

EUROPEAN PATENT APPLICATION

Application number: **81830058.4**

Int. Cl.³: **F 25 B 29/00**
F 24 H 1/18

Date of filing: **10.04.81**

Priority: **18.04.80 IT 211680**

Date of publication of application:
04.11.81 Bulletin 81/44

Designated Contracting States:
AT BE CH DE FR GB LI LU NL SE

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A single electrical appliance consisting in a refrigerator and a water heater working together.

Apparatus in which a refrigerator or a freezer and a boiler coexist and work at the same time. The boiler is equipped with a coil (6) that is connected directly to the outlet of the compressor (3) of the refrigerator and with a device sensitive to the temperature of the water such as, for instance, a thermostat (5) that causes the insertion of some electro valves (78) that restore the normal circuit of the refrigerator through the condenser i.e. the heat exchanger (4), when the temperature of the water of the boiler reaches values that don't allow the normal working of the refrigerator; this occurs if the boiler is equipped with an extra additional heating device (9) such as a resistance or, if the boiler coil (6) is connected directly to the evaporator of the refrigerator.

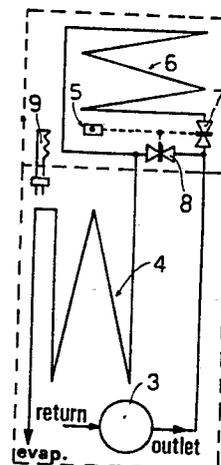


FIG. 2

- 1 -

A single electrical appliance consisting in a refrigerator and a water heater working together

The invention is classified among the combined heating and cooling electrical appliances.

As we know, refrigerating machines transfer outside the heat that is in a space in which a low temperature is needed.

- 5 The heat transferred by this process from the inside to the outside of the refrigerator is wasted without being used; besides, this dissipation of heat is inconvenient, specially in the summer because of the rise of temperature that it causes when it takes place in a limited space.

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The aim of this invention is to use the heat produced this way to heat the water of a water heater, below named, in short, boiler, annexed to the refrigerator, so to form a single electrical appliance, solving the problem connected with the use of the heat
15 that, otherwise, would be lost.

The advantages of this invention are in reducing and eventually eliminating the consumption of electric power or of fuel absorbed by the water heater, in particular in domestic uses.

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One way of carrying out the invention is described in detail below with reference to drawings which illustrate only one spe-

cific embodiment, in which:

- Fig. 1, is the refrigerator or a deep freezer with a prismatic shaped water heater annexed;
- 5 Fig. 2, the flow diagram of the appliance with heating circuit of the water heater connected in series to the heat exchanger of the refrigerator;
- Fig. 3, the flow diagram of the appliance with the heating circuit connected in parallel to the heat exchanger of the
- 10 refrigerator.

In the illustrated execution the water heater 1 i.e. the boiler, takes place on the top of the refrigerator or freezer 2 so to form one single appliances.

- 15 The freezing mixture that normally flows from the compressor 3 to the heat exchanger, i.e. the condenser 4, in both the executions, can be deviated by means of a system of valves operated by a thermostat 5, on a coil 6 mounted inside the boiler so as to receive the condensation heat.
- 20 The thermostat 5 is adjusted so as to cause the opening of the valve 7, if the temperature of the water in the water heater is lower than the one of the mixture coming from the compressor, and the closing of the valve 8, so that the warm fluid passes through the coil 6.
- 25 If the temperature of the water becomes higher or equal to the one of the mixture coming from the compressor, owing to the action of an additional heating device of the water heater, consisting, for instance, in a resistance 9, the thermostat 5 causes the closing of the valve 7 and the opening of the valve
- 30 8, sending back the mixture directly into the heat exchanger of the refrigerator, i.e. the condenser 4.

In the execution of Fig. 2 the mixture coming from the coil 6 of the water heater passes anyhow always through the coil 4

of the condenser, before entering the evaporator of the refrigerator.

In the execution of Fig. 3, instead, the fluid that comes from the coil 6 of the boiler enters directly the evaporator of the refrigerator: in this execution some devices must be provided to restore the normal flow circuit of the refrigerator through the condenser 4, when, owing to the lack of water delivering from the water heater, the temperature of the water itself reaches values that do not allow a sufficient cooling of the freezing-mixture, before it enters the evaporator.

With the flow diagram of Fig. 2, the temperature of the mixture that flow to the evaporator is always lower or, at the most, equal to the one that one would get if the refrigerator works without the water heater i.e. the boiler 6.

Should the water heater be equipped of an additional heating device, such as a resistance 9, so it can be provided with an extra regulation thermostat, so as to work like a normal water heater.

