(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 925 085 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.09.2015 Bulletin 2015/40

(21) Application number: **14162137.5**

(22) Date of filing: **27.03.2014**

(51) Int Cl.:
H05B 1/02 *(2006.01)* ***F24H 9/20*** *(2006.01)*
A41D 19/015 *(2006.01)* ***A61F 7/00*** *(2006.01)*
G05D 23/00 *(2006.01)* ***H05B 3/80*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **Liang, Shengquan**
Foshan, Guangdong 528300 (CN)

(72) Inventor: **Liang, Shengquan**
Foshan, Guangdong 528300 (CN)

(74) Representative: **Arpe Fernandez, Manuel de Guzmán el Bueno, 133**
(Edificio Germania)
28003 Madrid (ES)

(54) **Electric hot water warmer and heating device employing such a warmer**

(57) The invention provides an electric hot water warmer including a sealed warmer body, a heating unit and a power unit. A liquid medium for transmitting heat is filled in a sealed cavity inside the sealed warmer body. The total volume of the liquid medium when expanding or vaporized under predetermined temperature corresponds to the normal volume of the liquid medium under room temperature. The heating unit is disposed in the sealed cavity and immersed in the liquid medium. The power unit is sealingly connected with the sealed warmer body. A part of the power unit is exposed in the exterior of the sealed warmer body, and another part thereof is sealed in the sealed cavity of the sealed warmer body. The power unit is electrically connected with the heating unit. The invention further provides a heating device includes aforementioned electric hot water warmer and a charging rack. The charging rack includes a base, a connecting table, a protection device, a charging arm and a power line. The invention has advantages of convenient carry, safety and reliability, and comfort and practicality.

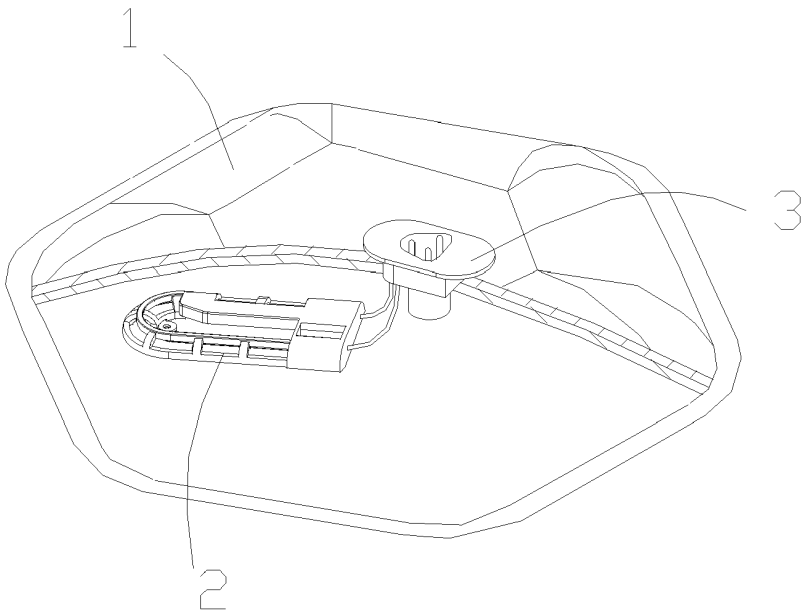

Figure 1

EP 2 925 085 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of heating device, and particularly to an electric hot water warmer and heating device employing such a warmer.

BACKGROUND OF THE INVENTION

[0002] In the cold winter, many people may use some heating devices to get warm, such as electric warmers. However, such heating devices all need one power supply unit, and therefore the volumes of such heating devices are huger. Obviously, they are not convenient for users to carry, causing the practicalities of the electric warmers are greatly reduced.

[0003] There is still one hot water warmer. The hot water warmer is made of water-proof material to a sealed warmer body, the internal cavity of which is used for storing hot water. When it is used, users need to pour hot water heated in advance into the internal cavity of the hot water warmer. The heat is transmitted to the warmer body through hot water, and then the heat is transmitted to human body through the warmer body, thus heating effect being achieved. However, the hot water in this hot water warmer can not provide heat for a long time. When this hot water warmer is used over a period of time, the heat of the water inside the hot water warmer is gradually dissipating and thus the heating effect is rapidly declined. At this moment, users need to pour the water in the internal cavity out and pour hot water into the hot water warmer again. Therefore, users need to often replace hot water to maintain the heating effect of the hot water warmer, thus the using of which being not convenient. And, in the process of pouring hot water heated in advance into the internal cavity of warmer body, hot water is easily overturned due to manual operation, making human body directly contact with hot water, which easily causes accident that human body is scalded. And the texture of the warmer body is not soft, so it is not beneficial to the contact with human body, influencing the comfort.

[0004] There is occurred a hot water warmer employing electricity to heat in the market now.

[0005] Such hot water warmer is provided with a heat generating tube and equipped with corresponding charging device. But the heat generating tube only has function of generating heat and has no safety function. Once the heating temperature is too high, human body is easily scalded or burned. When serious, dry burning may happen and even the fire happens. The consequence is inconceivable. In addition, the charging device matched with the hot water warmer also has no safety function. When the temperature of the heat generating tube is too high, the charging device is required to be cut off. If the electricity is continued to be provided, the liquid in the hot water warmer may be overheat to expand to a great extent, causing the warmer body being exploded. Once the warmer body is exploded, serious accident that the liquid in the warmer body is splashed will be caused, easily causing human body scalded.

[0006] It is not hard to see that there exists a certain defect in the prior art.

SUMMARY OF THE INVENTION

[0007] The invention provides an electric hot water warmer and a heating device incorporating this electric hot water warmer which have anti-dry burning and anti-explosion functions and have advantages of convenient carry, comfort and practicality.

