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(54) **Feed device for shower cubicle or equipped multi-function column**

Zufuhrvorrichtung für Duschkabinen oder multifunktionell ausgerüstete Säule

Dispositif d'alimentation pour une cabine de douche ou colonne équipée multifonctionnelle

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GB-A- 2 266 454 **US-A- 5 544 369**

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- **PATENT ABSTRACTS OF JAPAN** vol. 016, no. 180 (C-0935), 30 April 1992 & JP 04 022319 A (MATSUSHITA ELECTRIC IND CO LTD), 27 January 1992
- **PATENT ABSTRACTS OF JAPAN** vol. 016, no. 033 (C-0905), 28 January 1992 & JP 03 244417 A (MATSUSHITA ELECTRIC WORKS LTD), 31 October 1991

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Description

FIELD OF THE INVENTION

[0001] This invention concerns a feed device for a shower cubicle or an equipped multi-function column as set forth in the main claim.

[0002] The device according to the invention is employed to feed the functional components, such as electrovalves, electronic cards, sensors, etc. used in shower cubicles or equipped columns, in such away as to make the shower cubicles or equipped columns completely autonomous from the central electricity supply system, yet ensure they have autonomous energy which is substantially unlimited in time.

BACKGROUND OF THE INVENTION

[0003] The state of the art includes shower cubicles or equipped multi-function columns which, apart from working like a traditional shower, also offer a plurality of other functions such as total or localised hydromassage, Scottish shower (alternation of hot and cold water), cascade shower, Turkish bath, etc.

[0004] A shower cubicle of the traditional type needs to be connected both to the water supply and also to the monophasic electricity supply so as to feed the various functional components such as the pumps, boilers, electrovalves, electronic control units, inside lighting systems, sensors and so on.

[0005] While some of the electrical components such as the pumps, the boilers, certain types of electrovalves, etc. are fed directly by the alternating current supplied by the monophasic distribution line, other components, such as the electronic control units, the electrovalves, the sensors, etc., require the monophasic alternating current to be transformed into lower values, possibly direct current and stabilised.

[0006] This means that transformers and the appropriate circuits have to be used to straighten the alternating current and to stabilise the direct current obtained, with a consequent increase in the assembly times and the final cost of the product.

[0007] Moreover, using alternating monophasic current requires the use of anti-disturbance filters, safety screens for the cables and other contrivances so as to meet the requirements for approval and certification defined by the appropriate authorities, for example the Council of the European Community, but above all to ensure maximum safety for users.

[0008] These requirements often oblige the producers of shower cubicles or equipped columns to adopt extremely complex and costly design plans in order to meet the requirements laid down by the Norms.

[0009] With those feed systems as are known to the state of the art, therefore, some functions cannot be achieved or require onerous contrivances to be used which considerably affect the final cost of the product.

[0010] For example, with feed systems known to the state of the art, an automated hydromassage system of the fractional type is very problematical inasmuch as it requires a series of electrovalves to be used in association with the delivery nozzles and therefore has the above-mentioned problems connected to the dangers of a monophasic electrical supply.

[0011] Another disadvantage of known feed systems is that it is impossible to implement new components for new functions without problems of certification or approval because of the new electrical connections which, in most cases, require the electrical part to be upgraded and therefore new tests are needed to obtain approval.

[0012] Another disadvantage of known feed systems is that it is necessary to arrange beforehand the electricity supply of the place where the device is to be installed.

[0013] Therefore it is not always possible to install shower cubicles or equipped columns to replace traditional showers, or else it requires laborious and costly preparatory works which often cause the potential purchaser to forego the acquisition.

[0014] Documents JP-A-4022319 and JP-A-3244417 describe how to use a battery unit incorporated into, or outside, the shower unit, which serves to feed the electrical components such as electrovalves, electric panel or otherwise, thus making the shower unit autonomous from the central supply system as far as energy is concerned.

[0015] These solutions are in themselves satisfactory, but they have the problem of a limited autonomy, particularly in the case when the shower cubicle or multi-function column is equipped with a lot of auxiliary functions such as hydromassage, Scottish shower, Turkish bath, open/closed door sensors, lighting and so on.

