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(54) **Gas boiler with means for accumulating and maintaining hot water for domestic use**

Gaskessel mit Mitteln für die Speicherung und Warmhaltung von Brauchwasser

Chaudière à gaz avec moyens pour accumuler et maintenir chaude de l'eau sanitaire

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• **Del Grosso, Lamberto**
36061 Bassano del Grappa (Vicenza) (IT)

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(74) Representative: **Ripamonti, Enrico, Dr. Ing. et al**
Ing. A. Giambrocono & C. s.r.l.,
19/B, Via Rosolino Pilo
20129 Milano (IT)

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(73) Proprietor: **Baxi S.p.a.**
36061 Bassano del Grappa (Vicenza) (IT)

(56) References cited:
EP-A- 0 692 682 **EP-A- 0 784 191**
DE-U- 9 115 237 **GB-A- 2 209 594**
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(72) Inventors:
• **Baggio, Livio**
31011 Casella D'Asolo (Treviso) (IT)

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Description

[0001] This invention relates to a boiler for hot water production in accordance with the pre-characterising part of the main claim.

[0002] Gas boilers of the aforesaid type have been known for some time. One of the main drawbacks of these boilers is related to the fact that they are unable to immediately provide hot water for domestic use.

[0003] In this respect, when the user requires hot water to circulate through the secondary hydraulic circuit of the boiler, ie through the circuit for water for domestic use, the boiler has first to heat the water present in the primary circuit (ie in the circuit for supplying heating water), so that the water heated in this manner heats water for domestic use on passing through the second boiler heat exchanger, which is generally a plate heat exchanger.

[0004] In known boilers at least one minute is generally required to obtain water at about 50-60°C at the exit of the boiler domestic circuit from water entering at about 10-15°C.

[0005] It should also be noted that in known boilers the immediate unavailability of hot water for domestic use also negatively affects the water consumption of the domestic plant. In this respect, with known boilers water must be allowed to flow from a tap of the plant until it has reached the required temperature.

[0006] Moreover known boilers generally do not ensure stable delivery of hot water for domestic use.

[0007] .To obviate this drawback it has up to now been considered to add to traditional boilers small vessels (for example with a capacity of 3-6 litres) in which to accumulate hot water to be used in the initial heating stage of the water for domestic use. However this type of boiler is generally too bulky (and/or complex), as an additional vessel has to be provided compared with traditional boilers. Moreover these accumulation boilers require not only the vessel but other additional components, for example members for heating the water present in the vessel, which complicate their overall structure in addition to increasing the boiler assembly time and construction cost.

[0008] A known solution for obviating these drawbacks is known from EP 692682 und EP 0 784 191, which forms the preamble of the main claim.

[0009] A object of this invention is to provide a boiler for producing hot water for domestic use and for heating, which ensures immediate availability and stable delivery of hot water for domestic use, without the need to provide bulky additional components and/or components involving additional heating elements.

[0010] A further object is to provide a boiler with a time and cost of assembly comparable to those of traditional boilers and which does not require additional maintenance.

[0011] These and other objects which will be apparent to an expert of the field are attained by a boiler in ac-

cordance with the characterising part of the main claim.

[0012] The invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and on which:

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Figure 1 is a frontal schematic view of the components of a boiler which does not form part of the claimed invention

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Figure 2 is a schematic section taken on the line 2/2 of Figure 1;

Figure 3 is a view similar to Figure 1, according to invention;

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Figure 4 is a partly sectional side view of a part of the boiler of Figure 3; and

Figure 5 is an enlarged view in the direction of the arrow A of Figure 4.

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[0013] With reference to Figures 1 and 2, a boiler comprises a first hydraulic circuit 1, or primary circuit, containing a pump 2, a first heat exchanger 3 for heating the water circulating through the circuit, a three-way valve 4 and a second heat exchanger 25 for transferring heat to the water circulating through a second hydraulic circuit 5. The primary circuit 1 is connected to a heating system via a return pipe 6 and an exit or delivery pipe 7. Water for domestic use circulates through the second circuit, on passing through the second heat exchanger 25 it being heated as required. This second circuit comprises a delivery pipe 5B and a return pipe 5B.

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[0014] The boiler also comprises usual safety members 8, 9, 11, 12 and a safety valve 10, known flue gas conveying and control means 13, and regulator means 14 for a gas flow fed through a pipe 15 to a known burner 16. The boiler also comprises a usual control unit (not shown) for the boiler operation. This unit is connected to and controls all the internal members of the boiler.

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[0015] The aforescribed components are all of conventional type and will therefore not be described in detail hereinafter. The boiler also comprises a member 17 acting simultaneously as an expansion tank and as an accumulation vessel for hot water of the primary circuit.