[0008] In order to achieve above described aim, the following technical solutions are employed:

An electric hot water warmer includes a sealed warmer body, a heating unit and a power unit. A liquid medium for transmitting heat is filled in a sealed cavity inside the sealed warmer body. The total volume of the liquid medium when expanding or vaporized under predetermined temperature corresponds to the normal volume of the liquid medium under room temperature. The heating unit is disposed in the sealed cavity and immersed in the liquid medium. The power unit is sealingly connected with the sealed warmer body. A part of the power unit is exposed in the exterior of the sealed warmer body, and another part thereof is sealed in the sealed cavity of the sealed warmer body. The power unit is electrically connected with the heating unit.

[0009] Further, the heating unit includes a heat generating body, an outer casing and a safety unit. The outer casing is made up of an upper casing and a lower casing. A hollowed-out structure is provided in the outer casing. The heat generating body is disposed in the outer casing and contacts the liquid medium through the hollowed-out structure in the outer casing. A safety unit mounting portion is also provided in the outer casing. The safety unit mounting portion is provided to closely abut to the one side of the heat generating body. The safety unit is mounted in the safety unit mounting portion and is cascaded with the heat generating body. The safety unit is used for providing overheating power-off protection. The safety unit and the heat generating body are then electrically connected with the power unit respectively through wire.

[0010] Further, the safety unit is a fuse.

[0011] Further, the periphery of the safety unit is sealed by silicone.

[0012] Further, the heating unit further includes a spring clip clamping the safety unit and the heat generating body fixed. The spring clip is used for ensuring close abutment between the safety unit and the heat generating body and sufficient heat transmission.

[0013] Further, the spring clip is made of heat conducting material.

[0014] Further, the heat generating body is a heating generating tube.

[0015] The sealed warmer body includes an inner warmer body and an outer warmer body. The inner warmer body is located at the innermost layer of the sealed warmer body and it is made of flexible waterproof material. The sealed cavity formed by the inner warmer body is used to store the liquid medium. The outer warmer body is located at the outermost layer of the sealed warmer body and it is made of flexible material. The outer warmer body is intimately fitted with the outer warmer body. The outer warmer body is used for contact with human body.

[0016] The power unit includes a mounting sleeve, a temperature controlling unit and a socket. The mounting sleeve includes an external portion and an internal portion. The mounting sleeve is sealingly connected with the sealed warmer body. The external portion of the mounting sleeve is exposed to the exterior of the sealed warmer body, and the internal portion of the mounting sleeve is sealed in the sealed cavity of the sealed warmer body. A temperature controlling unit is provided in the internal portion of the mounting sleeve and is cascaded with the heating unit. The temperature controlling unit is used for controlling the conduction and the breakage state of the circuit according to the internal temperature of the electric hot water warmer. The socket is mounted on the external portion of the mounting sleeve and is exposed to the exterior of the sealed warmer body. The socket is electrically connected with the temperature controlling unit and the heating unit, constituting a complete circuit.

[0017] Further, the temperature controlling unit is a temperature controller.

[0018] The power unit further includes an indicator light. The indicator light is mounted on the external portion of the mounting sleeve and is exposed to the exterior of the sealed warmer body. The indicator light is paralleled with the heating unit.

[0019] The power unit further includes a cover. The cover is disposed on the socket and is movably connected with the power unit for controlling the exposure and the closing of the socket.

[0020] A heating device includes aforementioned electric hot water warmer and a charging rack. The charging rack includes a base, a connecting table, a protection device, a charging arm and a power line. The base is used to support the electric hot water warmer thereon. The connecting table is fixed on the base. The connecting table has a hollow structure and the protection device is disposed in the interior thereof. The charging arm has a hollow structure, and has one articulating end and one connecting end. The articulating end of the charging arm is hinged to the upper end of the connecting table. The connecting end of the charging arm is provided with a jack matching with the power unit. The jack is disposed in the electrical circuit inside the connecting arm and is electrically connected with the protection device. One end of the power line is electrically connected with the protection device and the other end is provided with a plug.

[0021] The protection device includes a micro switch. The micro switch is connected between the power line and the jack for controlling the conduction and the breakage of the circuit of the power line and the jack. The micro switch includes a fixed contact and a movable contact. The fixed contact is fixed inside the connecting table of the charging arm and is electrically connected with the power line. The movable contact is fixed to the charging arm and is electrically connected with the jack. The rotation movement of the charging arm around its own articulating end may drive the movable contact to move, thus controlling the connectivity and the disconnectivity of the fixed contact and the movable contact.

[0022] The charging rack further includes an indicator light. The indicator light is mounted on the charging arm and is paralleled with the heating unit through the socket and the jack.

[0023] An electric hot water warmer and a heating device incorporating the electric hot water warmer provided by the invention have the following advantages:

Having triple protection: power-off protection is performed by a safety unit, the conduction and breakage of the circuit is controlled by a temperature controlling unit, and a protection device prevents the sealed warmer body from expanding to be broken in the process of the charging, completely avoiding potential dry burning and explosion danger and thus having a significant high security;

A small volume, simple structure and convenient carry;

[0024] The texture of the electric hot water warmer being soft which is beneficial to the contact with human body, comforting the human body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] In order to more clearly illustrate embodiments of the invention or the technical solutions in the prior art, there is provided a brief introduction to the accompanying drawings which are necessary in the description of the embodiments or the prior art below. Obviously, the drawings described below are only a few embodiments of the invention. For those ordinary skilled in the art, other drawings may be obtained according to these drawings under the premise that creative work is not done.

Figure 1 is a structural schematic view of an electric hot water warmer provided by the embodiment of the invention.

Figure 2 is a structural schematic view of a sealed warmer body.

Figure 3 is a structural schematic view of a heating unit.

Figure 4 is a structural schematic view of a power unit.

