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Datasheet for the decision of 21 July 2023

Case Number: T 0153/20 - 3.2.03

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Language of the proceedings: EN

Title of invention:
COLD/HOT WATER SUPPLY APPARATUS

Patent Proprietor:
Panasonic Holdings Corporation

Opponent:
Robert Bosch GmbH

Headword:

Relevant legal provisions:
EPC Art. 123(2), 56

Keyword:
Amendments - allowable (yes) - extension beyond the content of the application as filed (no)
Inventive step - (yes) - non-obvious modification

Decisions cited:

Catchword:

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Case Number: T 0153/20 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 21 July 2023

Appellant: (Opponent)	Robert Bosch GmbH Postfach 30 02 20 70442 Stuttgart (DE)
Respondent: (Patent Proprietor)	Panasonic Holdings Corporation 1006, Oaza Kadoma Kadoma-shi Osaka 571-8501 (JP)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Postfach 31 02 60 80102 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 12 November 2019 concerning maintenance of the European Patent No. 2538146 in amended form.**

Composition of the Board:

Chairman	N. Obrovski
Members:	R. Baltanás y Jorge
	B. Goers

Summary of Facts and Submissions

I. European patent No. 2 538 146 B1 relates to a "*cold/hot water supply apparatus*".

II. An opposition was filed against the patent based on Article 100(a) EPC in conjunction with Articles 54 and 56 EPC.

III. In its interlocutory decision the opposition division found that auxiliary request 1 filed during the oral proceedings met the requirements of the EPC.

This decision was appealed by the opponent (appellant).

IV. Requests

At the end of the oral proceedings before the Board, the respondent requested that the patent be maintained in amended form on the basis of the new main request (i.e. auxiliary request 4a submitted with the respondent's reply to the statement of grounds of appeal).

The appellant requested that the decision under appeal be set aside and the patent be revoked.

For the sake of clarity, the new main request will be referred to as "auxiliary request 4a" in this decision.

V. Claim 1 of auxiliary request 4a, including a numbering of its features based on that adopted by the parties, reads as follows (amendments with regard to the originally-filed claim 1 are marked in bold; amendments

with regard to the granted claim 1 are also underlined):

M1 *A cold/hot water supply apparatus **(10**) comprising:*

M2 *a refrigerant circuit **(2)** including a compressor **(21)**, a first heat exchanger **(22)**, expansion means **(23)** and a second heat exchanger **(24)** which are annularly connected to one another and through which refrigerant flows;*

M3 *a fluid circuit **(5)** including the first heat exchanger **(22)** and a third heat exchanger **(53)** which are annularly connected to each other and through which fluid flows;*

M4 *a heat accumulator tank **(55**) in which water is stored;*

M5 *a first switching pipe **(62)** which is connected to the third heat exchanger **(53)** in parallel, and which exchanges heat between the fluid and water in the heat accumulator tank **(55)**; and*

M6 *a control apparatus **(4)** which* **[*~~switches~~*]** ***is configured to switch*** *between a flow of the fluid to the third heat exchanger **(53)** and a flow of the fluid to the heat accumulator tank **(55)**;*

M7 *in which the cold/hot water supply apparatus **(10)** has a heat-accumulation operation mode and a cooling operation mode,*

M8 *in the heat-accumulation operation mode, the fluid flows to the first switching pipe **(62)**, thereby heating the water in the heat accumulator tank **(55)**,*

M9 *and in the cooling operation mode, the fluid flows to the third heat exchanger **(53)**, thereby absorbing heat in air,*

M10 *wherein the cold/hot water supply apparatus **(10)** also includes: a temperature sensor **(70)** which detects temperature of the fluid; and*

M11 ***characterized by** a second switching pipe **(63)** which is connected to the third heat exchanger **(53)** in parallel and which is connected to the first switching pipe **(62)** in parallel, the fluid flowing through the second switching pipe **(63);***

M5a ***the first switching pipe (62) branching off from a first fluid path-switching valve (60) and being connected to a pipe extending from the third heat exchanger (53) to the first heat exchanger (22) through the heat accumulator tank (55),***

M11a ***the second switching pipe (63) branching off from a second fluid path-switching valve(61) and being connected to the pipe extending from the third heat exchanger (53) to the first heat exchanger (22);***

M6a ***the control apparatus (4) being configured to control the first fluid path-switching valve (60) and the second fluid path-switching valve (61) based on the temperature;***

M12 *and when the cooling operation mode is changed to the heat-accumulation operation mode, the control apparatus **(4)** [~~**determines**~~] **is configured to determine** whether the fluid which flows out of the first heat exchanger **(22)** should be made to flow to the second switching pipe **(63)** or to the first switching pipe **(62)** based on temperature of the fluid detected by the temperature sensor **(70).***

VI. The originally-filed claim 1 defines the following features on which features M6 and M12 are based (emphasis added):

M6' *a control apparatus which **switches** between a flow of the fluid to the third heat exchanger and a flow of the fluid to the heat accumulator tank*

M12' *and when the cooling operation mode is changed to the heat-accumulation operation mode, the control apparatus **determines** whether the fluid which flows out of the first heat exchanger should be made to flow to the second switching pipe or to the first switching pipe based on temperature of the fluid detected by the temperature sensor*

VII. Prior art

The following documents have been cited both in the grounds of appeal and during the opposition proceedings, and are relevant to this decision:

D1: EP 2 103 883 A1
D2: EP 2 395 302 A1
E1: JP 2002048398 A with Patent Abstract of Japan
E2: JP 2005098568 A with Patent Abstract of Japan

VIII. The appellant's arguments relevant to this decision can be summarised as follows:

(a) Added subject-matter

Feature M6a (the control apparatus being configured to control the first fluid path-switching valve and the second fluid path-switching valve based on the temperature) was allegedly based on paragraph [0023] of the description originally filed. However, some features disclosed in this paragraph had been omitted in the amended claim 1, thus giving rise to an unallowable intermediate generalisation. Namely,

paragraph [0023] disclosed that the control apparatus "inputs a signal from the temperature sensor". This was not equivalent to the defined valve control by the control apparatus "based on the temperature", in particular since this temperature could come from an undefined source.