[0016] Since modern technology in the field of shower cubicles is more and more concerned with extremely sophisticated solutions, equipped with more accessories and more functions, a battery power supply has revealed itself to be unsatisfactory inasmuch as it is not able to guarantee a sufficient autonomy to satisfy the requirements of the users.

[0017] The present Applicant has designed, tested and embodied this invention to overcome this shortcoming and to obtain further advantages.

SUMMARY OF THE INVENTION

[0018] The invention is set forth and characterised in the main claim, while the dependent claims describe embodiments of the invention.

[0019] The main purpose of the invention is to allow the installation of shower cubicles or equipped columns even in those rooms without the necessary electricity connections, at the same time guaranteeing an autonomy of energy which is substantially unlimited.

[0020] Another purpose of the invention is to provide a feed device for shower cubicles or equipped columns

according to the safety norms and functioning norms laid down by the appropriate authorities.

[0021] A further purpose of the invention is to provide shower cubicles or equipped columns with a desired number of functions or accessories fed by electricity, wherein new functions can be implemented after they have been approved or even after they have been installed inasmuch as they do not require new inspections to be made.

[0022] Yet another purpose is to simplify the electrical connections of the various functional components and to considerably reduce both the costs and the consumption of the shower cubicle and equipped columns.

[0023] The invention includes the use of electrical components functioning at low voltage and fed by an autonomous, low voltage source.

[0024] According to the invention, the autonomous, low voltage source consists of at least a solar cell module.

[0025] The solar cell module is fed by sunlight or, should this be absent, through the artificial light of lamps or bulbs present in the room where the shower cubicle is installed. It is connected to the electrical components by means of a control unit comprising at least a device to stabilise and convert the tension supplied by the solar cell module.

[0026] According to the invention, the control unit also incorporates battery means, functioning as energy accumulators, which function as auxiliary feeders in the event that the solar cell module is partially or totally run down.

[0027] The control unit comprises a processing unit suitable to perform the function of verifying the condition of the solar cell module, and therefore to determine whether the electrical components of the shower cubicle are fed either through the solar cell module or through the accumulators incorporated into the control unit.

[0028] In other words, if the level of energy accumulated by the solar cell module is above a set first threshold, the shower cubicle is fed through this module; if the level is below the first threshold, the shower cubicle is fed through the accumulators incorporated into the control unit.

[0029] According to a variant, in the event that the processing unit verifies that the level of feed of the solar cell module is above a set second threshold, a function is activated to load the accumulators at the same time as the function of feeding the electrical components of the shower cubicle.

[0030] Consequently, the invention provides shower cubicles or equipped columns with management costs which are extremely low, and which, as far as energy is concerned, are substantially unlimited in time.

[0031] In fact, during the periods when the shower cubicle is not being used, the solar cell module can recharge to a level above the second threshold level and therefore, when functioning, the function of recharging the accumulators is also activated.

[0032] If the shower cubicle is used so long that it takes the level of energy available from the solar cell module below the first threshold, the accumulators are automatically activated to perform their function as auxiliary feeders.

[0033] The feed device according to the invention does not require transformers, anti-disturbance filters, screened cables, or straightening and stabilising circuits, and therefore it simplifies assembly and reduces the final cost of the product.

[0034] The invention, moreover, makes the shower cubicles and equipped columns completely autonomous from the monophasic distribution device and thus extremely safe for the user.

[0035] Furthermore, the invention reduces the installation costs as only the water device needs to be connected.

[0036] It follows that the shower cubicles and equipped columns using the device according to the invention can be used to replace normal shower systems without needing particular preparatory electrical work in the room where it is to be installed.

[0037] Furthermore, the shower cubicles and equipped columns according to the invention do not present any problem as far as approval and certification are concerned, and have an optimum functioning from the ecological point of view.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] The attached Figures are given as a non-restrictive example and show a preferential embodiment of the invention as follows:

- Fig. 1 shows a three dimensional front view of a shower cubicle using the electrical feed device according to the invention;
- Fig. 2 shows a rear view of Fig. 1;
- Fig. 3 shows a diagram of the hydraulic and electrical circuit of the shower cubicle of Fig. 1;
- Fig. 4 shows the control and processing unit of the electrical feed device according to the invention;
- Fig. 5 shows a graph of the energy condition of the solar cell module used in the device according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0039] The shower cubicle 10 shown in Figs. 1 and 2 is of the multi-function type and has inside a plurality of means to deliver water 11 associated to the end of pipes 12 from a mixer assembly 16 connected to the water supply of the premises where the shower cubicle 10 is installed.

