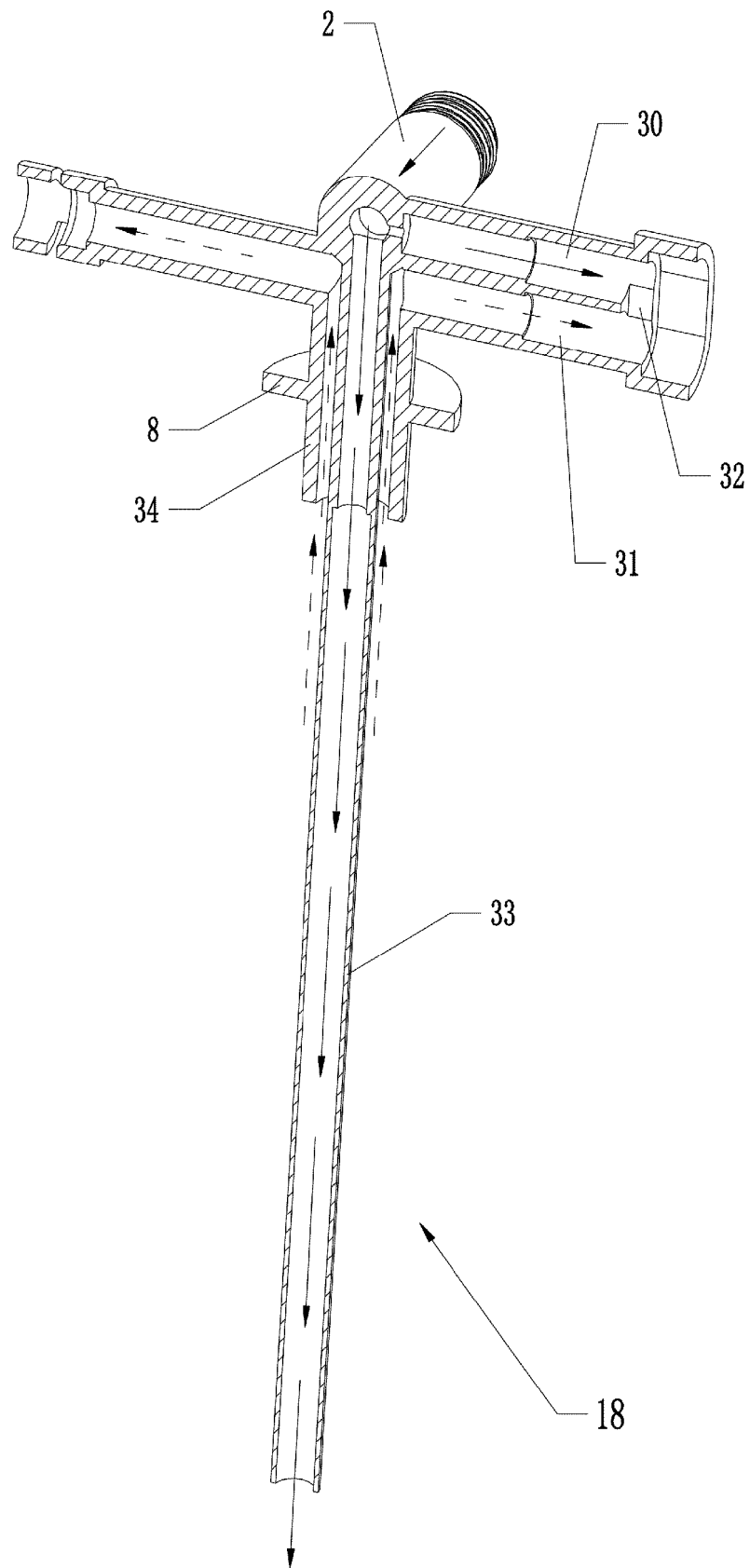


FIG. 4

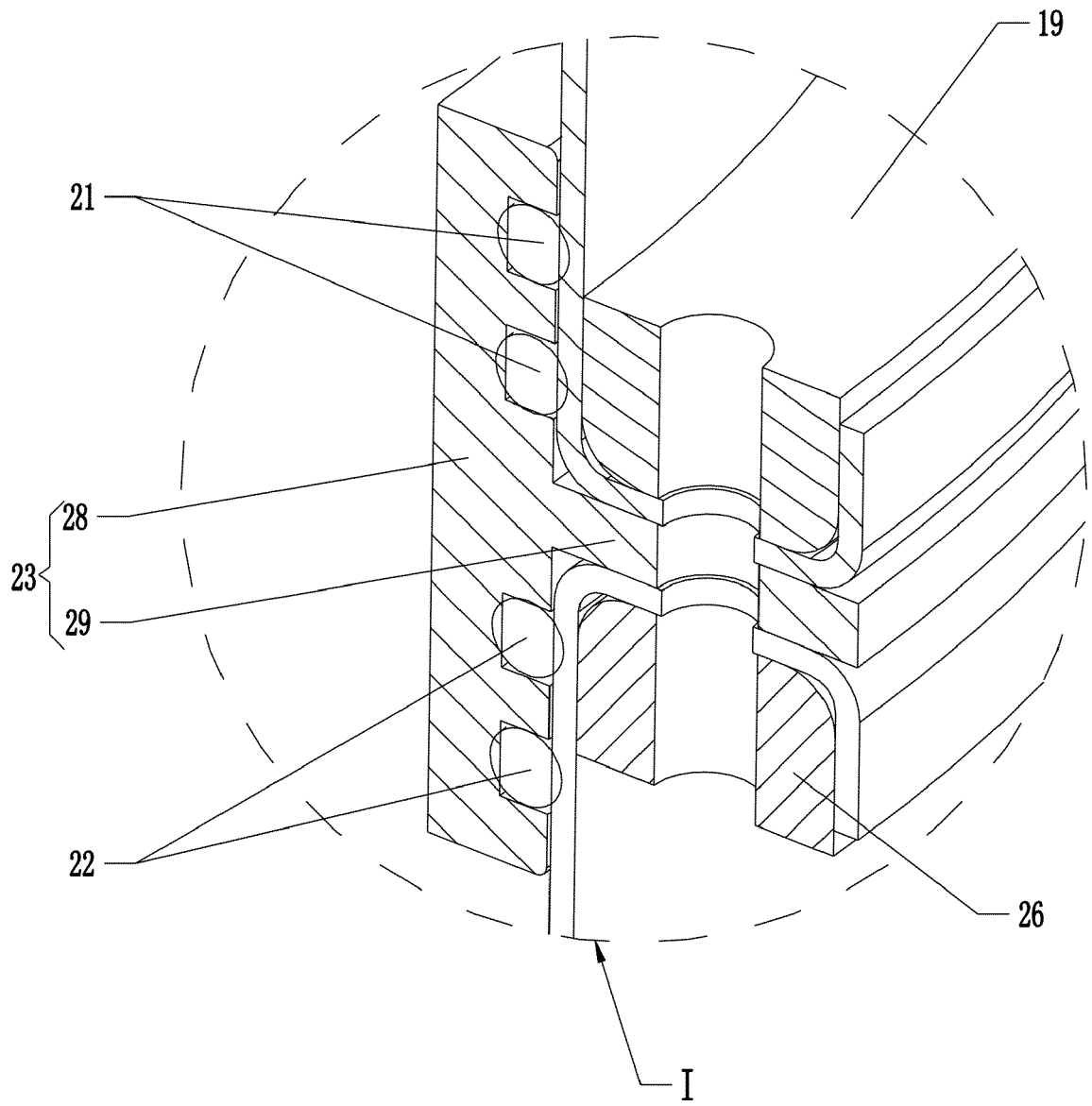


FIG. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 19 15 1730

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Place of search Munich		Date of completion of the search 3 April 2019	Examiner Ast, Gabor
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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