(b) Inventive step, D1 combined with E1

Document D1, apart from the undisputed features M1 to M10, also disclosed feature M11 (a second switching pipe connected to the third heat exchanger in parallel and connected to the first switching pipe in parallel, the fluid flowing through the second switching pipe). The bypass pipe comprising a valve disclosed on the right-hand side of the third heat exchanger (40) in Figure 2 corresponded to such a second switching pipe.

M12 was the only distinguishing feature (when the cooling operation mode is changed to the heat-accumulation operation mode, the control apparatus is configured to determine whether the fluid which flows out of the first heat exchanger should be made to flow to the second switching pipe or to the first switching pipe based on temperature of the fluid detected by the temperature sensor).

The distinguishing feature solved the problem of avoiding the flow of cold fluid into the hot-water tank (30) in order to improve energy efficiency. This last problem was acknowledged as such in paragraph [0014] of the contested patent, where D1 was discussed as closest prior art. Thus the objective technical problem raised by the respondent for the first time during oral proceedings before the Board - which was linked to some

constructional features of the D1 apparatus - was not correct.

E1 discussed the problem posed (see section "Problem to be solved" in the English abstract). The skilled person would therefore consult this document belonging to the same technical field and would find a solution to the problem in the form of a bypass pipe (17) controlled as a function of the temperature of the water flowing into the hot-water storage tank. E1 disclosed that, when the temperature of the water having passed heat exchanger (9) detected by temperature detecting means (40) did not reach a "preset reheat decision temperature", control means (19) were actuated to deviate the flow towards the bypass circuit (17) in order to reheat the water. Thus the skilled person would learn from E1 that a bypass pipe controlled in this manner was to be used in situations where the temperature of a fluid was insufficient to warm up a fluid intended to flow into a tank, as was the case in D1 when changing from a cooling mode of the third heat exchanger to a heat-accumulation mode in which hot water was to be accumulated in the hot-water tank (30). The problem occurring when changing mode in D1 was identical to that addressed in E1, since the concept "cooling mode" just meant a system which was too cold to warm up water in the tank properly.

The skilled person would arrange the bypass pipe of E1 in the circuit of D1 in the same way as disclosed in E1, i.e. in parallel to the first heat exchanger (25) and before the hot-water tank (30) in order to allow fluid recirculation. This would result in an arrangement similar to that of D1's already-existing bypass pipe comprising a valve disclosed in Figure 2. By doing so, the new bypass pipe would also be arranged

in parallel to the third heat exchanger (40). The skilled person would connect the new bypass pipe to the main pipes of the fluid circuit, which extend between the first and third heat exchangers.

D1 implicitly disclosed a control device for the valve (32) at the outlet of the first switching pipe (31, 34, 36). D1 also disclosed a temperature sensor (61) for detecting the temperature of the fluid in the fluid circuit. A control as a function of temperature was disclosed in D1 - even if not the same as in claim 1 - such that the skilled person would learn from both documents in combination that fluid temperature could be used for controlling both the valve (32) and the valve controlling the bypass pipe incorporated according to the teaching of E1.

(c) Inventive step, D2 combined with E2

Document D2 implied a disclosure under Article 54(2) EPC since it was the publication in English by the EPO of an international application filed under the PCT treaty and published before the priority date of the contested patent.

Document D2 disclosed features M1 to M9, in particular a hot-water tank(37), a first heat exchanger (13), a third heat exchanger (36), a first switching pipe - starting at a location between the three-way valve (33) and the first solenoid switching valve (34) - and a control apparatus as disclosed in paragraph [0018].

D2 also disclosed a second switching pipe branching off from a fluid path-switching valve (33).

The problem addressed by the distinguishing features - as when starting from D1 - was to increase the energy efficiency.

E2 discussed the problem of stabilising the temperature of the hot water supplied to a hot-water tank, which is equivalent to the problem posed. E2 disclosed using a bypass circuit (14) for preventing inflow of low-temperature water into the hot-water tank. The skilled person would be prompted by E2 to use a temperature sensor (10) and a control apparatus (11, 20) to actuate two three-way valves (17, 18) controlling the flow through the first and second switching pipes (see Figure 4). With this teaching in mind, the skilled person would implement a three-way valve at the junction of the first switching pipe with the hot-water circulation flow path in D2. The skilled person, having implemented in D2 a temperature sensor such as the one disclosed in E2 to control the bypass circuit, would therefore arrive at a control of both path-switching valves - corresponding to the first and second switching pipes, respectively - based on the fluid temperature.

IX. The respondent's arguments relevant to this decision can be summarised as follows:

(a) Added subject-matter

Feature M6a defined a control "based on **the** temperature". The article "the" implied that this was the fluid temperature detected by the temperature sensor of feature M10. Since the control apparatus could only be configured to control the valves "based on the temperature" if the temperature was an input for such control, the disputed content of the originally-

filed paragraph [0023] was incorporated into the amended claim 1.