[0040] The following description concerns an application with all the functions available for a shower cubicle,

but this must be considered only as an example.

[0041] The case shown by the shower cubicle also comprises a multi-function equipped column.

[0042] In this specific case, the delivery means 11 comprise a shower terminal 11a of a traditional type included on the side wall, a shower terminal 11b on the ceiling and used for the Scottish shower function, alternating hot and cold water, and a series of nozzles 11c arranged vertically on the side walls and used for hydromassage of the global and sequential type.

[0043] There are also delivery means 11d, 11e and 11f used for localised hydromassage.

[0044] To be more exact, the nozzles 11d above the seat 13 are used to achieve a cascade shower, the nozzles 11e situated at the height of the shoulders of the user are used for hydromassage of the cervical area and the nozzles 11f situated at the height of the user's back are used for hydromassage of the lumbar area.

[0045] Furthermore, there are nebuliser nozzles 11g used to obtain a flow of nebulised water so as to achieve a Turkish bath.

[0046] The shower cubicle 10 is suitable to achieve a fractional hydromassage according to timed cycles which can be selected by the user by means of an electronic control unit 14.

[0047] In fractional hydromassage, a single and specific delivery means 11d, 11e and 11f is activated in a timed manner at every step of the cycle: in this way, a localised hydromassage is obtained which gradually affects the user's whole body.

[0048] In order to do this, the water system shown diagrammatically in Fig. 3 of the shower cubicle 10 is equipped with a plurality of electrovalves 15 each of which is associated with a specific pipe 12 which carries the water to the delivery means 11.

[0049] The nozzles 11b, 11c, 11d, 11e, 11f and 11g are associated with respective electrovalves 15, two 15b, three 15c, one 15d, one 15e, one 15f and one 15g which activate the nozzles according to the specific function to be achieved.

[0050] The feed device according to the invention provides that the electronic control unit 14 and the electrovalves 15 are fed by an autonomous source 17 with a low voltage direct current and low consumption.

[0051] In the preferential embodiment of the invention, the low voltage direct current has standardised values of 6, 9, 12 or 24 volts.

[0052] The electrovalves 15 are of the bistable type with very low absorption and the activation pulse has a duration in the order of some milliseconds.

[0053] Moreover, the electrovalves 15 are of limited size, they work in any position whatsoever and are made of stainless steel (the nucleus) and of polyamide glass fibre (the valve body).

[0054] According to the invention, the autonomous source 17 consists of a solar cell module 18, arranged on the shower cubicle 10 advantageously in a position exposed to the natural or artificial light of the room where

the shower cubicle is installed.

[0055] In this case, as shown only as an example in Fig. 1, the solar cell module 18 is arranged on one side of the upper covering plate of the shower cubicle 10.

[0056] According to a variant which is not shown here, there are two or more solar cell modules 18 which feed the shower cubicle 10.

[0057] The solar cell module 18 is connected to the electronic control unit 14 by means of suitable electric connections 19.

[0058] The structure of the electronic control unit 14 is shown in diagram form in Fig. 4.

[0059] The unit 14 comprises a device 20 to convert and stabilise the tension supplied by the solar cell module 18 which goes to feed, through a processing unit 21 arranged on board the unit 14, and then through the cables 25, the various components of the shower cubicle 10, and in particular the electrovalves 15.

[0060] The unit 14 also comprises, incorporated therein, a battery unit 22 which has the function of accumulating energy while the shower cubicle 10 is functioning and a back-up feeder in the event that the energy supplied by the solar cell module 18 is no longer sufficient or is about to run out.

[0061] There is also a distribution unit 23 which constitutes the power section of the control unit 14 and has the function of distributing the feed to the electrovalves 15, to the control unit 14 itself or to the battery unit 22 in the way described hereafter.

[0062] When the shower cubicle 10 starts functioning, the processing unit 21 has the function of verifying the energy condition of the solar cell module 18.