In an other specific embodiment of the appliance, the compressor unit is mounted immediately below the boiler and directly cooled by the water itself of the boiler, to recover as well the heat produced by the compressor unit during its working.

The invention considers also the manufacturing of single appliances of larger sizes, in which there are two or more compressors; with this solution it is obvious that a higher working continuity is achieved.

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Claims:

1°. A single electrical appliance consisting in a refrigerator and a water heater working together, characterised in that the water heater is joined to the refrigerator so to form together with it a single set, and it is equipped with a coil 6 connected on one end to the outlet of the compressor unit of the refrigerator so as to receive directly the warm freezing mixture and, on the other end, directly to the coil 4 of the heat exchanger, i.e. the condenser of the refrigerator, or, otherwise, directly to the evaporator unit of the refrigerator, being the appliance also equipped with devices to restore the normal circuit through the heat exchanger 4 when, owing to the presence of additional heating devices such as, for instance, the resistance 9, or owing to other working reasons, the temperature of the water of the boiler reaches values that don't allow the normal working of the refrigerator.

2°. As single electrical appliance as claimed in claim 1, characterized in that the devices that restore the normal circuit of the refrigerator consist in a thermostat 5 that operates two electrovalves 7 and 8, respectively open and closed in order to deviate the mixture coming from the outlet of the compressor unit through the heating coil 6 of the boiler or, otherwise, respectively closed and open so as to send back the mixture directly to the coil 4 of the condenser, i.e. to restore the normal circuit of the refrigerator, depending if the temperature of the water of the boiler is respectively lower or higher than the temperature of the freezing mixture coming from the outlet of the compressor unit 3.

3°. A single electrical appliance as claimed in claim 1, characterized in that the refrigerator or the deep freezer are equipped with their own temperature regulation devices independent from the one of the boiler, so that they can work

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without any interference from the boiler.

4°. A single electrical appliance as claimed in claim 1, characterized in that it can include also an extra additional heating device of the boiler, such as, for instance, the resistance
5 and that the boiler itself can be equipped with additional
9 temperature regulator.