(b) Inventive step, D1 combined with E1

The invention focused on providing different flow circuits in a system which can also provide cold fluid. Thus the objective technical problem addressed by the distinguishing features had to be formulated as being to increase energy efficiency in a system with different flow circuits for a fluid and for the water to be heated, wherein the system had two modes of work, a cooling one and a heating one.

The skilled person would not consider document E1 when looking for a solution to this problem since it did not concern a system such as that of D1. E1 did not disclose different circuits for fluid and water as in D1, but a single circuit in which water was directly heated in the heat exchanger (9). The implementation of a solution based on E1 in the system of D1 would imply that limescale would accumulate in the floor heating circuit, a problem known to the skilled person, who consequently would discard the teaching of E1. Furthermore, E1 did not disclose any cooling mode, since heat exchanger (9) only received fluid at high temperature from the heating circuit (right-hand side of Figure 1). Finally, E1 did not mention any problem relating to increasing energy efficiency. Thus E1 could only be considered if the skilled person knew about the invention.

Even if E1 were considered at all, the skilled person would not arrive at the invention since the teaching of this document would lead them to provide a bypass pipe on the service-water side and not on the fluid side.

This would require further non-obvious adaptations of the bypass, including its control. The skilled person had no motivation to implement a bypass on the fluid side of D1, contrary to the teaching of E1. Moreover, this bypass pipe could be arranged at different locations on the fluid side, not all of them ensuring that the bypass pipe would be parallel to the third heat exchanger (40) as defined in feature M11. The allegedly-disclosed "bypass pipe" comprising a valve on the right-hand side of the third heat exchanger (40) in Figure 2 would not help the skilled person in deciding about such location.

Concerning control of valves, D1 disclosed an undefined control system for valve (32) leading to the alleged "first switching pipe", and a completely different use for its temperature sensor (61), which played a role in compensating for differences in fluid viscosity (see paragraph [0031]). The skilled person would not know how to control a bypass pipe added on the fluid side of the system, nor would they have any incentive to control the valve (32) based on the fluid's temperature.

(c) Inventive step, D2 combined with E2

Document D2 did not disclose a "first switching pipe" within the meaning of claim 1 since feature M5 (a first switching pipe which is connected to the third heat exchanger in parallel, and which exchanges heat between the fluid and water in the heat accumulator tank) implies that water in the tank is indirectly heated by the fluid flowing through this pipe. Contrary to this, D2 disclosed a pipe starting at a location between the three-way valve (33) and the first solenoid switching valve (34) which supplied water to the hot-water tank

(37) and ended inside this tank, thus not being connected in parallel to the third heat exchanger.

The skilled person would not take E2 into consideration since it only concerned the problem of "miniaturisation" of the hot-water storage tank. Furthermore, the English abstract of E1 did not disclose that element (10) was actually a temperature sensor, let alone that it controlled the bypass pipe as defined in claim 1.

Thus a combination of D2 with E2 could not lead the skilled person to the invention.

Reasons for the Decision

1. Auxiliary request 4a - added subject-matter - Article 123(2) EPC

Feature M6a defines a "*control apparatus being configured to control the first fluid path-switching valve and the second fluid path-switching valve based on* ***the*** *temperature*" (emphasis added).

The wording "**the** temperature" implies that this is the temperature detected by the temperature sensor as previously defined in feature M10. This is also consistent with feature M12, which defines a control of the fluid flow through the first or second switching pipes "*based on temperature of the fluid detected by the temperature sensor*".

Thus the control apparatus necessarily receives this temperature detected by the temperature sensor as an

input, since otherwise it could not be configured to control the valves (and the flow) "based on **the** temperature".

The second sentence of paragraph [0023] of the description originally filed discloses that "*A control apparatus 4 inputs a signal from the temperature sensor 70, and controls the first fluid path-switching valve 60 and the second fluid path-switching valve 61*".

Since any information received by the control apparatus of feature M6a relating to the temperature detected by the temperature sensor defined in feature M10 must necessarily be in the form of a signal having its origin in the temperature sensor, the subject-matter of feature M6a corresponds to the disclosure in the description originally filed.

Thus the omission of the precise wording used in the second sentence of paragraph [0023] in feature M6a does not give rise to an unallowable extension of subject-matter.

2. Auxiliary request 4a - inventive step - Article 56 EPC

2.1 D1 combined with E1

2.1.1 Features disclosed in D1

It is common ground that - as concluded by the opposition division - D1 discloses a cold/hot water supply apparatus (see Figure 2) with the following features:

a refrigerant circuit (10) including a compressor (15), a first heat exchanger (25), expansion means (13) and a

second heat exchanger (14) which are annularly connected to one another and through which refrigerant flows;

a fluid circuit (21, 22, 31, 34) including the first heat exchanger (25) and a third heat exchanger (40) which are annularly connected to each other and through which fluid flows;

a heat accumulator tank (30) in which water is stored;

a first switching pipe (31, 34, 36) which is connected to the third heat exchanger (40) in parallel, and which exchanges heat between the fluid and water in the heat accumulator tank (30) (see column 4, lines 17 to 19);

and a control apparatus which is configured to switch between a flow of the fluid to the third heat exchanger (40) and a flow of the fluid to the heat accumulator tank (30) (see column 5, lines 15 to 18);

in which the cold/hot water supply apparatus has a heat-accumulation operation mode and a cooling operation mode, in the heat-accumulation operation mode, the fluid flows to the first switching pipe (31, 34, 36), thereby heating the water in the heat accumulator tank (30), and in the cooling operation mode, the fluid flows to the third heat exchanger (40), thereby absorbing heat in air (see column 3, lines 53 to 58),

wherein the cold/hot water supply apparatus also includes a temperature sensor (61) which detects temperature of the fluid,

the first switching pipe (31, 34, 36) branching off from a first fluid path-switching valve (32) and being connected to a pipe extending from the third heat exchanger (40) to the first heat exchanger (25) through the heat accumulator tank (see Figure 2).

