

**Internal distribution code:**

- (A) [ ] Publication in OJ  
(B) [ ] To Chairmen and Members  
(C) [X] To Chairmen

**D E C I S I O N**  
of 28 July 2000

**Case Number:** T 0012/98 - 3.2.4

**Application Number:** 90911862.2

**Publication Number:** 0484421

**IPC:** A47K 3/10

**Language of the proceedings:** EN

**Title of invention:**  
Jet units for whirlpool-bath systems

**Patentee:**  
PH POOL SERVICES LIMITED

**Opponent:**  
HOESCH Metall + Kunststoffwerk GmbH & Co.

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 100(b), 56

**Keyword:**  
"Disclosure of invention - yes"  
"Functional definitions in claim - allowable"  
"Inventive step - yes"

**Decisions cited:**  
T 0068/85, T 0204/83

**Catchword:**  
-



**Case Number:** T 0012/98 - 3.2.4

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.4**  
**of 28 July 2000**

**Appellant:** HOESCH Metall + Kunststoffwerk GmbH & Co.  
(Opponent) Schneidhausen  
D-52372 Kreuzau (DE)

**Representative:** Langmaack, Jürgen, Dipl.-Ing.  
Patentanwälte  
Maxton & Langmaack  
Postfach 51 08 06  
D-50944 Köln (DE)

**Respondent:** PH POOL SERVICES LIMITED  
(Proprietor of the patent) Unit 12, Woodside Park Industrial Estate  
Catteshall Lane  
Godalming  
Surrey GU7 1LG (GB)

**Representative:** Coles, Graham Frederick  
24 Seeleys Road  
Beaconsfield  
Buckinghamshire HP9 1SZ (GB)

**Decision under appeal:** Interlocutory decision of the Opposition Division  
of the European Patent Office posted 17 November  
1997 concerning maintenance of European patent  
No. 0 484 421 in amended form.

**Composition of the Board:**

**Chairman:** C. A. J. Andries  
**Members:** M. G. Hatherly  
C. Holtz

## Summary of Facts and Submissions

I. The interlocutory decision of the opposition division was dispatched on 17 November 1997 to maintain the European patent No. 0 484 421 in amended form.

On 7 January 1998 the appellant (opponent) filed an appeal against this decision and simultaneously paid the appeal fee. The statement of grounds of appeal was received on 25 February 1998.

II. The following documents played a role in the appeal proceedings:

D1: GB-A-2 201 890

D1': DE-A-3 807 135

D2: US-A-4 593 420

D4: US-A-4 742 965

D7: US-A-3 890 656

D8: US-A-3 946 449

Statutory Declaration by Eric William Bailey of 23 July 1996.

III. Oral proceedings took place on 28 July 2000 in the presence of the parties.

During these oral proceedings the respondent (proprietor) filed a new claim 1 forming the basis of his sole request and reading:

"A jet unit for a whirlpool-bath system in which a housing (15) of the unit has an internal cavity with an open mouth, a flanged hollow stem (13) for clamping the housing to the bath (2) provides an outlet (12) of the unit for discharging a jet of water into the bath (2), said stem (13) extending axially into the cavity through said mouth to define an air chamber (19) within the unit between an open rear end of the stem (13) and the inside of the housing (15), and in which a stream of water is discharged across a gap (20) into the rear-end opening of the hollow stem (13) from a nozzle (18) such as to entrain air admitted to the chamber (19) via an air inlet (21) with the water stream in the gap (20), said gap (20) being defined by axial spacing of the nozzle (18) from the rear-end of the stem (13), the rear end of the stem (13) having a part (22) that extends axially from it in the direction upstream of the water flow to shroud the gap (20) the said part (22) shrouding the gap (20) within the air chamber (19) for constricting air flow from the chamber (19) into the gap (20) to an annular space (24) defined between that part (22) and a nose-part (23) of the nozzle (18), characterised in that the nozzle (18) has an outlet diameter less than its inlet diameter such that the water-flow passage within the nozzle (18) towards the gap (20) is convergent in the direction of water flow so as to constrict water flow into the gap (20) for enhancing the suction of air into the gap (20) by venturi action, and that the constriction of the annular space is such that in consequence of the enhanced suction, the air is drawn into the gap (20) with a substantially even distribution around the gap (20) to result in enhanced mixing of the air with the water in the jet from the outlet (12)."