Figure 5 is a schematic view of a power unit having another structure.

Figure 6 is a structural schematic view of a heating device provided by the embodiment of the invention in a normal charged state.

Figure 7 is a structural schematic view of a heating device provided by the embodiment of the invention in a protection device action state.

Illustration of the reference numeral

1-sealed warmer body	2-heating unit
3-power unit	4-outer warmer body
5-inner warmer body	6-sealed cavity
7-outer casing	8-upper casing
9-lower casing	10-heat generating body
11-safety unit mounting portion	12-safety unit
13-spring clip	14-mouting sleeve
15-external portion	16-internal portion
17-temerature controlling unit	18-socket
19-indicator light	20-charging rack
21-base	22-connecting table
23-charging arm	24-jack
25-power line	26-plug
27-protection device	28-fixed contact
29-movable contact	

DETAILED DESCRIPTION

[0026] In order to make the purpose, technical solutions and advantages of the embodiments more clear, the technical solutions in the embodiments of the invention will be described clearly and completely below in combination with the embodiments and drawings of the invention. It should be explained that the described embodiments are only a part of embodiments of the invention not all embodiments. Based on the embodiments of the invention, all other embodiments obtained by those ordinary skilled under the premise that no creative work is done fall in the protection scope of the invention.

First embodiment

[0027] Reference is made to Figure 1. An electric hot water warmer includes a sealed warmer body 1, a heating unit 2 and a power unit 3. A liquid medium for transmitting heat is filled in a sealed cavity 6 inside the sealed warmer body 1. The total volume of the liquid medium when expanding or vaporized under predetermined temperature corresponds

to the normal volume of the liquid medium under room temperature. The heating unit 2 is disposed in the sealed cavity 6 and immersed in the liquid medium. The power unit 3 is sealingly connected with the sealed warmer body 1. A part of the power unit 3 is exposed in the exterior of the sealed warmer body 1, and another part thereof is sealed in the sealed cavity 6 of the sealed warmer body 1 and immersed in the liquid medium. The power unit 3 is electrically connected with the heating unit 2.

[0028] The liquid medium may be pure water, and as an improvement, may be a fluid or solution having good heat storage performance, and the liquid medium should be a nontoxic, non-corrosive and safety liquid having no harm to human. It should be explained that there is a difference between different liquid media in the heat storage performance. But no matter which of these liquid media is chosen, they all fall in the protection scope of the invention under the premise that the conception of the invention is not departed.

[0029] The liquid medium when heated to a particular temperature may expand or be vaporized which makes the sealed warmer body 1expand. The liquid medium is generally heated to near 70°C under which the sealed warmer body 1 expands with respect to the room temperature state about 1-2 centimeters.

[0030] Reference is made to Figure 2. The sealed warmer body 1 has two roles: first, providing the sealed cavity 6 for sealing the liquid medium; and second, to be used to directly contact with human body for ensurance of soft, comfort texture.

[0031] Further, the sealed warmer body 1 includes an inner warmer body 5 and an outer warmer body 4. The inner warmer body 5 is located at the innermost layer of the sealed warmer body 1 and it is made of flexible waterproof material. The sealed cavity 6 formed by the inner warmer body 5 is used to store the liquid medium. The outer warmer body 4 is located at the outermost layer of the sealed warmer body 1 and it is made of flexible material. The outer warmer body 4 is intimately fitted with the outer warmer body 5. The outer warmer body 4 is used for the contact with human body.

[0032] Preferably, in the present embodiment, the inner warmer body 5 is made of PVC film. The PVC film has good waterproof performance and can ensure the seal, preventing the leakage of the liquid medium. Meanwhile the PVC film itself has good softness so that it can change shape following the flow of the liquid medium, which is in favor of users to touch and press the PVC film. And the PVC film has sufficient toughness so that it is safe and practical, widely used in industry and has low production cost. The PVC film is softer and more comfortable than the colloidal warmer body.

[0033] Preferably, the outer warmer body 4 is made of a composite cloth composed of polyester and sponge, and it is weaved to be plush, super soft fabric and other cloth for contact with human body. If the PVC film is simply used, the fabric is rougher. The outer warmer body 4 made of the cloth can efficiently improve the texture which makes the use of the electric hot water warmer more comfortable.

[0034] The heating unit 2 is used for heating the liquid medium and it is an important component of the electric hot water warmer. The heating unit 2 makes use of the electric energy to generate heat and the safety thereof is extremely important to the electric hot water warmer.

[0035] Reference is made to Figure 3. Particularly, the heating unit 2 includes a heat generating body 10, an outer casing 7 and a safety unit 12.

[0036] The outer casing 7 is made up of an upper casing 8 and a lower casing 9. A hollowed-out structure is provided in the outer casing 7. The heat generating body 10 is disposed in the outer casing 7 and contacts the liquid medium through the hollowed-out structure in the outer casing 7. If the heat generating body 10 is simply used for heating the liquid medium, it means the heat generating body 10 can directly contact with the sealed warmer body 1 during the heating process although the heating function is satisfied. If the temperature of the heat generating body 10 is too high when directly contact with the sealed warmer body 1, the sealed warmer body 1 is easily hot melted which causes the sealed warmer body 1 broken. Or if users press the sealed warmer body 1 during the use of the electric hot water warmer causing the heat generating body 1 contact with the human body through the sealed warmer body 1, human body is easily burned resulting in human injury. The outer casing 7 on the one hand plays a part in the safety, and on the other hand can effectively prevent the sealed warmer body 1 or human body from directly contacting with the heat generating body 10, avoiding accidents.