Thus all the consecutive features from M1 to M10 are disclosed in D1, as is feature M5a.

2.1.2 Feature M11

It was a matter of dispute whether D1 also discloses feature M11 (*second switching pipe which is connected to the third heat exchanger in parallel and which is connected to the first switching pipe in parallel, the fluid flowing through the second switching pipe*).

The appellant argued that the bypass pipe comprising a valve disclosed on the right-hand side of the third heat exchanger (40) in Figure 2 corresponded to a second switching pipe within the meaning of feature M11.

Even if this were true - i.e. even if it were acknowledged that such a pipe is "connected to the third heat exchanger in parallel" and not a part of the third heat exchanger itself - the matter is irrelevant for determining the technical problem addressed in the light of the distinguishing features for the following reasons:

Feature M11 has to be read in combination with features M12 and M11a, i.e. in the context of claim 1 as a whole. Feature M12 defines a control apparatus configured to determine whether the fluid which flows out of the first heat exchanger should be made to flow

to the second switching pipe or to the first switching pipe based on temperature of the fluid detected by the temperature sensor. Feature M11a specifies that the second switching pipe branches off from a second fluid path-switching valve and is connected to the pipe extending from the third heat exchanger to the first heat exchanger. Thus the second switching pipe must be connected as in feature M11a and suitable for the use defined in feature M12 when claim 1 is considered as a whole. This is essential when determining the technical effect and the objective technical problem (see point 2.1.3 below) and, therefore, the question of whether or not the isolated feature M11 is disclosed in D1 does not have any impact on such analysis.

Furthermore, it is uncontested that the pipe referred to by the appellant - due to its location downstream from the third heat exchanger - cannot satisfy the conditions defined in features M11a and M12. Actually, the appellant argued that the skilled person considering the teaching of E1 would provide a further, **different** second switching pipe.

Thus the fluid connection to the valve indicated in Figure 2 of D1 downstream of the third heat exchanger is not a relevant disclosure of feature M11 for determining the starting point of the inventive-step analysis, even if it will be considered when determining what incentives the skilled person would have when deciding where to locate the supplementary second switching pipe taught by E1 (see point 2.2.4(a) below).

2.1.3 Distinguishing features M11a, M6a and M12

It is undisputed that features M11a, M6a and M12 are not disclosed in D1. These distinguishing features read as follows:

the second switching pipe branching off from a second fluid path-switching valve and being connected to the pipe extending from the third heat exchanger to the first heat exchanger;

the control apparatus being configured to control the first fluid path-switching valve and the second fluid path-switching valve based on the temperature;

and when the cooling operation mode is changed to the heat-accumulation operation mode, the control apparatus is configured to determine whether the fluid which flows out of the first heat exchanger should be made to flow to the second switching pipe or to the first switching pipe based on temperature of the fluid detected by the temperature sensor.

2.2 Technical effect and problem to be solved

The technical effect of the above distinguishing features is that fluid at a temperature below a predetermined threshold is not introduced into the heat accumulator tank, thereby avoiding heat loss in the accumulator tank caused by such introduction.

During the oral proceedings before the Board, the respondent proposed as the objective technical problem to increase the energy efficiency in a system with different flow circuits for a fluid and for the water

to be heated, wherein the system had two operation modes, a cooling one and a heating one.

However, this way of formulating the objective technical problem is not correct, since it is too specific. The skilled person would not formulate the problem with reference to particular constructional features of the device of D1 which are not at all related to the technical effect of the distinguishing features.

The Board further notes that the question of how to formulate the objective technical problem must not be confused with the question of whether the skilled person would look for a solution to this problem in prior art which does not disclose all the constructional features of the device of D1. Nor must it be confused with the question of how the skilled person would integrate such prior-art solutions in the device of D1 (see points 2.2.2 and 2.2.3 below).

Thus the objective technical problem in the light of the technical effect is to shorten the heating time and to enhance energy efficiency, as had also been acknowledged by the respondent in its reply to the statement setting out the grounds of appeal. This problem also corresponds to that identified in the patent specification (see paragraph [0015]) in the light of the same closest prior art (see paragraph [0012]).

2.2.1 Alleged alternative solution in D1

The respondent argued - as had the opposition division - that D1 already disclosed a solution to the objective technical problem which was different from that of

claim 1, namely the provision of an additional booster heater (33). This would have discouraged the skilled person from looking for other solutions to the same problem.

This argument is not persuasive.

The alternative based on the additional booster heater (33) may shorten the heating time, but does not solve the problem of enhancing energy efficiency. Moreover, even if an alternative solution to both aspects of the objective technical problem were indeed provided in the closest prior art, this would, as such, not automatically "teach away from using other solutions".

2.2.2 Consideration of E1 by the skilled person

E1 relates to a hot water supply apparatus based on a first circuit comprising three heat exchangers (9, 21, 26). The first heat exchanger (9) of this circuit is used to heat water in a heat-accumulation operation mode. The water heated in this way is stored in a hot-water storage tank (1).