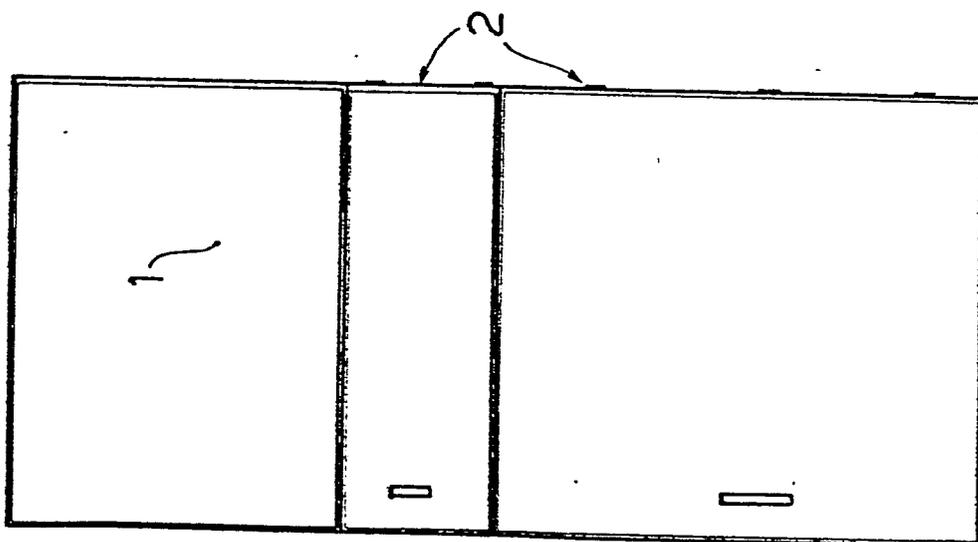


FIG. 1

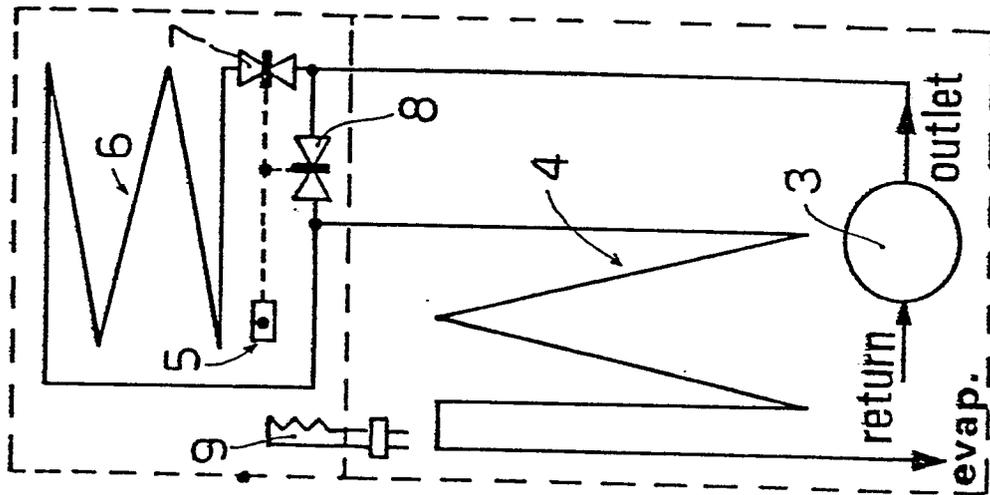


FIG. 2

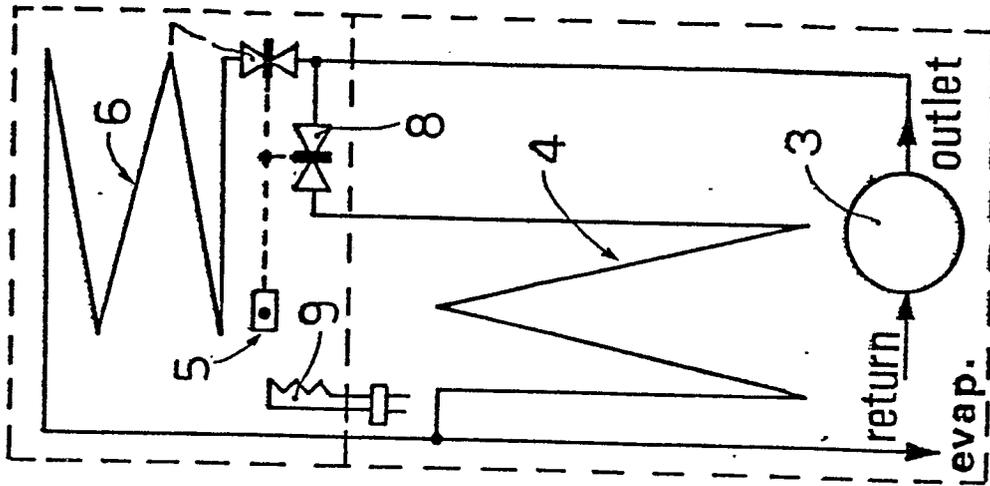


FIG. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>DE - C - 928 953</u> (MASCHINENFABRIK SÜRTH) * Page 2, lines 37-75; figures * ---	1-4	F 25 B 29/00 F 24 H 1/18
X	<u>CA - A - 1 068 917</u> (SMITH) * Page 5, line 1 to page 10, line 22; figures 1 and 2 * ---	1,2,4	
X	<u>DE - B - 1 031 326</u> (MASCHINENFABRIK SÜRTH) * Column 3, lines 1-32; figures 1-3 * ---	1-4	TECHNICAL FIELDS SEARCHED (Int. Cl.)
X	<u>US - A - 2 934 913</u> (HAINES) * Column 2, line 31 to column 17, line 44; figures 1-6 * ---	1-4	F 24 D F 25 B F 24 H
X	<u>US - A - 1 874 803</u> (REED) * Page 1, line 25 to page 2, line 51; figures 1 and 2 * ---	1,2,4	
X	<u>DE - A - 2 530 994</u> (LICENTIA) * Page 3, last paragraph to page 6, last paragraph; figures 1,2 * ---	1,2	CATEGORY OF CITED DOCUMENTS
	<u>US - A - 2 241 070</u> (McLENEGAN) * Page 1, right-hand column, line 40 to page 6, right-hand column, line 51; figures 1 and 2 * ---	1-4	X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
P	<u>EP - A - 0 012 204</u> (EUREKA-KÜHL-ANLAGEN) ./..	1	&: member of the same patent family, corresponding document
X	The present search report has been drawn up for all claims		
Place of search The Hague		Date of completion of the search 17.07.1981	Examiner BOETS



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	* Page 2, line 14 to page 6, line 10; figures * & DE - A - 2 853 944 ---		
A	<u>US - A - 1 937 288</u> (McGRAW)		
A	<u>US - A - 2 690 649</u> (BORGERD)		
A	<u>US - A - 4 141 222</u> (RITCHIE)		
A	<u>DE - C - 947 246</u> (LICENTIA)		
A	<u>GB - A - 1 532 222</u> (EXETER RE-FRIGERATION)		TECHNICAL FIELDS SEARCHED (Int. Cl.)
A	<u>FR - A - 2 381 984</u> (LICENTIA)		