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[0016] The expansion and accumulation member 17 comprises (Figure 2) a shell 18 of substantially parallelepiped shape, defining an internal space divided into two parts 18A, 18B by an elastically deformable element 19 (formed for example of an elastomer) provided within the shell 18 and having for example the shape of an inverted jug. The shell 18 comprises upperly a through hole 24A sealed by a plug 24 and lowerly a tubular connector 20 arranged to close a shell aperture on which this connector is positioned, and to sealedly retain the edges of the elastic element 19 against the edges of said aperture. The connector 20 is advantageously connected to the edge of the shell 18 by seaming. The tubular element 20 comprises a water inlet aperture 20A and an outlet aperture 20B. This latter is connected to a tubular element 21 inserted into the elastic element 19 and dimensioned such that its upper end 21A is positioned

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in correspondence with the upper portion S of the elastic element when this contains water at ambient temperature (Figure 2). In correspondence with the lower portion I of the elastic element 19, the tubular element 21 comprises a plurality of holes 22. A probe 23 of conventional type is provided within the tubular element to measure the temperature of the water contained in the element 19. The signal obtained by the probe is transmitted to the outside (to the aforesaid control unit) via a cable 23A. The probe could also be positioned within the space between the elastic element 19 and the tubular element 21 (as shown by dashed lines in Figure 2). Alternatively, the temperature of said water can be measured by the control unit in another manner, for example indirectly via a probe measuring the temperature of the shell 18.

[0017] The outlet 20B of the expansion and accumulation member 17 is connected to the pump 2, the inlet 20A being connected to a connection pipe connected both to the heating water inlet pipe 6 and to the outlet of the second heat exchanger 25.

[0018] To form the expansion and accumulation member 17 the conventional expansion members already present in known boilers can be advantageously used. In this respect, such members are totally identical to that shown in Figure 2 with regard to the shell 18 and the elastic element 19, so that commercially available shells and elements can be used for its construction. However, known expansion members have a different lower connection and closure element from the aforescribed (with only one aperture acting both as inlet and outlet for the water provided in the elastic element) and may not possess the tubular element 21 or the temperature measurement probe 23. Generally, in known boilers the expansion members are connected to the inlet or outlet branch of the second heat exchanger 25.

[0019] The known expansion members are arranged to automatically adjust the water pressure in the primary circuit as its temperature varies. In known members the chamber 18A of the shell 18 is filled through the hole 24A with a gas (inert, for example nitrogen) at a determined pressure (for example at a pressure of 1 bar) whereas the elastic element, being connected to the primary hydraulic circuit of the boiler, is filled with water at ambient temperature. Under these conditions the elastic element fills until the pressure in its interior equals the pressure within the remaining part of the chamber (under such conditions the elastic element generally occupies a space equal to that indicated in Figure 2). When the primary circuit water is heated the volume of the elastic element increases, and simultaneously the gas present in the chamber 18A is compressed until a new equilibrium situation is attained (when the water in the elastic element is at its maximum temperature, this element can for example have the shape indicated by the dashed line M in Figure 2). The aforescribed type of operation is usual in known boilers and is in no way altered by the expansion and accumulation member of the

invention.

[0020] According to the preamble of claim 1 the elastic element 19 is however also used for accumulating hot water to be used for the initial heating of the water of the secondary circuit 5 in the heat exchanger 25. For this purpose, when the probe 23 senses that the temperature of the water contained in the elastic element 21 has fallen below a predetermined value (for example 40°C) the unit controlling the various boiler components operates the three-way valve 4 to close the flow of water from the primary circuit to the outlet pipe 7 and instead direct it to the heat exchanger 25, and activates the pump 2 and burner 16. The water of the primary circuit is heated until the probe 23 inserted in the elastic element 19 senses the attainment of a predetermined temperature (for example 55°C).

[0021] It should be noted that during this water heating stage the second heat exchanger 25 does not operate as a heat exchanger but simply as a passive element for connecting the valve 4 to the expansion and accumulation member 17. In a variant (not shown), a dedicated pipe and valve could also be provided for this purpose.

[0022] Advantageously, during this water heating stage the boiler control unit operates the burner 16 at reduced power to prevent stressing of the primary hydraulic circuit 1 which has a reduced capacity, so preventing overheating.

[0023] In this manner when the control unit detects a request for hot water for domestic use (this being usually detected by the member 9 which feeds a signal to the control unit), with the boiler of the invention under normal operating conditions the expansion and accumulation member 17 contains a quantity of hot water sufficient to provide immediate heating of the water for domestic use circulating through the circuit 5.

[0024] In this respect, when the control unit receives a signal relative to a request for hot water, this unit, as also happens in known boilers, activates the pump 11 and burner 16, and closes the valve 4 so that the water of the circuit 1, taken from the member 17, circulates towards the heat exchanger 25 and not towards the pipe 7. Hence with the boiler of the invention it is no longer necessary to wait for the water of the primary circuit 1 to heat up before transferring heat via the heat exchanger 25 to the water circulating through the domestic circuit 5. In this respect, by virtue of the hot water accumulated within the member 17 in the primary circuit 1, hot water is immediately available, with corresponding immediate heat transfer between the water of the primary circuit 1 and the water of the secondary circuit 5.