The problem addressed by E1 is to avoid lowering the temperature of the hot water stored in the hot-water storage tank (see section "Problem to be solved" in the English abstract). It is apparent to the skilled person that this **implies less energy** to be spent later on for heating up the water stored in the hot-water storage tank.

Since E1 relates to a heat-accumulation operation using a hot-water storage tank as in D1 and since a corresponding problem is addressed, the skilled person would consult E1 when looking for a solution to the

objective technical problem posed. This is so since the main features and the problem addressed in D1 and E1 are close enough to justify considering E1.

2.2.3 Provision of a second switching pipe in D1

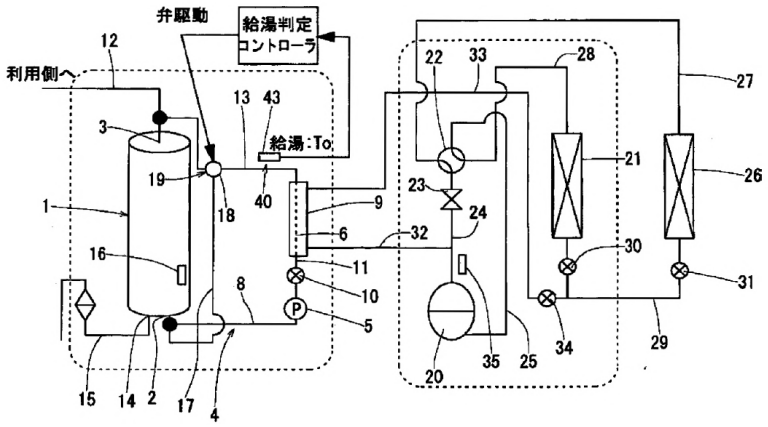
The respondent argued that since E1 disclosed a solution consisting of a bypass pipe ("bypass circuit 17") on the service-water ("Brauchwasser") side the skilled person would be motivated to implement this bypass pipe as a "second switching pipe" within the meaning of claim 1 on the corresponding side of the system of D1, i.e. the service-water side of the accumulator indicated by "50".

The Board does not agree with this view since such a location of a "second switching pipe" would not make technical sense.

The service-water cycle of D1 only consumes warm water but does not deliver heat to the accumulator. The only purpose of directing service water through the tank is thus to heat up the service water, i.e. the service water is always intentionally removing heat from the accumulator.

Instead, the skilled person will learn from E1 that, in order to avoid lowering the temperature of the hot water in a hot-water storage tank (1), a bypass circuit (17) has to be arranged in parallel to the heat exchanger (9) heating a fluid **entering** the hot-water storage tank (1) and also in parallel to this tank (see Figure 1, reproduced below), such that when means (40) detect a temperature of the fluid supplied which is lower than a preset temperature, a control means

activates a recirculation by adjusting a corresponding means (19) for switching the water flow (i.e. a valve).



The fact that the heated recirculated fluid of E1 is service water does not render this basic teaching inapplicable to the circuit fluid of D1 (water or refrigerant), and the skilled person would immediately understand that, if this fluid of D1 **intended for heating** is at a low temperature which is not enough to heat up the water in the hot-water tank (30), energy efficiency can be enhanced by providing a bypass pipe as in E1 and controlled in the same manner. Therefore the skilled person would contemplate providing a bypass circuit as in E1 - i.e. a "second switching pipe" within the meaning of claim 1 - on the fluid side of the circuit of D1 heating up the service water inside the hot-water tank.

2.2.4 Location of the second switching pipe in D1

(a) No incentive provided by the alleged second switching pipe

The appellant argued that the presence of a bypass pipe comprising a valve on the right-hand side of the third

heat exchanger (40) in Figure 2 of D1 would motivate the skilled person to arrange the second switching pipe (bypass pipe) in a similar manner, i.e. between the main pipes of the fluid circuit.

This is not convincing since, as explained above, no technical relationship is apparent to the skilled person between the roles of the alleged bypass pipe - for which no function is disclosed in D1 - and the claimed one, which has a well-defined function relating to hot-water storage.

(b) Technically sensible location

The Board agrees with the appellant that, in view of the teaching of E1, the skilled person would arrange a second switching pipe ("bypass circuit") in parallel to the first heat exchanger (25) of D1 and in parallel to the hot-water tank (30), as in E1. The skilled person, taking into account the function to be performed by the added second switching pipe, would have to decide about the location of the latter in the fluid circuit of D1 from a very limited number of options.

Firstly, the skilled person would understand from E1 that the added second switching pipe must be arranged such that it allows recirculation of fluid to the first heat exchanger (25) **before** the hot-water tank (see Figure 2, reproduced below) as in E1.