[0037] A safety unit mounting portion 11 is also provided in the outer casing 7. The safety unit mounting portion 11 is provided to closely abut to the one side of the heat generating body 10. The safety unit 12 is mounted in the safety unit mounting portion 11 and is cascaded with the heat generating body 10. The safety unit 12 is used for providing overheating power-off protection. The safety unit 12 and the heat generating body 10 are then electrically connected with the power unit 3 respectively through wire. Once the heat generating body 10 is overheated, the safety unit 12 immediately comes into play so that the circuit is broken and the heat generating body 10 stop heating. Overheating of the heat generating body 10 is often seen in the condition that the heating unit is not fully immersed in the liquid medium during the heating process, causing that the heat of the heat generating body 10 is not fully transmitted into the liquid medium, so that the heat generating body 10 is dry burning when continues heating. Or it is often seen in the condition that the liquid medium is overheated, and the heat generating body 10 cannot stop heating, so that the temperature continues to rise. The overheating of the heat generating body 10 is very dangerous, and when serious it can cause the sealed warmer body 1 breakage, fire accident and other circumstances. In the invention, the heating unit 2 is protected through the safety

unit 12. Once the temperature of the heat generating body 10 reaches predetermined value, the safety unit 12 rapidly acts to break the circuit, so the dry burning problem is fundamentally eliminated, having a very high safety. Meanwhile, if the safety unit 12 and the heat generating body 10 is separated from each other in space layout, the rate of temperature rising of the safety unit 12 obviously lags behind the same of the heat generating body 10, which is not in favor of the sensitivity of the safety unit 12 action. The close abutment between the safety unit 12 and the heat generating body 10 is beneficial to the temperature of the safety unit 12 to close to the temperature of the heat generating body 10, and thus the sensitivity of the safety unit 12 action is further improved. Preferably, in the present embodiment, the safety unit 12 is fuse. The fuse has advantages such as small volume and low cost. And when the fuse reaches predetermined temperature, the interior thereof is directly fused so that the circuit is permanently broken, having very strong safety. As an improvement, the periphery of the safety unit 12 is sealed by silicone, thus preventing the liquid medium from immersing into the safety unit 12.

[0038] As an improvement, the heating unit 2 further includes a spring clip 13 clamping the safety unit 12 and the heat generating body 10 fixed. The spring clip 13 is used for ensuring close abutment between the safety unit 12 and the heat generating body 10 and sufficient heat transmission. As previously mentioned, the close abutment between the safety unit 12 and the heat generating body 10 is beneficial to the temperature of the safety unit 12 to close to the same of the heat generating body 10, thus the sensitivity of the safety unit 12 action is improved. But in the actual work process, the close abutment between the safety unit 12 and the heat generating body 10 cannot be ensured because the heat generating body 10 generates heat to be expanding. The spring clip 13 clamps the safety unit 12 and the heat generating body 10 fixed, so the separation of the heat generating body 10 from the safety unit 12 is effectively prevented. Preferably, the spring clip 13 is made of heat conducting material, so that it not only clamps the heat generating body 10 and the safety unit 12, but also further facilitates heat conduction between them, causing that the temperature of the safety unit 12 further closes to the same of the heat generating body 10, and thus the sensitivity of the safety unit 12 is further improved. After repeating attempts, it has been proved that the safety unit 12 provided to abut to the heat generating body 10 and clamped by the spring clip 13 fixed has very high action sensitivity, and can perform protection action of cutting off electricity in 15 seconds when the temperature of the heat generating body 10 reaches the predetermined temperature.

[0039] Reference is made to Figures 4 and 5. The power unit 3 is used for feeding electricity into the heating unit 2 so that the heating unit 2 generates heat and thus the heating of the liquid medium is realized.

[0040] Reference is made to Figure 4. Particularly, the power unit 3 includes a mounting sleeve 14, a temperature controlling unit 17 and a socket 18.

[0041] The mounting sleeve 14 includes an external portion 15 and an internal portion 16. The mounting sleeve 14 is sealingly connected with the sealed warmer body 1. The external portion 15 of the mounting sleeve 14 is exposed to the exterior of the sealed warmer body 1, and the internal portion 16 of the mounting sleeve 14 is sealed in the sealed cavity 6 of the sealed warmer body 1. A temperature controlling unit 17 is provided in the internal portion 16 of the mounting sleeve 14 and is cascaded with the heating unit 2.The temperature controlling unit 17 is used for controlling the conduction and the breakage of the circuit according to the internal temperature of the electric hot water warmer. The socket 18 is mounted on the external portion 15 of the mounting sleeve 14 and is exposed to the exterior of the sealed warmer body 1. The socket 18 is electrically connected with the temperature controlling unit 17 and the heating unit 2, constituting a complete circuit.

[0042] Reference is made to Figure 5. As an improvement, the power unit 3 further includes an indicator light 19. The indicator light 19 is mounted on the external portion 15 of the mounting sleeve 14 and is exposed to the exterior of the sealed warmer body 1. The indicator light 19 is paralleled with the heating unit 2. The indicator light 19 is used for providing users an indication of the working condition of the electric hot water warmer, playing a role in identification. When the electric hot water warmer is in charging and heating state, the circuit is switched on and the indicator light 19 is illuminated. When the charging and heating of the electric hot water warmer is completed or the electricity is cut off due to the overheating, the circuit is broken and the indicator light 19 is out.

[0043] The temperature controlling unit 17 is another safety component of the electric hot water warmer. When the liquid medium is heated to predetermined temperature, the temperature controlling unit 17 is heated to perform an action, automatically breaking the circuit. The temperature controlling unit 17 has two roles for the electric hot water warmer: first, controlling the illumination and the extinguishment of the indicator light 19 and indicating the state of the electric hot water warmer; and second, preventing that the temperature of the liquid medium is too high. The temperature controlling unit 17 is different from the safety unit 12 in that the temperature controlling unit 17 is required to control the conduction and the breakage of the circuit many times, while the safety unit 12 is the extreme protection measure employed under the condition that the temperature controlling unit 17 is failed. Therefore, the temperature controlling unit 17 cannot be made of fuse permanently breaking the circuit. Preferably, the temperature controlling unit 17 is temperature controller.