[0025] It has been found experimentally that in a traditional boiler more than 60 seconds are required to raise the temperature of the water for domestic use leaving the pipe 5B from 20°C to 50-60°C whereas in a boiler of the invention about 5 seconds are sufficient.

[0026] The holes 22 present in the tubular element 22 have proved of particular use when hot water for domes-

tic use is requested but the accumulated water in the element 19 is at a low temperature, close to the limiting temperature measured by the probe 23. Under these conditions the expansion and accumulation member feeds the heat exchanger 25 with water able to transfer a limited quantity of heat to the water for domestic use. Moreover in this situation if the holes 22 were absent, the water volume present in the elastic element 19 would slow down the heating of the water. However the holes 22 enable the water volume present in the elastic element to be by-passed; most of the water to be heated by the burner 16 follows the path indicated by the arrow F. Hence even under said critical conditions the water for domestic use is heated rapidly.

[0027] It should be noted that the boiler of the invention achieves the same results as known boilers comprising an additional hot water accumulation vessel and additional means for heating the water present in the vessel, without the need to use a greater number of components and without varying the overall size compared with traditional boilers without hot water accumulation.

[0028] Moreover, in contrast to the accumulation vessels of known boilers, the aforescribed expansion and accumulation member 17 does not require insulation. In this respect, the air present in the part 18A of the shell 18 provides sufficient insulation.

[0029] The control unit of the boiler according to the invention has not been described as it is of conventional type to the expert of the art.

[0030] Thus for example, the expansion and accumulation member 17 could be provided in another position of the circuit 1, for example upstream of the heat exchanger 25, or the elastic element 19 could be formed differently from that shown. According to the invention, the element 19 has the form of a flat membrane to sealably separate the chamber into two parts of variable volume, one for water and the other for pressurized gas.

[0031] Such an embodiment is shown in Figures 3, 4 and 5 (where parts corresponding to those of Figures 1 and 2 are indicated by the same reference numerals) in which the member 17 comprises an element 19 in the form of a flat membrane, as stated. When not caused to expand by the water of the primary circuit (heating water), this membrane rests substantially on a rigid baffle 33 which divides the internal space of the shell 18 into two chambers 18A, 18B of predefined volume when the water in the chamber 18B is at low temperature. The baffle 33 comprises holes 34 enabling the water of the chamber 18B to displace the membrane 19 within the chamber 18A when said water heats up, so increasing its pressure.

[0032] The member 17 shown in Figures 3, 4 and 5 enables the boiler to operate as already described in relation to Figures 1 and 2, while enabling a minimum volume of water (for example 2 litres) to be always maintained in this member when at relatively low temperature. This is achieved by providing the baffle 33, which

defines a minimum volume of the chamber 18B to which the heating water inlet pipe 20A and outlet pipe 20B are connected. These pipes can be positioned at opposite ends 17A and 17B of the member 17 or (as in Figure 4) on the same side or end (for example 17A) of this latter. Again in this case, as in the case of Figures 1 and 2, the outlet 20B is connected to and communicates with the tubular element 21.

Claims

1. A boiler for producing hot water for heating and for domestic use, of the type comprising a first hydraulic circuit (1) for heating the water destined for a heating system, said first circuit comprising means (2) for the forced circulation of the water through said first circuit, first means (3, 16) for generating heat and transferring it to the water, valve means (4) for conveying the heated water to a delivery pipe (7) or to second heat exchanger means (25) arranged to transfer at least part of the heat of the heated water to the water for domestic use circulating through a second hydraulic circuit (5), means for automatically adjusting the pressure of the water circulating through the primary circuit as its temperature varies, and means for accumulating and maintaining a predetermined quantity of heated water in the primary circuit within a predetermined temperature range, said accumulating and maintaining means being connected to the primary circuit in such a manner as to make available to the second heat exchanger means (25) said predetermined quantity of heated water at least during an initial stage in the heating of the water for domestic use circulating through the second circuit, means being provided for controlling the operative components of the boiler, the means for accumulating and maintaining a quantity of heated water to be made available to the second heat exchanger means (25) being the expansion means (17), means for measuring the temperature of the water present in the expansion means being provided, said measuring means being connected to the control means which on the basis of the measured temperature of the water present in the expansion means (17) acts on the first hydraulic circuit (1) to maintain this temperature at a predetermined value at which heat transfer to the water for domestic use during the initial stage of its heating can take place effectively the expansion means (17) comprising a hollow shell (18) and an elastically deformable element (19) arranged to divide the internal space defined by said shell into two parts (18A, 18B) sealedly separated from each other, a closed first part (18A) being filled with a pressurized gas, the second part (18B) being connected to the primary hydraulic circuit (1) and being fillable, against the action of said pressurized gas,

by the water of said primary circuit, said second part (18B) comprising a water inlet aperture (20A) and an outlet aperture (20B) and containing the water temperature measurement means (23), whereas the elastically deformable element (19) is in the form of a substantially flat membrane, **characterised in that** the two chambers (18A, 18B) of the hollow shell (18) of the expansion means (17) are separated by a rigid baffle (33) provided with apertures (34) connecting said chambers (18A, 18B) together, in the chamber (18A) filled with gas there being positioned the deformable element (19) which, when the temperature of the water in the other chamber (18B) is low, rests on at least part of said baffle (33) and which, when said temperature increases, expands into said chamber (18A) to withdraw from said baffle (33).