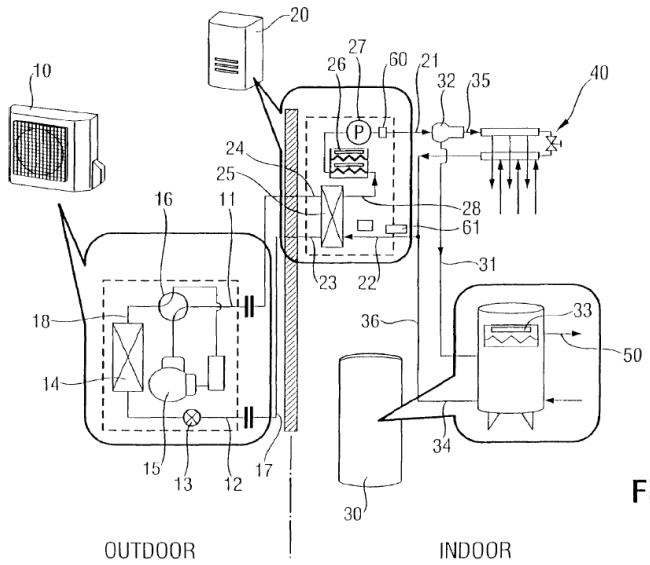


Fig. 2

The fluid circuit of D1 differs from the heat-exchanging path (6) of E1 in that it comprises a derivation (31/36) (i.e. the "first switching pipe") connected to the pipes directly connecting the third heat exchanger (40) to the first heat exchanger (25). However, in order to apply the teaching of E1, the first end of the second switching pipe ("bypass circuit") must be connected either to some point of the outlet pipe (21) of D1 connecting the first heat exchanger (25) to the valve (32), or to the pipe (31) conducting the fluid to the hot-water tank (30). Concerning the second end, the skilled person would have to connect it to some point of the inlet pipe (22) of D1 connecting the first heat exchanger (25) to the junction of the pipe (34, 36) returning the fluid from the hot-water tank (30), or to the latter pipe.

In this way, recirculation of fluid to the first heat exchanger (25) would be ensured and the teaching of E1 relating to recirculation taking place before the hot-water tank would be followed. It is remarked that any combination of these connection points results in a second switching pipe connected in parallel to the

third heat exchanger (40), since the ends of the second switching pipe would in any case be connected to portions of the fluid circuit which are located upstream and downstream respectively of the third heat exchanger (40).

(c) Arrangement of a second path-switching valve (M11a)

As soon as the skilled person envisaged in an obvious manner connecting the first end of the bypass pipe to the outlet pipe (21) which connects the first heat exchanger (25) to the valve (32) - i.e. when choosing one out of the only two equally-valid possibilities - they would have to arrange at this location a switching valve corresponding to the switching means (19) disclosed in E1. In this way, the skilled person would arrive in an obvious manner at feature M11a (second switching pipe branching off from a second fluid path-switching valve and being connected to the pipe extending from the third heat exchanger to the first heat exchanger).

It is pointed out that if the second possibility is chosen - i.e. connecting the added bypass pipe after the valve (32) - the first switching pipe would no longer start at the valve (32), but at the point where the switching means according to E2 would be implemented. This is so since feature M11 specifies the first and second switching pipes being connected in parallel and feature M12 excludes fluid being able to flow simultaneously through the first and second switching pipes. If this were the case, no first and second path-switching valves would be present, since the switching means of E1 (i.e. a three-way valve) would be enough to switch the flow towards the bypass pipe or the pipe leading to the tank.

2.2.5 Obvious feature M12

Similarly, as soon as the skilled person arranged a bypass pipe as explained in the preceding point 2.2.4 for the same function as disclosed in E1 - i.e. to recirculate the fluid in the event that its temperature is lower than a preset one - feature M12 would be automatically obtained.

Indeed, this arrangement would necessarily imply that, when the fluid circuit is changed from a cooling operation mode to a heat-accumulation operation mode, the temperature sensor would detect the low temperature of the fluid and the control means would consequently direct the fluid towards the recirculation path through the bypass pipe, in accordance with the teaching of E1. For this purpose, the skilled person would adopt the temperature sensor (40) and control means of E1 since they form a single solution together with the bypass pipe (17) and its switching means (19). As in the teaching of E1, the skilled person would arrange the switching means (19) such that the fluid is either recirculated through the bypass pipe (17) or directed to the hot-water storage tank. Applied to D1, this means that the fluid would be either recirculated or allowed to flow in the direction of the valve (32).

2.2.6 Non-obvious feature M6a

Valve (32) of D1 is controlled by control means to allow flow of the fluid towards either the third exchanger (40) or the hot-water tank (column 5, lines 15 to 18). D1 does not disclose that this is done as a function of any temperature, let alone the one detected by temperature sensor (61), which is only used in a

different context for the purpose of estimating the fluid viscosity (see column 6, line 41 to column 7, line 2). From the wording of D1, the skilled person will understand that valve (32) is operated as a function of a corresponding need, i.e. whether it is wished to accumulate hot water or to use the third heat exchanger. This is not dependent on the fluid temperature but on the needs of the user concerning climate control and hot-water availability.

The incorporation of a bypass pipe and its control system as taught in E1 would not change this. The skilled person will learn from E1 that the path-switching valve (19) leading to the bypass pipe (i.e. second switching pipe) has to be controlled based on fluid temperature measured by a corresponding sensor (40), but this has no influence on the way the existing valve (32) of D1 would have to be operated.

It is, rather, the other way around: the skilled person would understand that the added switching valve for the bypass pipe can only be used when a hot-water accumulation mode is actuated since it would be technically unreasonable for this switching valve to recirculate the fluid e.g. during a cooling mode of the third heat exchanger.

Thus the result of the combination of D1 with E1 would be a system in which the valve (32) would be operated in the way disclosed in D1 (i.e. not based on temperature) and the added switching valve - i.e. a single three-way valve responsive to the temperature as suggested by E1 and capable of switching between a second bypass pipe and the line with the "first switching pipe" within the meaning of claim 1 - would

allow recirculation of the fluid in the event that the fluid temperature is too low.

Consequently, the skilled person would not arrive at the claimed invention when combining D1 with E1 since feature M6a would still be lacking.