[0063] If the energy accumulated by the solar cell module 18 exceeds a first threshold "S1" but is less than a second threshold "S2" (see graph in Fig. 5 wherein the energy level is expressed in lumen [L]), then the processing unit 21 causes the electric components of the shower cubicle 10 to be fed only by the solar cell module 18, through the power distribution unit 23.

[0064] If the accumulated energy is above the second threshold "S2", then the solar cell module 18 not only feeds the components of the shower cubicle 10 but also performs the function of recharging the battery unit 22.

[0065] In this case, the distribution unit 23 performs the function of dividing the feed in part to the components of the shower cubicle 10 and in part to the battery unit 22 to recharge the batteries through the connections 24, shown here as a line of dashes.

[0066] If the energy accumulated is below the first threshold "S1", the processing unit 21 disconnects the solar cell module 18 and feed is supplied to the components of the shower cubicle 10 directly by the battery unit 22 through the connection 26 shown by a line of dashes and dots.

[0067] According to a variant which is not shown here, the autonomous source 17 is located outside the structure of the shower cubicle 10 and connected to the control unit 14 by means of the appropriate external cable.

[0068] The feed device according to the invention gives a plurality of advantages including: greater safety and comfort for the user, unlimited autonomy in time, energy saving, simplification of the electric cables, the elimination of costly anti-disturbance filters or screens and, with regard to the electrical part, the guarantee that the Norms issued by the appropriate authorities or institutions will be met.

Claims

1. Electric feed device for shower cubicle (10) or multi-function column equipped with a plurality of means to deliver water (11a-11g) associated with a mixer assembly (16) or directly with the water system, there being included on the water supply pipes (12) relative electrovalves (15b-15g) governed by a programmable electronic control unit (14) comprising at least a conversion and stabilisation device (20), wherein the electronic control unit (14) is equipped with an incorporated battery unit (22) functioning as an accumulator of energy, and wherein the electrovalves (15b-15g) and the electronic control unit (14) can be fed by said battery, **characterised in that** an autonomous electric source (17) consisting of a solar cell module (18) suitable to provide a direct current, low tension feed, is provided and that the electronic control unit (14) is equipped with a processing unit (21) suitable to selectively activate, according to the energy level in the solar cell module (18), either the solar cell module (18) or the battery unit (22) in the event that the energy level of the solar cell module (18) is less than a first threshold ("S1"), and **in that** the processing unit (21) of the control unit (14) is suitable to select, through a distribution unit (23) integrated into the control unit (14), a function to recharge the battery unit (22) by the solar cell module (18) if the energy level of the module (18) is above a second threshold ("S2").
2. Device as in claim 1, **characterised in that** the voltage delivered has standardised values of 6, 9, 12 or 24 volts.
3. Device as in claim 1 or 2, **characterised in that** the electric source (17) is arranged applied on the outside of the shower cubicle (10).
4. Device as in any claim hereinbefore, **characterised in that** the electrovalves (15) are of the bistable type with an activation pulse in the order of some milliseconds and with limited absorption.

Patentansprüche

1. Vorrichtung zur elektrischen Speisung einer Dusch-

kabine (10) oder multifunktionalen Säule, die mit mehreren mit einer Mischeinheit (16) oder unmittelbar mit der hydraulischen Anlage verbundenen Wasserabgabemitteln (11a-11g) ausgestattet ist, wobei auf den hydraulischen Speiserohren (12) entsprechende Magnetventile (15b-15g) vorhanden sind, die von einem programmierbaren, mindestens eine Umwandlungs- und Regelungsvorrichtung (20) umfassenden elektronischen Überwachungseinheit (14) gesteuert sind, wobei die elektronische Überwachungseinheit (14) mit eingebauten, als Energieakkumulator wirkenden Batterien (22) ausgestattet ist, wobei die Magnetventile (15b-15g) und die elektronische Überwachungseinheit (14) von dieser Batterie gespeist werden können, **dadurch gekennzeichnet, daß** eine unabhängige elektrische Quelle (17) vorgesehen ist, welche aus einem für eine Gleichstrom- und Niederspannungsspeisung geeigneten Solarzellenbaustein (18) besteht, daß die elektronische Überwachungseinheit (14) mit einer Verarbeitungseinheit (21) ausgestattet ist, die geeignet ist, auf Grund des Energieniveaus des Solarzellenbausteins den Solarzellenbaustein (18) oder die Batterien (22) zu aktivieren, wenn das Energieniveau des Solarzellenbausteins (18) unterhalb einer ersten Schwelle ("S1") liegt, und daß die Verarbeitungseinheit (21) der Überwachungseinheit (14) geeignet ist, mittels einer in der Überwachungseinheit (14) integrierten Verteilungseinheit (23) eine Nachladefunktion der Batterien (22) durch den Solarzellenbaustein (18) zu wählen, wenn das Energieniveau des Solarzellenbausteins (18) oberhalb einer zweiten Schwelle ("S2") liegt.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die abgegebene Spannung Standardwerte von 6, 9, 12 oder 24 Volt aufweist.
3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** die elektrische Quelle (17) außerhalb der Duschkabine (10) angeordnet ist.
4. Vorrichtung nach dem einen oder dem anderen der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die Magnetventile (15) bistabil sind, mit einem Aktivierungsimpuls von einigen Millisekunden und einer beschränkten Entnahme.