2. A boiler as claimed in claim 1, **characterised in that** the expansion means (17) are connected to the first hydraulic circuit (1) by circulation means (20) such as to enable the water contained in them to move from and to said circuit (1) and to enable them to also be used as accumulation means.
3. A boiler as claimed in claim 1, **characterised in that** the elastically deformable element (19) is in the form of an inverted jug.
4. A boiler as claimed in claim 1, **characterised in that** the inlet aperture (20A) is connected to the base of the second part (18B) containing water, the outlet aperture (20B) being connected to an upper region of said second part (18B).
5. A boiler as claimed in claim 4, **characterised by** comprising an element (21) connecting the water outlet aperture (20B) to the upper region of the second part (18B) and arranged to enable the water entering from the base of said second part to flow out only after it has reached the upper region of said second part.
6. A boiler as claimed in claim 5, **characterised in that** the connection element (21) comprises a plurality of through holes (22) positioned in correspondence with the base of the second part (18B) and arranged to enable at least part of the water entering the second part to immediately flow from said second part.
7. A boiler as claimed in claim 1, **characterised in that** the expansion and accumulation means (17) are provided between the second heat exchanger means (25) and the means (2) for the forced circulation of the water.
8. A boiler as claimed in claim 1, **characterised in**

that the temperature measurement means are a temperature probe (23) located inside the expansion means (17).

9. A boiler as claimed in claim 1, **characterised in that** the temperature measurement means are a probe measuring the temperature of the hollow shell (1) of the expansion means.

Patentansprüche

1. Kessel, um heißes Wasser zum Heizen und für den häuslichen Gebrauch zu erzeugen, von dem Typ, der einen ersten Hydraulik-Schaltkreis (1) zum Erhitzen des Wassers, das für ein Heizsystem bestimmt ist, wobei der erste Schaltkreis Einrichtungen (2) für die erzwungene Zirkulation des Wassers durch den ersten Schaltkreis aufweist, erste Einrichtungen (3, 16) zum Erzeugen von Hitze und zum Übertragen der Hitze auf das Wasser, Ventileinrichtungen (4), um das erhitzte Wasser zu einem Zuführrohr (7) oder zu zweiten Wärmetauschereinrichtungen (25) zu leiten, die dazu ausgestaltet sind, um zumindest einen Teil der Hitze des erhitzten Wassers auf das Wasser für den häuslichen Gebrauch zu übertragen, das durch einen zweiten Hydraulik-Schaltkreis (5) zirkuliert, Einrichtungen zum automatischen Einstellen des Drucks des Wassers, das durch den ersten Schaltkreis zirkuliert, wenn dessen Temperatur variiert, und Einrichtungen zum Akkumulieren und zum Beibehalten einer vorbestimmten Menge an erhitztem Wasser in dem ersten Schaltkreis innerhalb eines vorbestimmten Temperaturbereichs aufweist, wobei die Einrichtungen zum Akkumulieren und Beibehalten mit dem ersten Schaltkreis in einer solchen Weise verbunden sind, um die vorbestimmte Menge an erhitztem Wasser zumindest während einer anfänglichen Stufe beim Erhitzen des Wassers für den häuslichen Gebrauch, das durch den zweiten Schaltkreis zirkuliert, den zweiten Wärmetauschereinrichtungen (25) verfügbar zu machen, wobei Einrichtungen vorgesehen sind, um die operativen Komponenten des Kessels zu steuern, wobei die Einrichtungen zum Akkumulieren und Beibehalten einer Menge an erhitztem Wasser, das den zweiten Wärmetauschereinrichtungen (25) verfügbar gemacht werden soll, die Expansionseinrichtungen (17) sind, wobei Einrichtungen zum Messen der Temperatur des Wassers, das sich in den Expansionseinrichtungen befindet, vorgesehen sind, wobei die Messeinrichtungen mit den Steuereinrichtungen verbunden sind, die auf Basis der gemessenen Temperatur des Wassers, das sich in den Expansionseinrichtungen (17) befindet, auf den ersten Hydraulik-Schaltkreis (1) wirken, um diese Temperatur bei einem vorbestimmten Wert zu halten, bei dem