2.3 D2 combined with E2

2.3.1 Document D2 as state of the art

Document D2 was published after the priority date of the patent in dispute and is the English translation, provided under Article 153(4) EPC, of the Euro-PCT application with publication number WO 2010/090071 A1 published before the priority date of the patent. The respondent contested that D2 was the correct translation of the PCT application originally filed and argued that D2 therefore did not form part of the state of the art.

However, in view of the Board's conclusion set out below that the claimed subject-matter involves an inventive step starting from D2, the question of whether or not D2 constitutes a correct translation of the PCT application originally filed and forms part of the state of the art does not need to be addressed.

2.3.2 Features M1, M2, M3, M4, M6, M7, M8 and M9 disclosed in D2

It was undisputed by the respondent that document D2 discloses a cold/hot water supply apparatus with the following features:

a refrigerant circuit (10) including a compressor (11), a first heat exchanger (13), expansion means (17) and a second heat exchanger (12) which are annularly connected to one another and through which refrigerant flows;

a fluid circuit (30) including the first heat exchanger (13) and a third heat exchanger (36) which are annularly connected to each other and through which fluid flows;

a heat accumulator tank (37) in which water is stored;

a first switching pipe (pipe starting between valves (33) and (34) in Figure 1);

and a control apparatus which is configured to switch between a flow of the fluid to the third heat exchanger (40) and a flow of the fluid to the heat accumulator tank (30) (see paragraph [0018]);

in which the cold/hot water supply apparatus has a heat-accumulation operation mode and a cooling operation mode (see column 5, lines 16 to 22), in the heat-accumulation operation mode, the fluid flows to the first switching pipe, thereby heating the water in the heat accumulator tank (37), and in the cooling operation mode, the fluid flows to the third heat exchanger (36), thereby absorbing heat in air,

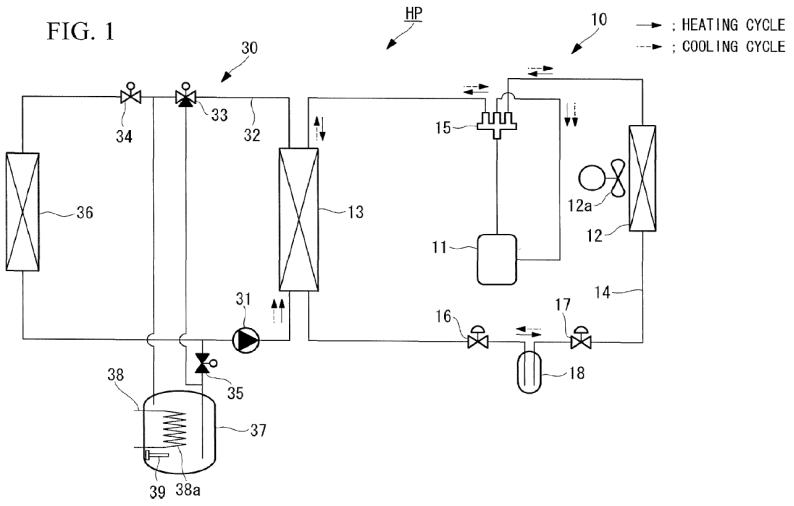
wherein the cold/hot water supply apparatus also includes a temperature sensor (see paragraph [0025]) which detects temperature of the fluid.

Thus it is common ground that features M1, M2, M3, M4, M6, M7, M8 and M9 are disclosed in D2.

2.3.3 Features M11 and M11a

Document D2 discloses a pipe connecting the three-way valve (33) to the second solenoid switching valve (35) (see Figure 1 of D2, reproduced below).

FIG. 1



D2 does not disclose any use of this "second switching pipe". The three-way valve (33) is closed with respect to the pipe concerned both in Figure 1 and in Figure 2, as represented by the "black filling" in this direction (see first sentences of paragraphs [0026] and [0027]). The selection procedure shown in D2 in the context of the defrosting operation mode does not provide any flow in this pipe, since it merely selects which fluid flow should be fed to the indoor heat exchanger (13) - the one circulating in the hot-water circulation flow path (32) or the one extracted from the water tank (37) (see paragraph [0024] or claim 1) - when the system is in a defrosting operation mode. The purpose of the pipe connecting the three-way valve (33) and the second solenoid switching valve (35) is not disclosed in D2.

However, it can reasonably be assumed that this pipe must be provided for a certain (undefined) purpose and

that a fluid flow through it is possible since the valves (33) and (35) could be adjusted for it.

Since the pipe concerned is connected to the third heat exchanger (36) and the (alleged) first switching pipe in parallel, feature M11 is disclosed in D2.

As the second switching pipe branches off from a fluid path-switching valve (three-way valve (33)) and is connected to the pipe extending from the third heat exchanger (36) to the first heat exchanger (13), feature M11a is also disclosed by D2.

2.3.4 Feature M5

The respondent also contested that feature M5 was disclosed in D2. In view of the Board's conclusion on this line of attack, the Board leaves this question open and, for reasons of procedural economy, proceeds under the assumption that M5 is also disclosed in D2.

2.3.5 Distinguishing features and objective technical problem

It is undisputed that D2 does not disclose the following features:

The first switching pipe branching off from a first fluid path-switching valve (M5a)

The control apparatus being configured to control the first fluid path-switching valve and the second fluid path-switching valve based on the temperature (M6a)

When the cooling operation mode is changed to the heat-accumulation operation mode, the control

apparatus is configured to determine whether the fluid which flows out of the first heat exchanger should be made to flow to the second switching pipe or to the first switching pipe based on temperature of the fluid detected by the temperature sensor (M12)

It is common ground that the distinguishing features and their technical effect correspond to those already explained when starting from D1 (see point 2.1.3 above). Consequently, the objective technical problem, when starting from D2 as well, is to shorten the heating time and enhance energy efficiency.

