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DECISION
of 14 February 1996

Case Number: T 0754/93 - 3.2.5

Application Number: 87401658.7

Publication Number: 0253729

IPC: D06F 43/00

Language of the proceedings: EN

Title of invention:

Controller for a dry cleaning apparatus

Applicant:

mitsubishi jukogyo kabushiki kaisha

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step - no"

Decisions cited:

-

Catchword:

-



Case Number: T 0754/93 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 14 February 1996

Appellant:

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Decision under appeal:

Decision of the Examining Division of the European
Patent Office posted 23 March 1993 refusing
European patent application No. 87 401 658.7
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: G. Gall
Members: C. Biggio
H. Ostertag

Summary of Facts and Submissions

- I. On 21 May 1993, the appellant (applicant) lodged an appeal against the decision of the Examining Division dated 23 March 1993 to refuse European patent application No. 87 401 658.7. The appeal fee was paid on 19 May 1993 and the statement of grounds was filed by telecopy on 19 July 1993.
- II. The Examining Division found that the subject-matter of all claims then on file was obvious. The relevant prior art documents cited by the Examining Division are the following:
- D1: US-A-4 184 347
D2: EP-A-0 186 621
- III. With the statement of grounds the appellant requested cancellation of the decision under appeal and the granting of a patent with the claims 1 to 8 (submitted in version A, B, C and D). He also requested the refund of the appeal fee.
- IV. In a communication dated 6 May 1994 the Board expressed the provisional opinion that none of the sets of claims appeared to be allowable, since the subject-matter was lacking an inventive step pursuant to Article 56 EPC. The conditions mentioned in Rule 67 EPC for the reimbursement of the appeal fee would hence not be fulfilled.
- V. The Board informed the applicant in two further communications dated 31 October 1994 and 10 October 1995 that it appeared that the amended claims filed by the appellant on 3 September 1994 and on 26 April 1995, respectively, did not overcome the objections raised in

the first communication. The applicant was summoned to oral proceedings at the instance of the Board pursuant to Article 116(1) EPC.

VI. The appellant filed a new set of claims 1 to 8 by telecopy on 8 February 1996 and stated that "Other earlier requests need not be considered further".

VII. Oral proceedings were held on 14 February 1996.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claim 1 filed during the oral proceedings and claims 2 to 8 filed on 8 February 1996.

The wording of the present claim 1 is as follows:

"1. A dry cleaning apparatus (50) comprising

- a1) a means for taking at least two kinds of organic solvents, soluble in each other,
- a2) from exclusive tanks (3, 3a) of said solvents
- a3) through respective filters (8, 8a)
- a4) for using said solvents in a processing tank (10),
- a5) for distilling said solvents after use in said fractionating device (15) and
- a6) for recovering the solvents thus distilled into said exclusive tanks (3, 3a),
- a7) for drying washed clothes with a recovery air duct (19), and
- a8) after drying, for opening dampers (25, 26) for removing smell of the solvents contained in the washed clothes, thus exhausting gas of the solvents,
- a9) said means comprising a controller,
- a10) said cleaning apparatus comprising motor means for rotating said processing tank,

- a11) a pump for pumping up or circulating said solvent,
- a12) and a plurality of valves disposed between the parts constituting said dry cleaning apparatus, said recovery duct and dampers,

characterised in that said controller comprises:

- b1) - a memory circuit (54) previously storing washing programs for washing clothes with a single solvent, or with combined solvents in successive washing operations each involving a different single solvent, drying the clothes and removing smell of the solvents remaining in the clothes and performing a distillation step of the solvent(s) used during said selected washing program;
- b2) said memory circuit further storing control sequences
- b3) and including temporary memory means (55) for storing temporarily stored data necessary for control, such data being stored in the memory circuit as a setting of drying temperature, a selected washing program and a condition of progress of said program;
- b4) - a control panel (51) for selecting said washing programs;
- b5) - an input circuit (58) for receiving a signal from a sensor for detecting an amount of said solvent to be taken into said processing tank (10);
- b6) - an output circuit (57) for driving said motors, said pump and said valves; and
- b7) - a CPU (central processing unit) (53) for calculating and operating a program selection signal from said control panel (51), a program signal from said memory circuit (54) and an input signal from said input circuit (58) supplying said operated signal to said output circuit (57);