[0044] As an improvement, the power unit 3 further includes a cover. The cover is disposed on the socket 18 and is movably connected with the power unit 3 for controlling the exposure and the closing of the socket 18, protecting the

socket 18.

Second embodiment

[0045] Reference is made to Figure 6 in which there is shown a heating device including aforementioned electric hot water warmer and a charging rack 20. The charging rack 20 is used for feeding electricity into the electric hot water warmer, charging and heating the same.

[0046] Particularly, the charging rack 20 includes a base 21, a connecting table 22, a protection device 27, a charging arm 23 and a power line 25. The base 21 is used to support the electric hot water warmer thereon. The connecting table 22 is fixed on the base 21. The connecting table 22 has a hollow structure and the protection device 27 is disposed in the interior thereof. The charging arm 23 has a hollow structure, and has one articulating end and one connecting end. The articulating end of the charging arm 23 is hinged to the upper end of the connecting table 22. The connecting end of the charging arm 23 is provided with a jack 24 matching with the power unit 3. The jack 24 is disposed in the electrical circuit inside the connecting arm and is electrically connected with the protection device 27. One end of the power line 25 is electrically connected with the protection device 27 and the other end is provided with a plug 26.

[0047] Wherein, when the electric hot water warmer is in a charging and heating state, the charging arm 20 and the electric hot water warmer are connected with each other. At this moment, the electric hot water warmer is placed on the base 21, the jack 24 is connected with the socket 18 and the plug 26 is inserted into jack 24. When the electric hot water warmer is used, the charging rack 20 and the electric hot water warmer are separated from each other.

[0048] The protection device 27 is another safety component of the invention. It protects the electric hot water warmer when in charging and heating state.

[0049] Particularly, the protection device 27 includes a micro switch. The micro switch is connected between the power line 25 and the jack 24 for controlling the conduction and the breakage of the circuit of the power line 25 and the jack 24. The micro switch includes a fixed contact 28 and a movable contact 29. The fixed contact 28 is fixed inside the connecting table 22 of the charging arm 20 and is electrically connected with the power line 25. The movable contact 29 is fixed to the charging arm 23 and is electrically connected with the jack 24. The rotation movement of the charging arm 23 around its own articulating end may drive the movable contact to move, thus controlling the connectivity and the disconnectivity of the fixed contact and the movable contact 29.

[0050] Reference is made to Figure 7. As mentioned above, when the liquid medium is heated to a certain temperature, it may expand or vaporized, causing that the sealed warmer body 1 expands following that. When the sealed warmer body 1 expands to predetermined extent, the charging arm 23 of the charging rack 20 is raised by the sealed warmer body 1 and is rotated around its own articulating end. At this moment, the movable contact 29 is driven by the charging arm 23 to move so that the movable contact 29 and the fixed contact 28 are separated and thus the circuit is broken. Thereby, the breakage of the sealed warmer body 1 may be prevented when the liquid medium is overheated to significantly expand in the process of charging and heating. Once the sealed warmer body 1 is broken, the liquid medium will be splashed, likely causing burn injury of human body and even fire. With the use of the protection device 27, the accident may be effectively avoided, the dangerous that the sealed warmer body 1 is exploded due to the overheating is eliminated, the explosion proof safety function is completely achieved and the personal safety of users is safeguarded. Based on the electrical safety principle, the protection device 27 is preferably connected to the live fire provided by the commercial power supply.

[0051] As an improvement, the charging rack 20 further includes an indicator light 19. The indicator light 19 is mounted on the charging arm 23 and is paralleled with the heating unit 2 through the socket 18 and the jack 24. This indicator light 19 has the same purpose as the aforementioned indicator light 19 provided on the power unit 3. It is only needed to choose from those two in principle, or they are chosen to be provided according to electrical product standard of different region. Herein details are not given.

[0052] The electric hot water warmer and the heating device incorporating the same of the invention have triple security protection. First, there is provided with the safety unit 12 inside the heating unit 2. When the heating generating body is dry burning or overheated, the safety unit 12 closely abut to the heat generating body 10 can rapidly break the circuit and thus power-off protection is performed. Second, the temperature controlling unit 17 controls the conduction and the breakage of the circuit through the temperature of the liquid medium itself, preventing the explosion and the splashing due to the overheated liquid medium. Third, the protection device 27 provided on the charging arm 20 automatically break the circuit when the sealed warmer body 1 expands to a certain extent, preventing that the sealed warmer body 1 expands to be broken during the charging process. Thereby, the invention is different from the prior art in that very high security is obtained in the invention.

[0053] And the electric hot water warmer of the invention has a small volume and a simple structure so that it is easy to carry. Plug-in design is used in the electric hot water warmer, thus operation is easy, and heating effect is long lasting and practicability is significantly strong. The electric hot water warmer is made of flexible material, so the texture is soft, which is beneficial to the contact with human body, comforting the human body.

[0054] The above-mentioned embodiments are only several embodiments of the invention. The description of the above-mentioned embodiments is more specific and detail, but they should not be considered to be a limitation of the invention. It should be noted that several variations and improvements may also be made without departing the concept of the invention for those ordinary skilled in the art. These variations and improvements all belong to the protection scope of the invention. Therefore, the protection of the invention should take the appended claim as standard.

Claims

1. An electric hot water warmer comprising a sealed warmer body, a heating unit and a power unit, wherein a liquid medium for transmitting heat is filled in a sealed cavity inside the sealed warmer body, the total volume of the liquid medium when expanding or vaporized under predetermined temperature corresponds to the normal volume of the liquid medium under room temperature, the heating unit is disposed in the sealed cavity and immersed in the liquid medium, the power unit is sealingly connected with the sealed warmer body, a part of the power unit is exposed in the exterior of the sealed warmer body, and another part thereof is sealed in the sealed cavity of the sealed warmer body and the power unit is electrically connected with the heating unit.