die Wärmeübertragung auf das Wasser für den häuslichen Gebrauch während der anfänglichen Stufe von dessen Erhitzen wirksam erfolgen kann, wobei die Expansionseinrichtungen (17) eine hohle Schale (18) und ein elastisch verformbares Element (19) aufweist, das dazu ausgestaltet ist, um den inneren Raum, der durch die Schale definiert ist, in zwei Teile (18A, 18B) zu unterteilen, die abgedichtet voneinander getrennt sind, wobei ein geschlossener erster Teil (18A) mit einem unter Druck stehenden Gas gefüllt ist, der zweite Teil (18B) mit dem ersten Hydraulik-Schaltkreis (1) verbunden und gegen die Wirkung des unter Druck stehenden Gases durch das Wasser von dem ersten Schaltkreis befüllbar ist, wobei der zweite Teil (18B) eine Wasser-Einlassöffnung (20A) und eine Auslassöffnung (20B) aufweist und die Wassertemperatur-Messeinrichtungen (23) beinhaltet, wohingegen das elastisch verformbare Element (19) die Form von einer im wesentlichen flachen Membran hat, **dadurch gekennzeichnet, dass** die beiden Kammern (18A, 18B) der hohlen Schale (18) der Expansionseinrichtungen (17) durch eine starre Leitplatte (33) getrennt sind, die mit Öffnungen (34) versehen ist, wodurch die Kammern (18A, 18B) miteinander verbunden sind, dass in der Kammer (18A), die mit Gas gefüllt ist, das verformbare Element (19) angeordnet ist, das dann, wenn die Temperatur des Wassers in der anderen Kammer (18B) niedrig ist, an zumindest einem Teil der Leitplatte (33) anliegt, und das dann, wenn die Temperatur ansteigt, in die Kammer (18A) expandiert, um sich von der Platte (33) zu lösen.

2. Kessel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Expansionseinrichtungen (17) durch Zirkulationseinrichtungen (20) mit dem ersten Hydraulik-Schaltkreis (1) so verbunden sind, um zu ermöglichen, dass sich das Wasser, das darin enthalten ist, von und zu dem Schaltkreis (1) bewegt, und um zu ermöglichen, dass sie auch als Akkumulationseinrichtungen verwendet werden können.
3. Kessel nach Anspruch 1, **dadurch gekennzeichnet, dass** das elastisch verformbare Element (19) die Form von einem invertierten Wanne hat.
4. Kessel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Einlassöffnung (20A) mit der Basis von dem zweiten Teil (18B) verbunden ist, das Wasser enthält, und dass die Auslassöffnung (20B) mit einem oberen Bereich von dem zweiten Teil (18B) verbunden ist.
5. Kessel nach Anspruch 4, **dadurch gekennzeichnet, dass** dieser ein Element (21) aufweist, durch das die Wasser-Auslassöffnung (20B) mit dem oberen Bereich von dem zweiten Teil (18B) verbunden

ist und das dazu ausgestaltet ist, um zu ermöglichen, dass Wasser, das von der Basis des zweiten Teils eintritt, nur ausströmt, nachdem es den oberen Bereich von dem zweiten Teil erreicht hat.

6. Kessel nach Anspruch 5, **dadurch gekennzeichnet, dass** das Verbindungselement (21) eine Vielzahl von Durchgangslöchern (22) aufweist, die in Beziehung mit der Basis von dem zweiten Teil (18B) angeordnet und dazu ausgestaltet sind, um zu ermöglichen, dass zumindest ein Teil von dem Wasser, das in das zweite Teil eintritt, unmittelbar aus dem zweiten Teil ausströmt.
7. Kessel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Expansions- und Akkumulationseinrichtungen (17) zwischen den zweiten Wärmetauschereinrichtungen (25) und den Einrichtungen (2) für die erzwungenen Zirkulation des Wassers angeordnet sind.
8. Kessel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Temperatur-Messeinrichtungen eine Temperatur-Sonde (23) aufweisen, die sich innerhalb der Expansionseinrichtungen (18) befindet.
9. Kessel nach Anspruch 1, **dadurch gekennzeichnet, dass** die Temperatur-Messeinrichtungen eine Sonde aufweisen, die die Temperatur der hohlen Schale (1) der Expansionseinrichtungen misst.

Revendications

1. Chaudière pour produire de l'eau chaude pour le chauffage et les utilisations domestiques, du type comprenant un premier circuit hydraulique (1) pour chauffer l'eau destinée à un système de chauffage, ledit premier circuit comprenant un moyen (2) pour la circulation forcée de l'eau dans ledit premier circuit, des premiers moyens (3, 16) pour produire de la chaleur et transmettre celle-ci à l'eau, un moyen formant clapet (4) pour acheminer l'eau chauffée jusqu'à un tuyau de refoulement (7) ou jusqu'à un second moyen formant échangeur de chaleur (25) conçu pour transmettre au moins une partie de la chaleur de l'eau chauffée à l'eau destinée à des utilisations domestiques circulant dans un second circuit hydraulique (5), un moyen pour régler automatiquement la pression de l'eau circulant dans le circuit primaire lorsque sa température varie, et un moyen pour accumuler et maintenir une quantité prédéterminée d'eau chauffée dans le circuit primaire dans un intervalle de température prédéterminée, ledit moyen d'accumulation et de maintien étant relié au circuit primaire de façon à ce que ladite quantité prédéterminée d'eau chauffée soit rendue disponible pour le second moyen formant