in that,

- c1) during said distillation step, the temperature of the evaporated solvent gas is detected by a temperature detection sensor (62) and,
- c2) when said detected temperature is less than a set temperature intermediate between the boiling point of the first solvent and the boiling point of the second solvent, opening a first valve (32) to introduce the condensed solvent in a first water separator (22) to recover the first solvent in the first exclusive tank (3),
- c3) and when said detected temperature is higher than said set temperature, opening a second valve (32a) to introduce the condensed solvent in a second water separator (22a) to recover the second solvent in the second exclusive tank (3a);

and in that for the drying process,

- d1) in the recovery duct (19), there are provided an air cooler (17),
- d2) an air heater (18) and
- d3) a drying temperature sensor (61),
- d4) wherein the drying temperature is detected by said drying temperature sensor (61)
- d5) so that the CPU (53) controls said air heater (18) until said drying temperature can reach that is set in said memory means (55),
- d6) said air cooler (17) serving to condense the solvent gas evaporated from the clothes (2) and
- d7) to feed it to the distiller (15) through a withdrawal path (21)
- d8) and a check valve (31),

e1) thereby enabling an optimum washing process to be selected in accordance with the material, processing and form of clothes to be washed."

VIII. In support of his request, the appellant submitted essentially the following:

The object of the present invention was to provide a satisfactory controller for a multi-solvent dry cleaning apparatus. The controller according to the present invention is characterized in that it comprises a PROM for storing pre-stored programs for washing, drying and distillating to recover the individual solvents, and a RAM for storing control variables, such as the drying and distillation temperatures. Although admittedly a controller according to the present invention was known per se, the thrust of the invention was not that such a controller was chosen, but why it was chosen.

A multi-solvent dry cleaning apparatus was for example disclosed in patent application D2, also filed by the present applicant. The document D2 did not disclose how this apparatus was controlled, since a practical controller for this apparatus giving satisfactory results was not developed at the time of filing of D2. In the present application (see page 1, line 6 to page 8, line 29, and Figures 6 to 8) reference is made to a single-solvent dry cleaning apparatus, also developed by the present applicant, which comprised a controller. This controller, however, was not suitable for use in a multi-solvent dry cleaning apparatus. The complexity of a multi-solvent dry cleaner was much higher than of single-solvent dry cleaner, since the number of possible combinations of cleaning operations grew steeply with the number of solvents and also the distillation and drying processes were more elaborate. A straight-forward adaptation of the controller for a

single-solvent dry cleaner for use in a multi-solvent dry cleaner, would lead to a structure consisting of many separate controllers for each possible combination of cleaning operations, which was not only impracticable when the number of solvents was large, but would also lead to an inflexible structure. Such an approach could hence not lead to the simplified structure of the controller according to the invention. The controller known from document D1 for a simple washing machine could also not suggest the structure of the controller now claimed.

There were two other important differences between the dry cleaning apparatus according to the invention and the apparatus known from document D2. In the distillation step according to document D2 the temperature of the solvent was detected, whereas in the present invention the temperature of the evaporated solvent gas was detected, which led to a better fractional distillation of the solvents and hence to an improved cleaning result. The second improvement related to the drying process: a drying temperature sensor was provided to control the drying temperature.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*

After comparison of the subject-matter of the new claims with the application documents as filed, the Board is satisfied that these claims do not contain subject-matter which extends beyond the contents of the application as filed.

Hence there are no objections under Article 123(2) EPC.

3. *Novelty*

After examination of the cited documents, the Board is satisfied that none of them discloses a dry cleaning apparatus having all the features as set out in claim 1. The subject-matter of claim 1 is therefore new within the meaning of Article 54 EPC.

4. *Inventive step*

4.1 The Board, like the appellant, considers that the prior art closest to the present invention is the document D2. This document, on which the preamble of claim 1 (cf. features a1) through a12)) is based, discloses (see page 13, line 18, to page 16, line 24, and Figure 6) a multi-solvent dry cleaner for washing clothes in successive washing operations each involving a different solvent, drying the clothes and removing smell of the solvents remaining in the clothes and performing a distillation step of the solvents used during the washing operations.

4.2 Document D2 further discloses (see e.g. page 17, line 25, to page 18, line 7) the following means to perform the drying process: in a recovery duct (19), there are provided an air cooler (17) and an air heater (18), whereby the air cooler (17) serves to condense the solvent gas evaporated from the clothes, which liquified solvent is then fed to the distiller (15) through a withdrawal path (21) and a check valve (31).