Revendications

1. Dispositif d'alimentation électrique pour cabine de douche (10) o colonne multifonction pourvue d'une pluralité de moyens de distribution d'eau (11a, 11g) associés à un groupe mélangeur (16) ou directement au système hydraulique, sur les tuyaux (12) d'alimentation hydraulique étant comprises des électrovannes (15b-15g) correspondantes contrô-

lées par un groupe de contrôle électronique programmable (14) comprenant au moins un dispositif (20) de conversion et stabilisation, dans lequel le groupe de contrôle électronique (14) est pourvu d'un groupe de batteries incorporé (22) en fonction d'accumulateur d'énergie, et dans lequel les électrovannes (15b-15g) et le groupe de contrôle électronique (14) peuvent être alimentés par ladite batterie, **caractérisé en ce qu'on** prévoit une source électrique autonome (17) constituée d'un module à cellules solaires (18) apte à fournir un'alimentation à courant continu à basse tension, **en ce que** le groupe de contrôle électronique (14) est pourvu d'un groupe d'élaboration (21) apte à activer sélectivement, selon le niveau d'énergie dans le module à cellules solaires (18), le module à cellules solaires (18) ou le groupe de batteries (22), si le niveau d'énergie du module à cellules solaires (18) est inférieur à un premier seuil ("S1"), et **en ce que** le groupe d'élaboration (21) du groupe de contrôle (14) est apte à sélectionner, au moyen d'un groupe de distribution (23) intégré dans le groupe de contrôle (14), une fonction de rechargement du groupe de batteries (22) par le module à cellules solaires (18), si le niveau d'énergie du module (18) est supérieur à un deuxième seuil ("S2").

2. Dispositif selon la revendication 1, **caractérisé en ce que** le voltage distribué a des valeurs standardisées de 6, 9, 12 ou 24 volts.
3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** la source électrique (17) est disposée appliquée à l'extérieur de la cabine de douche.
4. Dispositif selon l'une ou l'autre des revendications précédentes, **caractérisé en ce que** les électrovannes (15) sont de type bistable avec une impulsion d'activation de quelques millisecondes et une absorption limitée.