échangeur de chaleur (25) au moins pendant un stade initial du chauffage de l'eau pour usages domestiques circulant dans le second circuit, un moyen étant prévu pour commander les organes de la chaudière, le moyen pour accumuler et maintenir une quantité d'eau chauffée à rendre disponible pour le second moyen formant échangeur de chaleur (25) étant le moyen d'expansion (17), un moyen pour mesurer la température de l'eau présente dans le moyen d'expansion étant prévu, ledit moyen de mesure étant connecté au moyen de commande qui, d'après la température mesurée de l'eau présente dans le moyen d'expansion (17), agit sur le premier circuit hydraulique (1) afin de maintenir cette température à une valeur prédéterminée à laquelle la transmission de chaleur à l'eau pour usages domestiques pendant le stade initial de son chauffage peut avoir lieu d'une façon efficace, le moyen d'expansion (17) comportant une enveloppe creuse (18) et un élément élastiquement déformable (19) conçu pour diviser l'espace intérieur défini par ladite enveloppe en deux parties (18A, 18B) séparées de manière étanche l'une de l'autre, une première partie fermée (18A) étant remplie d'un gaz sous pression, la deuxième partie (18B) étant reliée au circuit hydraulique primaire (1) et étant remplissable, à l'encontre de l'action dudit gaz sous pression, par l'eau dudit circuit primaire, ladite deuxième partie (18B) comprenant un orifice d'entrée (20A) d'eau et un orifice de sortie (20B) et contenant le moyen de mesure (23) de température d'eau, tandis que l'élément élastiquement déformable (19) se présente sous la forme d'une membrane sensiblement plane, **caractérisée en ce que** les deux chambres (18A, 18B) de l'enveloppe creuse (18) du moyen d'expansion (17) sont séparées par un déflecteur rigide (33) pourvu d'ouvertures (34) reliant l'une à l'autre les chambres (18A, 18B), dans la chambre (18A) remplie de gaz étant placé l'élément déformable (19) qui, lorsque la température de l'eau dans l'autre chambre (18B) est basse, repose sur au moins une partie dudit déflecteur (33) et qui, lorsque ladite température augmente, se déploie dans ladite chambre (18A) pour s'écarter dudit déflecteur (33).

2. Chaudière selon la revendication 1, **caractérisée en ce que** le moyen d'expansion (17) est relié au premier circuit hydraulique (1) par des moyens de circulation (20) de façon à permettre à l'eau contenue dans ceux-ci d'aller et venir par rapport audit circuit (1) et à leur permettre d'être utilisés également comme moyens d'accumulation.
3. Chaudière selon la revendication 1, **caractérisée en ce que** l'élément élastiquement déformable (19) se présente sous la forme d'une carafe retournée.

4. Chaudière selon la revendication 1, **caractérisée en ce que** l'ouverture d'entrée (20A) est reliée à la base de la deuxième partie (18B) contenant de l'eau, l'ouverture de sortie (20B) étant reliée à une région supérieure de ladite deuxième partie (18B).
5. Chaudière selon la revendication 4, **caractérisée en ce qu'elle** comprend un élément (21) reliant l'ouverture de sortie (20B) d'eau à la région supérieure de la deuxième partie (18B) et conçu pour permettre à l'eau entrant à partir de la base de ladite deuxième partie de sortir uniquement après avoir atteint la région supérieure de ladite deuxième partie.
6. Chaudière selon la revendication 5, **caractérisée en ce que** l'élément de liaison (21) comporte une pluralité de trous traversants (22) dont les positions correspondent à la base de la deuxième partie (18B) et qui sont conçus pour permettre au moins à une partie de l'eau entrant dans la deuxième partie de quitter immédiatement ladite deuxième partie.
7. Chaudière selon la revendication 1, **caractérisée en ce que** le moyen d'expansion et d'accumulation (17) est disposé entre le second moyen formant échangeur de chaleur (25) et le moyen (2) pour la circulation forcée de l'eau.
8. Chaudière selon la revendication 1, **caractérisée en ce que** le moyen de mesure de température est une sonde de température (23) située à l'intérieur du moyen d'expansion (17).
9. Chaudière selon la revendication 1, **caractérisée en ce que** le moyen de mesure de température est une sonde mesurant la température de l'enveloppe creuse (1) du moyen d'expansion.