Thus, document D2 also discloses features d1), d2), d6), d7) and d8). A drying temperature sensor is not disclosed in document D2.

4.3 In document D2 the distillation step is described in detail on page 16, lines 3 to 24 and on page 18, line 14, to page 19, line 12. After each washing operation the respective solvent is collected in a distiller (15), where the (then) mixed solvents are to be distilled. The solvent with the lower boiling point is evaporated first, the vapour is caused to pass through a condenser (27), the liquified solvent is then introduced into a water separator (22) via a valve (32) under the control of a program control system with the aid of a distillation temperature sensor detecting the temperature of the solvent in the distiller, and is returned to a tank (3) through a solvent pipe (23). After the evaporation of the solvent with the lower boiling point, the temperature progressively approaches the boiling point of the solvent having the higher boiling point. The solvent having the higher boiling point is distilled in the same manner: it is first passed through the condenser (27), and then, via a second valve (32a), water separator (22a) and solvent pipe (23a) returned to a tank (3a).

It follows from the above that features c2) and c3) are disclosed by document D2.

4.4 The multi-solvent dry cleaner according to document D2 has substantially the same design as the dry cleaner according to the present invention (apart from the fact that document D2 is silent about the controller and about a drying temperature sensor). It is stated in document D2 (see page 10, lines 2 to 4) that it is an object of the invention disclosed therein "to provide a dry cleaning apparatus which can apply to varied materials, processings, morphologies of clothes". Thus, feature e1) is substantially disclosed by document D2.

4.5 The subject-matter according to claim 1 differs from what is disclosed in document D2 in that

- a controller is provided (cf. the features b1) through b7)),
- the distillation temperature sensor detects the temperature of the evaporated solvent gas (cf. feature c1)), and
- a drying temperature sensor is provided which output enables the CPU to control the drying temperature at a preset temperature (cf. features d3), d4) and d5)).

The Board, however, cannot recognize any positive contribution to inventive step in these distinguishing features for the following reasons.

4.6 In the introductory part of the description of the present application a known controller for a single-solvent dry cleaner is described (see page 5, lines 1 to 8, and Figure 7), which comprises a central processor unit (CPU) (47), an electronic memory unit (48) and an output circuit (49) for driving the various devices of the dry cleaner. The single-solvent dry cleaner has a control panel (32) for selecting the washing programs (see page 4, lines 8 to 30, and Figure 8), which comprises a drying temperature controller (41) with a setting indicator (42) for setting the drying temperature.

In the view of the Board, it would be obvious for the person skilled in the art to include the aforementioned features known for a single-solvent dry cleaner, viz. a controller comprising a control panel, an output circuit for driving the respective motors for the processing

tank, pump and valves, and a CPU (cf. features b4), b6) and b7)) and a drying temperature sensor (cf. features d3) and d4)), in a multi-solvent dry cleaner. Unexpected advantages of including these features in a multi-solvent dry cleaner were not put forward by the appellant.

4.7

In the known single-solvent dry cleaner described in the introductory part of the present application the necessary amount of solvent is pumped up from a solvent tank and fed into a processing tank (see page 1, lines 14 to 17). Although a sensor for detecting the amount of the solvent to be taken into the processing tank is not disclosed, in the view of the Board the inclusion of such a sensor and linking it to the controller, is merely one of several possibilities the person skilled in the art would select, in accordance with circumstances, without the exercise of inventive skill, to achieve the objective of pumping up the necessary amount of solvent. It follows that the inclusion of feature b5) must be regarded as obvious.

The same considerations apply to the feature d5), viz. that the output of the drying temperature sensor enables the CPU to control the drying temperature at a preset temperature. In the single-solvent dry cleaner described in the introductory part of the present application an electrical switch is provided which is closed when the drying temperature exceeds the set value. The person skilled in the art would regard it as a normal design option to supply the signal of the drying temperature sensor to the CPU and to put the electrical switch under control of the CPU, since the advantages can be readily contemplated in advance.

4.8 The known controller described in the introductory part of the present application is said to comprise a memory unit, but details about this memory unit are not disclosed.