2. The electric hot water warmer according to claim 1, wherein the heating unit comprises a heat generating body, an outer casing and a safety unit, wherein the outer casing is made up of an upper casing and a lower casing and is provided with a hollowed-out structure, the heat generating body is disposed in the outer casing and contacts the liquid medium through the hollowed-out structure in the outer casing, a safety unit mounting portion is also provided in the outer casing, the safety unit mounting portion is provided to closely abut to the one side of the heat generating body, the safety unit is mounted in the safety unit mounting portion and is cascaded with the heat generating body, the safety unit is used for providing overheating power-off protection and the safety unit and the heat generating body are then electrically connected with the power unit respectively through wire.

3. The electric hot water warmer according to claim 2, wherein the safety unit is a fuse.

4. The electric hot water warmer according to claim 2, wherein the periphery of the safety unit is sealed by silicone.

5. The electric hot water warmer according to claim 2, wherein the heating unit further comprises a spring clip clamping the safety unit and the heat generating body fixed, the spring clip is used for ensuring close abutment between the safety unit and the heat generating body and sufficient heat transmission.

6. The electric hot water warmer according to claim 5, wherein the spring clip is made of heat conducting material.

7. The electric hot water warmer according to claim 2, wherein the heat generating body is a heat generating tube.

8. The electric hot water warmer according to claim 1, wherein the sealed warmer body comprises an inner warmer body and an outer warmer body, wherein the inner warmer body is located at the innermost layer of the sealed warmer body and is made of flexible waterproof material, the sealed cavity formed by the inner warmer body is used to store the liquid medium, the outer warmer body is located at the outermost layer of the sealed warmer body and is made of flexible material, the outer warmer body is intimately fitted with the outer warmer body and the outer warmer body is used for contact with human body.

9. The electric hot water warmer according to claim 1, wherein the power unit comprises a mounting sleeve, a temperature controlling unit and a socket, wherein the mounting sleeve comprises an external portion and an internal portion, the mounting sleeve is sealingly connected with the sealed warmer body, the external portion of the mounting sleeve is exposed to the exterior of the sealed warmer body, the internal portion of the mounting sleeve is sealed in the sealed cavity of the sealed warmer body, a temperature controlling unit is provided in the internal portion of the mounting sleeve and is cascaded with the heating unit, the temperature controlling unit is used for controlling the conduction and the breakage state of the circuit according to the internal temperature of the electric hot water warmer, the socket is mounted on the external portion of the mounting sleeve and is exposed to the exterior of the sealed warmer body and the socket is electrically connected with the temperature controlling unit and the heating unit, constituting a complete circuit.

10. The electric hot water warmer according to claim 9, wherein the temperature controlling unit is a temperature controller.

11. The electric hot water warmer according to claim 9, wherein the power unit further comprises an indicator light, wherein the indicator light is mounted on the external portion of the mounting sleeve and is exposed to the exterior of the sealed warmer body and the indicator light is paralleled with the heating unit.

12. The electric hot water warmer according to claim 9, wherein the power unit further comprises a cover, wherein the cover is disposed on the socket and is movably connected with the power unit for controlling the exposure and the closing of the socket.

13. A heating device comprising the electric hot water warmer according to claim 1 and a charging rack, wherein the charging rack comprises a base, a connecting table, a protection device, a charging arm and a power line, wherein the base is used to support the electric hot water warmer thereon, the connecting table is fixed on the base, the connecting table has a hollow structure and the protection device is disposed in the interior thereof, the charging arm has a hollow structure, and has one articulating end and one connecting end, wherein the articulating end of the charging arm is hinged to the upper end of the connecting table, the connecting end of the charging arm is provided with a jack matching with the power unit, the jack is disposed in the electrical circuit inside the connecting arm and is electrically connected with the protection device, one end of the power line is electrically connected with the protection device and the other end is provided with a plug.

14. The heating device according to claim 13, wherein the protection device comprises a micro switch, wherein the micro switch is connected between the power line and the jack for controlling the conduction and the breakage of the circuit of the power line and the jack, the micro switch comprises a fixed contact and a movable contact, wherein the fixed contact is fixed inside the connecting table of the charging arm and is electrically connected with the power line, the movable contact is fixed to the charging arm and is electrically connected with the jack, the rotation movement of the charging arm around its own articulating end may drive the movable contact to move, thus controlling the connectivity and the disconnectivity of the fixed contact and the movable contact.

15. The heating device according to claim 13, wherein the charging rack further comprises an indicator light, wherein the indicator light is mounted on the charging arm and is paralleled with the heating unit through a socket and a jack.