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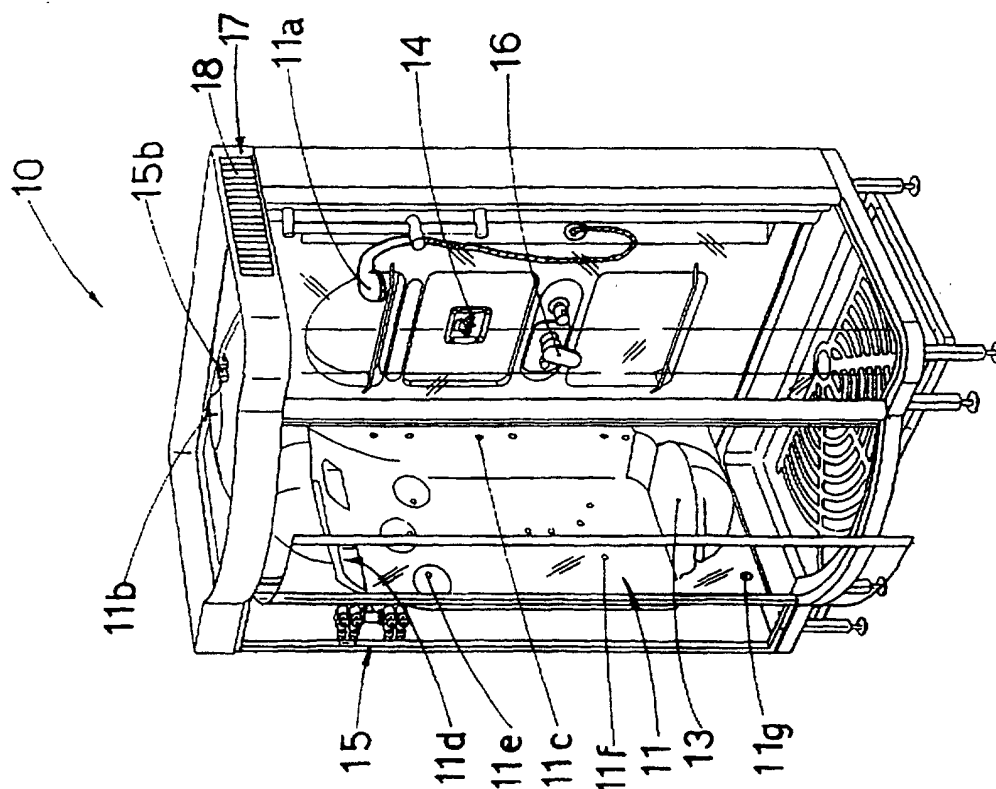


fig.1

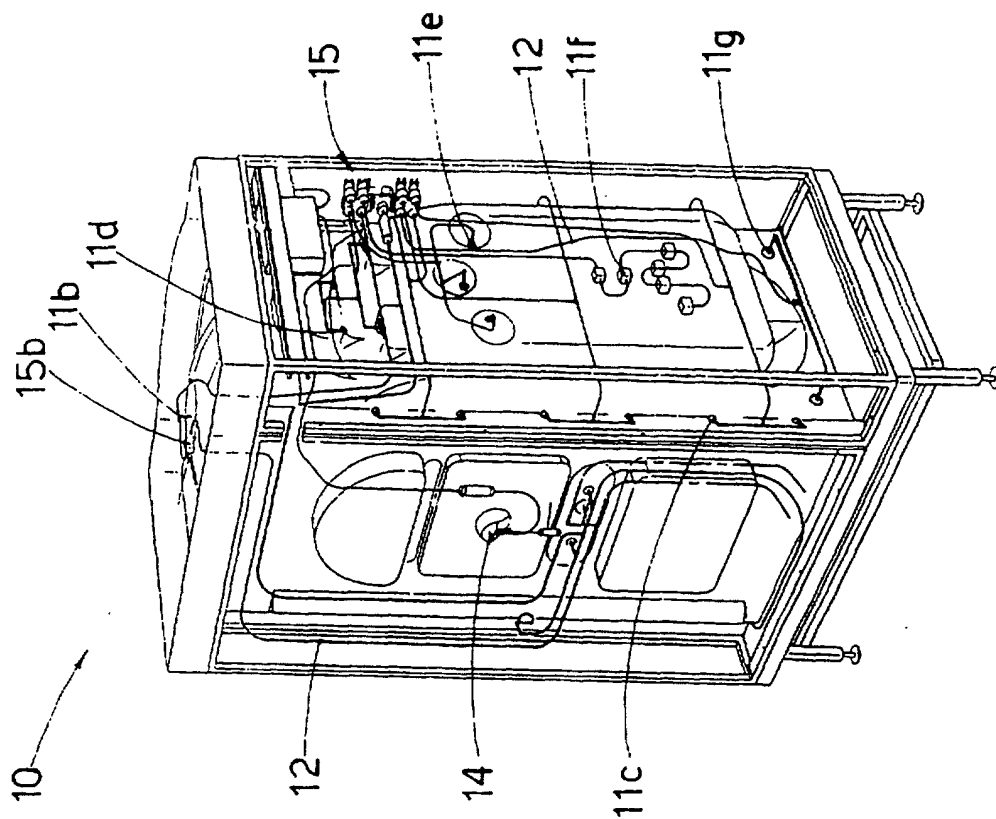


fig.2