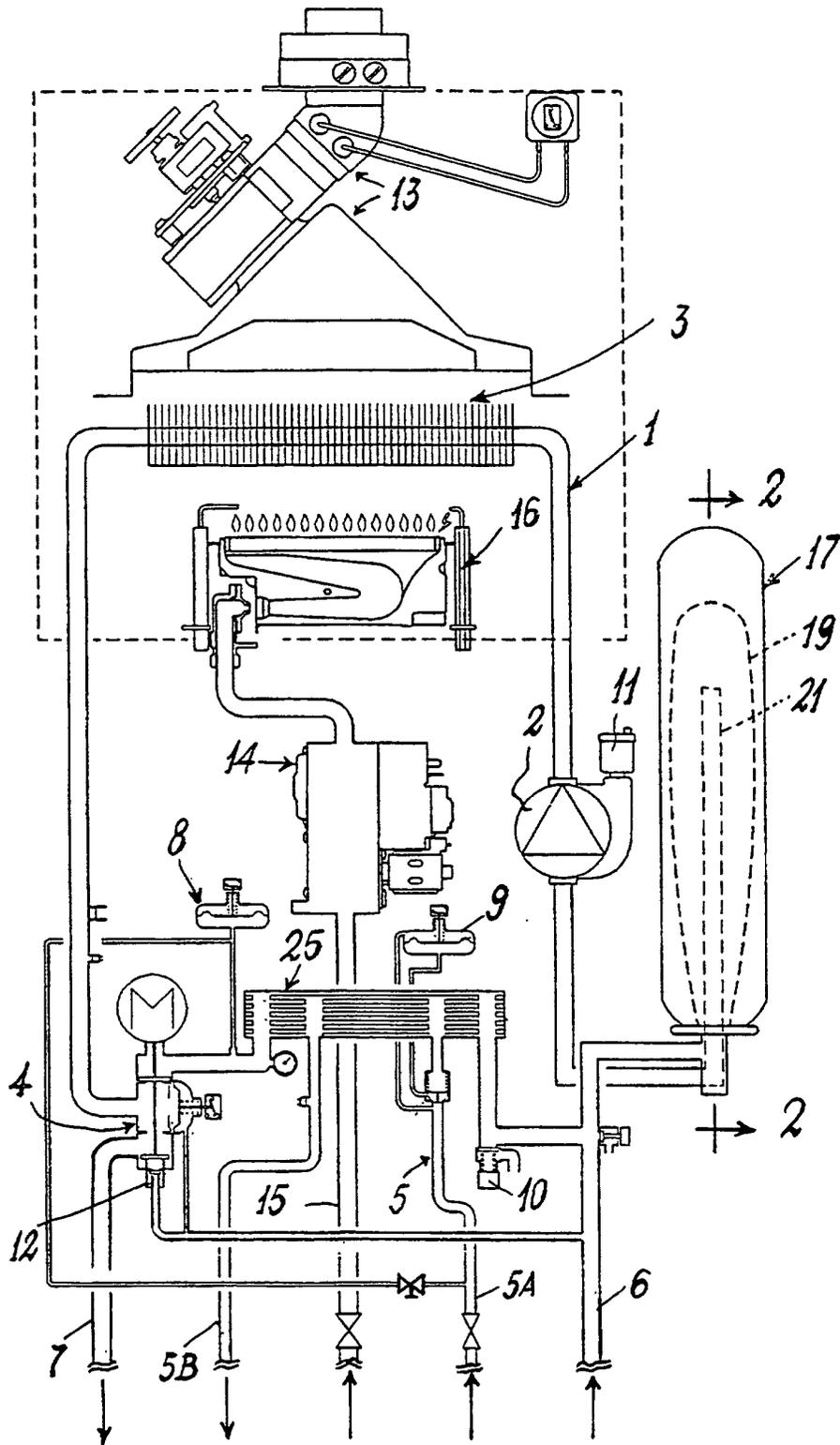
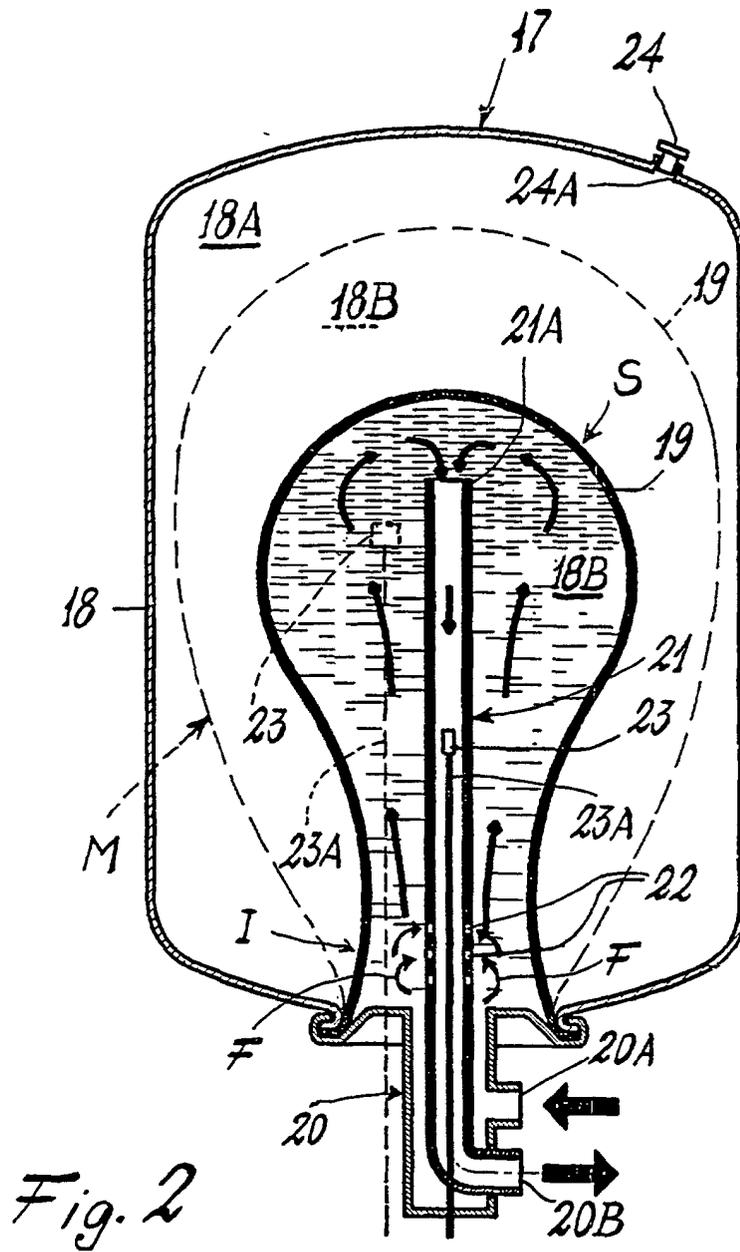