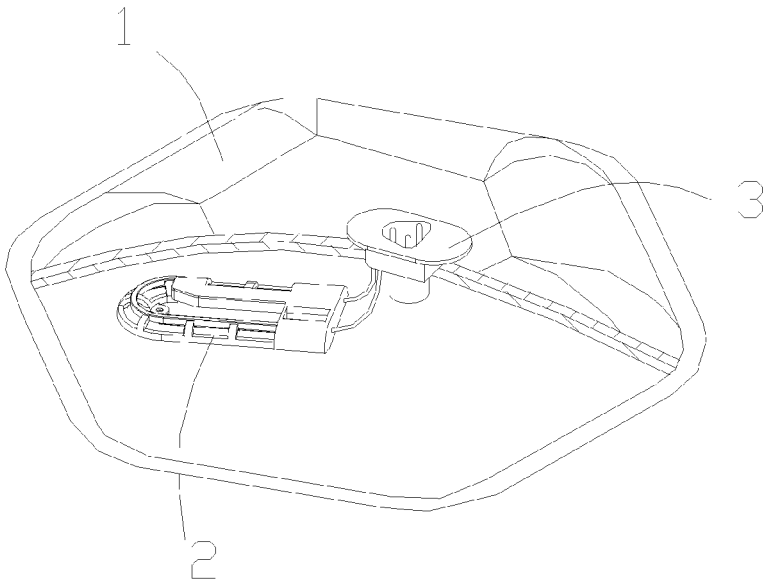

Figure 1

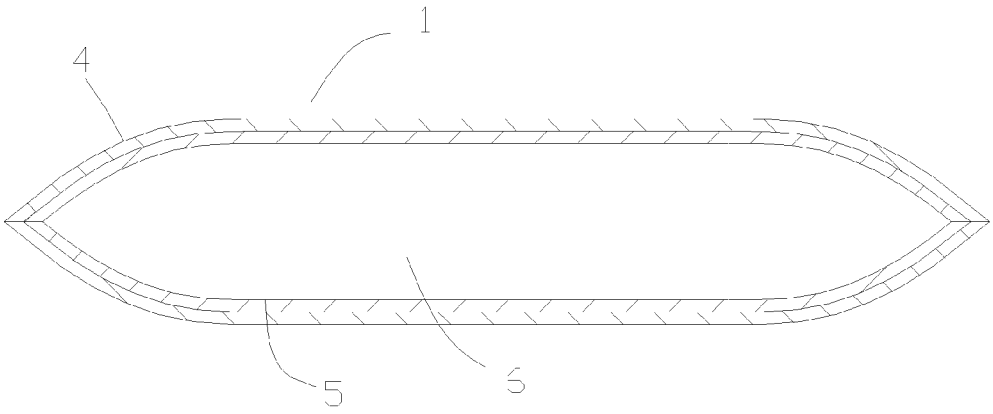

Figure 2

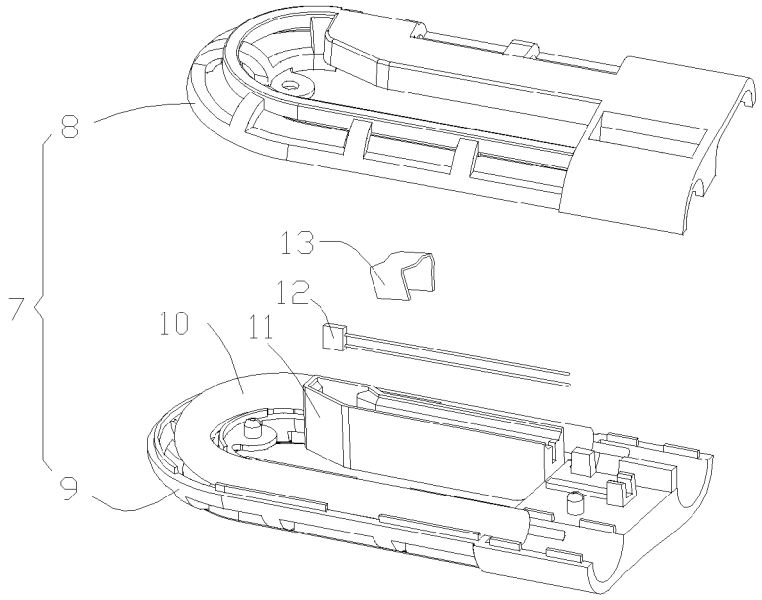

Figure 3

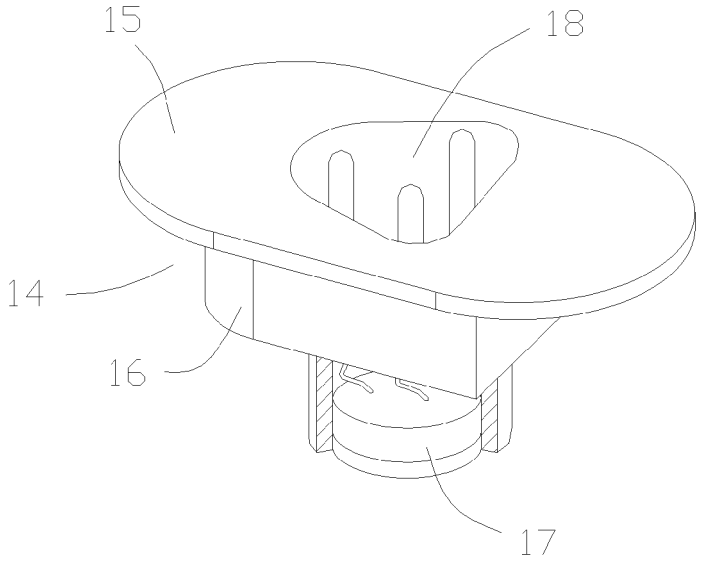

Figure 4

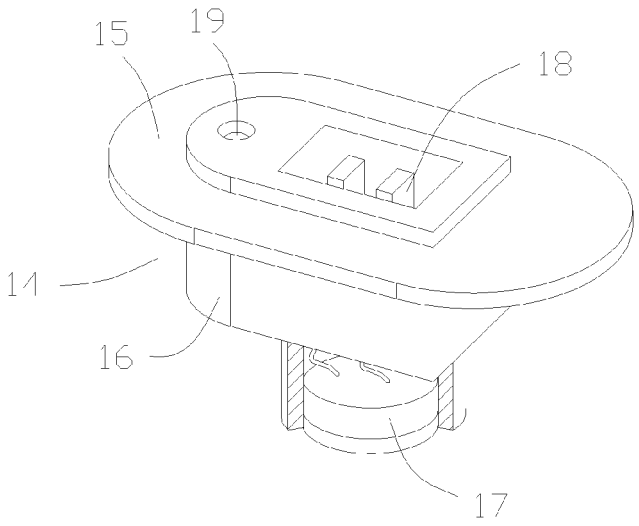

Figure 5

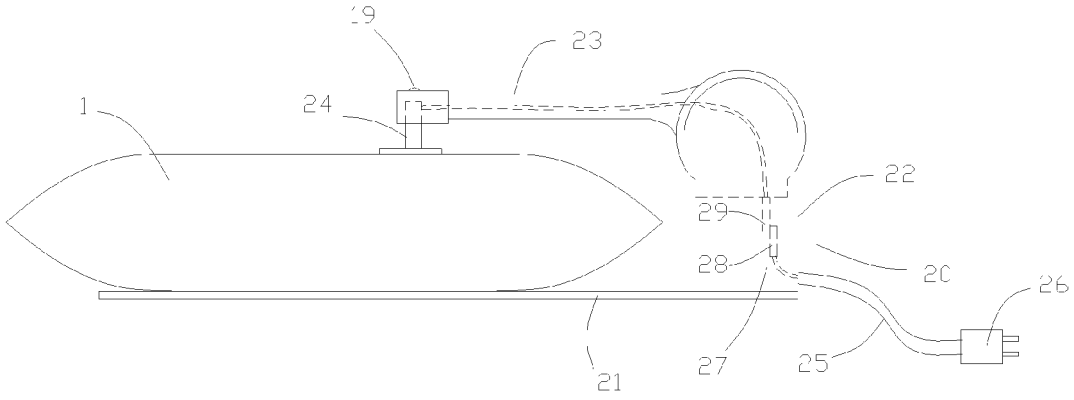

Figure 6

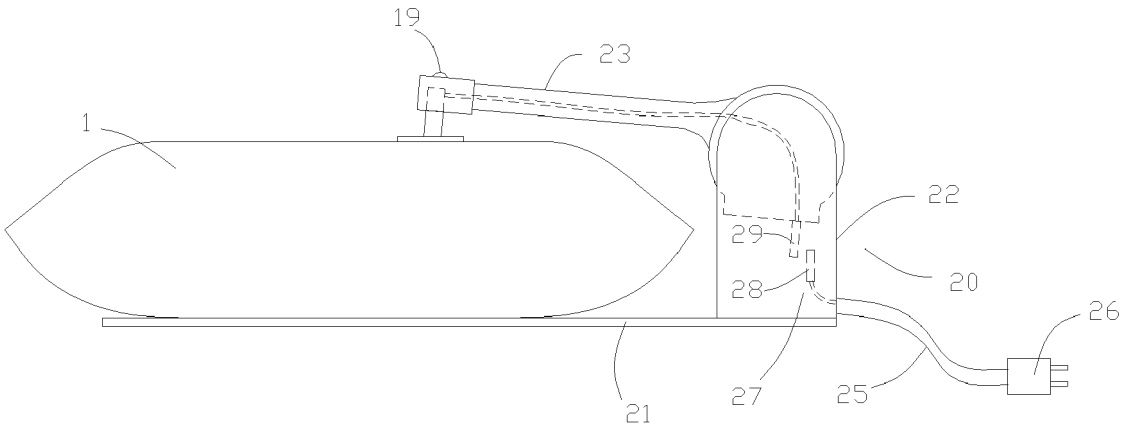

Figure 7

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 16 2137

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	GB 2 291 321 A (CHAINPORT LTD [GB]) 17 January 1996 (1996-01-17) * page 3 - page 12; figures 1-3 *	1-3,7 4-6	INV. H05B1/02 F24H9/20 A41D19/015
X	US 2008/245785 A1 (LIANG SHENGQUAN [CN]) 9 October 2008 (2008-10-09) * paragraph [0051] - paragraph [0139]; figures 1,5,8,13,25-27 *	1,8-15	A61F7/00 G05D23/00 H05B3/80
X	US 2008/296286 A1 (LIANG SHENGQUAN [CN]) 4 December 2008 (2008-12-04) * paragraph [0037] - paragraph [0070]; figures 1,4,6,12-14 *	1,8-15	
X	KR 2007 0052815 A (PARK JI YONG [KR]) 23 May 2007 (2007-05-23) * page 1 - page 3; figures 1,2 *	1	
Y	US 4 068 116 A (MCKINSTRY JAMES E) 10 January 1978 (1978-01-10) * column 3 - column 5; figure 3 *	5,6	
			TECHNICAL FIELDS SEARCHED (IPC)