The memory circuit of the controller according to the invention comprises two parts (see page 14, lines 26 to 29): a programmable read only memory (PROM) (54), which stores washing programs and control sequences (cf. features b1) and b2)), and a random access memory (RAM) (55), which temporarily stores data necessary for control, such as a set drying temperature, a selected washing program and a condition of progress of said program (cf. feature b3)).

This general structure of a memory circuit (i.e. comprising a ROM and a RAM) is, however, quite usual in the art. An example is given in document D1, which relates to an automatic washing machine in which a control unit (37) is provided, which is adapted to control the operations of a drive unit, a water supply system, a drain system in accordance with predetermined programs and to allow the processes of washing, rinsing and spinning to be carried out automatically (see column 5, lines 23 to 30, and Figure 1).

The specification of document D1 continues (column 5, lines 30 to 40): "The control unit (37) may be implemented in the form of a micro-computer, a functional block diagram of which is shown in Figure 5. As can be seen from this figure, the control unit comprises a read-only memory or ROM 38, a random access memory or RAM 39, a program counter or PC 40, ..., an arithmetic logic unit or ALU 42, ..., input devices 47 and 48, input/output devices 49 and 50, ...". Procedures and times for running the programs are programmed in terms of combined instruction codes and stored in ROM,

whereas the RAM serves to fetch data in the course of execution of the program to store therein (see column 5, lines 43 to 57).

Thus document D1 discloses in general terms a generic functional block diagram for a micro-computer with a memory circuit comprising two parts: a programmable read only memory, which stores washing programs, and a random access memory, which temporarily stores data necessary for control (cf. the feature b1) to b3) mentioned above).

- 4.9 The appellant, who has acknowledged that a controller according to the present invention was known per se, has argued that the problems of distillation and drying of a multi-solvent dry-cleaner were absent in the relatively simple washing machine according to document D1, so that it was not obvious to include the controller according to document D1 in the multi-solvent dry cleaner according to document D2.

In the opinion of the Board this argument is not convincing, since the person skilled in the art is aware of the advantages the structure of the memory circuit according to document D1 offers in terms of flexibility, i.e. a structure whereby the process parameters common to the various washing, drying or spinning programs are conveniently arranged in a ROM, and the preset parameters, such as timer instructions or program selection are arranged in a RAM.

- 4.10 In order for the distillation process both according to document D2 and according to the invention to function, the temperature at which the opening and shutting of the valves occurs must be set at a temperature between the boiling point of the first solvent and the boiling point of the second solvent.

The appellant has argued that an important difference between the distillation method according to the invention and the distillation method according to document D2 was that in the invention the distillation temperature sensor detects the temperature of the evaporated solvent gas and not of the solvent itself (cf. feature c1)), which would enable an improved control of the distillation temperature and hence would lead to a better fractional distillation. The Board notes that in the description of the application as filed there is no indication that detecting the temperature of the vapour would have the alleged advantage. There is also no indication in document D2 that the distillation process described therein was unsatisfactory. On the contrary, on page 19, lines 8 to 11, of document D2 it is stated that the separation of the solvents is not a problem in practice, and that "an intermediate component is small as trace".

Although the Board agrees with the appellant that the relative concentrations of the solvents in the solution vary gradually during the distillation of the solvent with the lower boiling point, whereas the relative concentrations of the solvent vapours vary suddenly at the end of the distillation step, the appellant's contention, viz. that the temperature of the solvent vapour would behave in a similar way as the relative concentration of the solvent vapour, i.e. suddenly, is not plausible since it follows from thermodynamical considerations that the temperature of the solvents and of the vapours are substantially the same. The appellant's argument, viz. that detecting the temperature of the evaporated solvent gas would lead to an improved control of the distillation temperature, is hence not convincing.

In the view of the Board, the person skilled in the art would set a suitable "valve switching" temperature with a view of optimizing the purity of the distillates, and then, during the distillation step, measure the temperature at a suitable location inside the distiller, i.e. in the fluid or in the vapour, in order to switch the valve after the evaporation of the solvent with the lower boiling point. Hence no inventive step can be seen in feature c1).

4.11 It follows from the above that the person skilled in the art would without exercising inventive skill arrive at the subject-matter according to claim 1.


5. Since claim 1 is not allowable with respect to Articles 52(1) and 56 EPC, the application has to be refused. As the appeal has to be dismissed there is no basis for a refund of the appeal fee under Rule 67 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:


A. Townend

The Chairman:


G. Gall