Fig. 1



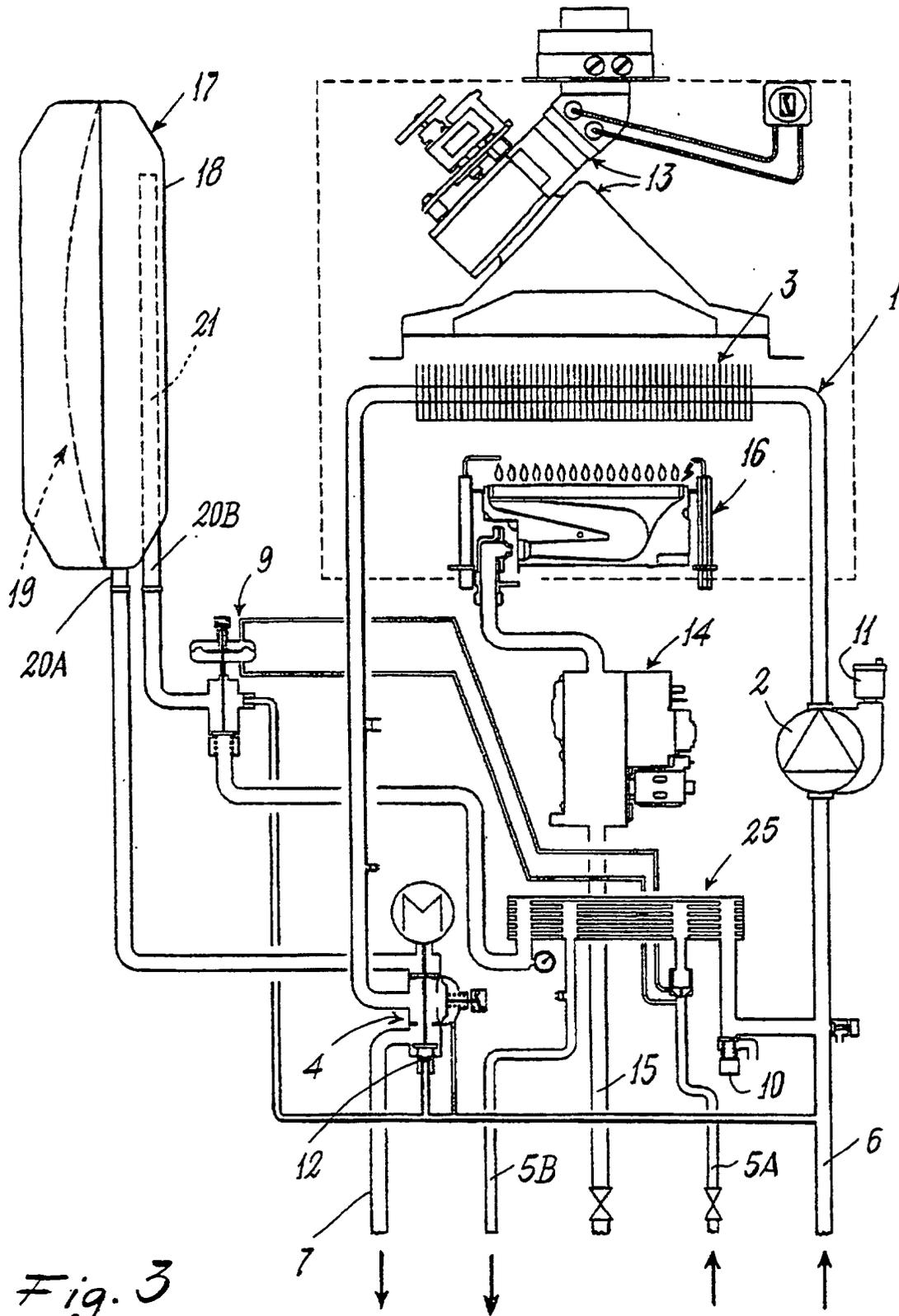


Fig. 3