2.3.6 Consideration of E2 by the skilled person

The respondent argued that the skilled person would not have consulted E2 since the English abstract of this document - which was the only portion provided in an official language of the EPO - merely discussed the problem of miniaturisation of the hot-water storage tank.

Even if it is true that the miniaturisation issue is mentioned in the English abstract, this is done in the context of preventing "*Flow-in of low-temperature water into the hot-water storage tank* [...] *to stabilise temperature of the hot-water to be supplied.*"

The skilled person will understand from this that energy is actually saved because the hot water inside the tank is not mixed with low-temperature incoming water. Otherwise, heat would have to be applied later on to recover the target temperature. Thus the skilled person would understand that E2 focuses on energy efficiency.

Since E2 concerns heat accumulation based on the use of a hot-water storage tank as in D2 and since a corresponding problem is addressed, the skilled person would consult E2 when looking for a solution to the objective technical problem posed (see also considerations in point 2.2.2 above).

2.3.7 Result of the combination with E2

The appellant argued that the skilled person would learn from E2 how to use a temperature sensor (10) and a control apparatus (11, 20) to actuate two three-way valves (17, 18) for controlling the flow through first and second switching pipes (see Figure 4). With this teaching in mind, the skilled person would implement a three-way valve at the junction of the (alleged) first switching pipe with the pipe connecting the first (13) and third (36) heat exchangers of D2. The skilled person, having implemented in D2 a temperature sensor such as the one disclosed in E2 to control the bypass circuit, would therefore arrive at control of both path-switching valves - leading to the first and second switching pipes, respectively - based on the fluid temperature.

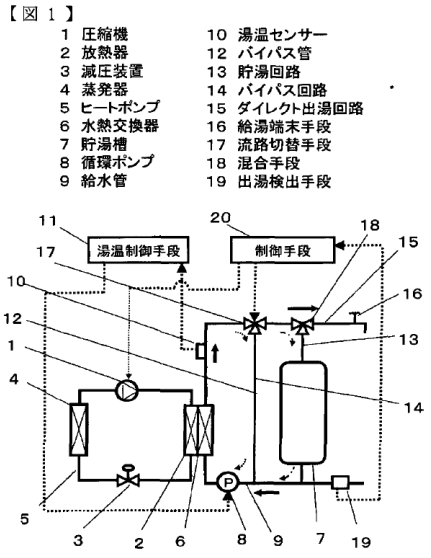
This is not convincing.

First, the English abstract of E2 - i.e. the only portion of E2 supplied in an official EPO language by the parties - does not disclose what element (10) in the figures is. Its role is not self-explanatory from the figures alone, since it could be any type of sensor or actuator. It is noted that Figure 4 - referred to by the appellant - does not even disclose an element (10),

but it is acknowledged that Figure 1 - also comprising two three-way valves (17, 18) - does.

Second, even assuming that element (10) is a temperature sensor and that the three-way valve (17) is controlled based on the temperature detected by the alleged sensor, this would at most be a pointer for the skilled person as to how to control the three-way valve (33) of D2 in order to use the second switching pipe of this document as a bypass pipe in a similar way as in E2. However, no incentive can be seen as concerns the control of a non-existent first path-switching valve in D2.

The system of E2 comprises substantial differences with regard to D2 as concerns the elements surrounding the hot-water tank (see Figure 1, reproduced below).



The three-way valve (18) at the entrance to the hot-water tank is used to control flow towards what seems to be a water tap (16). The skilled person would not understand from this disclosure that a three-way valve for such purpose has to be controlled based on water

temperature, and anyway there is no equivalent arrangement in D2 - i.e. no water tap - that could motivate the skilled person to adopt such a three-way valve at the junction of the (alleged) first switching pipe with the main pipe connecting the first and third heat exchangers (13, 36).

Actually, D2 would not need any modification of the first switching pipe in the event of the skilled person adopting the teaching of E2 relating to the bypass pipe as argued by the appellant. The three-way valve (34) would still be used as disclosed in D2 to select the heat-accumulation operation mode or the operation of the third heat exchanger (36). The second switching pipe would merely be used for recirculating the water in the event of the water temperature being too low. This recirculation does not require any modification in how to manage the first switching pipe. Rather, on the contrary, the skilled person would have to consider how to make sure that the three-way valve (33) is controlled based on temperature only when the heat-accumulation operation mode is active (similarly to what was explained in the third paragraph of point 2.2.6 above).

Consequently, even if all the appellant's arguments concerning the alleged disclosure or obviousness of features M5, M10 and M12 were accepted, the resulting device would still lack features M5a (first path-switching valve) and M6a (control of the first path-switching valve based on fluid temperature).

2.4 In view of the above, the subject-matter of claim 1 of auxiliary request 4a involves an inventive step (Article 56 EPC).

3. Article 101(3)(a) EPC

Since no objection has been raised which can prove that, taking into consideration the amendments made by the respondent, the patent and the invention to which it relates do not meet the requirements of the EPC, the patent can be maintained as amended according to auxiliary request 4a.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent as amended in the following version:

   - claims 1 to 4 according to auxiliary request 4a filed with the reply to the statement setting out the grounds of appeal
   - description pages 2 to 7 as filed during the oral proceedings before the Board
   - figures 1 to 6 of the patent specification.

The Registrar: The Chairman:

C. Spira N. Obrovski

Decision electronically authenticated