Y	DE 602 00 470 T2 (JEDAC CUTRY [FR]) 25 May 2005 (2005-05-25) * paragraph [0021]; figure 1 *	4	H05B F24H A41D A61F
A	US 2 223 154 A (GEORGE THORNTON-NORRIS) 26 November 1940 (1940-11-26) * the whole document *	1	G05D
A	US 1 695 753 A (BAKER JOHN M) 18 December 1928 (1928-12-18) * the whole document *	2	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 October 2014	Riesen, Jörg

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 16 2137

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-10-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2291321 A	17-01-1996	NONE	
US 2008245785 A1	09-10-2008	CN 101319819 A	10-12-2008
		US 2008245785 A1	09-10-2008
		US 2013028578 A1	31-01-2013
US 2008296286 A1	04-12-2008	US 2008296286 A1	04-12-2008
		WO 2008148284 A1	11-12-2008
KR 20070052815 A	23-05-2007	NONE	
US 4068116 A	10-01-1978	NONE	
DE 60200470 T2	25-05-2005	AT 266938 T	15-05-2004
		DE 60200470 D1	17-06-2004
		DE 60200470 T2	25-05-2005
		EP 1278400 A2	22-01-2003
		ES 2219625 T3	01-12-2004
		FR 2827735 A1	24-01-2003
US 2223154 A	26-11-1940	NONE	
US 1695753 A	18-12-1928	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82