IV. In the appeal proceedings the appellant argued essentially that claim 1 was unclear with impermissible functional definitions that merely set problems without detailing with what the improvement was to be compared or how it was to be achieved. In any case these functions were already achieved by the nozzle assembly of D1 which the skilled person would modify in an obvious way to arrive at the claimed subject-matter.

The respondent countered the appellant's arguments.

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

The respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of

- claims 1 to 9 as submitted in the oral proceedings;
- pages 1 to 3 of the description as submitted in the oral proceedings, and column 2, line 50 to column 6, line 18 as granted, with the amendment that column 2, line 51 reads as follows "stem extends over the nose-part of the nozzle"; and
- Figures 1 to 4 as granted

## Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*
  - 2.1 No objections have been made under Article 100(c) EPC to the patent specification as granted.
  - 2.2 The present claim 1 contains all the subject-matter of claim 1 as granted, to which the following restrictions have been added:
    - that the outlet (12) of the unit is "for discharging a jet of water into the bath (2)" which is self evident;
    - the "gap (20) being defined by axial spacing of the nozzle (18) from the rear-end of the stem (13)" which is derived from Figure 4 and from page 5, lines 3 and 4 of the patent application WO-A-91/01675 (Figure 4 and column 4, lines 14 and 15 of the granted patent specification);
    - that the part (22) extends axially from the rear end of the stem in the direction upstream of the water flow, which is derived from Figure 4 and page 5, lines 15 to 17 of the patent application WO-A-91/01675 (Figure 4 and column 4, lines 25 to 27 of the granted patent specification);
    - that "the nozzle (18) has an outlet diameter less than its inlet diameter such that the water-flow passage within the nozzle (18) towards the gap

(20) is convergent in the direction of water flow for enhancing the suction of air into the gap (20) by venturi action" can be derived from Figure 4 and the Bernoulli law; and

- that "the constriction of the annular space is such that in consequence of the enhanced suction, the air is drawn into the gap (20) with a substantially even distribution around the gap (20) to result in enhanced mixing of the air with the water in the jet from the outlet (12)" can be derived from page 5, line 14 to page 6, line 14 of the patent application WO-A-91/01675 (column 4, line 24 to column 5 line 3 of the granted patent specification).

2.3 The present claims 2 to 9 correspond to the granted claims 2 and 4 to 10. The present description has merely been adapted to the new claim 1 and to acknowledge the prior art document D1' while the Figures remain as granted.

2.4 Thus the board sees no objection under Article 123 EPC to the present version of the patent.

### 3. *Novelty*

No prior art document on file discloses all the subject-matter of the present claim 1. The appellant accepted this during the oral proceedings.

The subject-matter of the present claim 1 is therefore novel in the meaning of Article 54 EPC.

4. *Closest prior art - Figure 5 of D1*

4.1 The parties agree that the spa bath nozzle assembly 34 shown in Figure 5 of D1 is closest to the present invention.

4.2 While the board is not inclined to agree with the appellant that the constant diameter inlet 14 on Figure 5 of D1 is a nozzle, this point is not decisive because claim 1 specifies not only a nozzle but also that "the nozzle (18) has an outlet diameter less than its inlet diameter such that the water-flow passage within the nozzle (18) towards the gap (20) is convergent in the direction of water flow". Thus the distinction over D1 has been made and whether inlet 14 of D1 is or is not a nozzle does not affect the scope of the claim but only whether the word nozzle is to be in the pre-characterising or the characterising portion.

It is true that D7 when referring to Figure 2 states in column 3, line 12 and 13 that "The outlet end of the water passage 34 is in the form of a nozzle 35" and it is also true that the constant diameter tube numbered 35a on Figure 7 of D8 is termed a nozzle. However the board sees in both cases a constriction of the passageway upstream of the nozzle outlet, so that the entity "constriction - downstream conduit" is in fact the nozzle and the downstream conduit is the extension to the nozzle, indeed part 35a in D8 is termed an "extended nozzle" in line 56 of column 4 whereas feature 35 (see Figure 3) is termed a nozzle in line 3 of the same column.



While D1 refers to "a spa bath **nozzle** assembly 34" this is because it comprises the **nozzle 16** and is independent of whether **inlet 14** could be termed a nozzle which without any constriction has to be considered as merely a conduit.

However, to avoid all doubt on the part of the reader, where the constricting effect of the nozzle is concerned the board will use the expression "(constricting) nozzle".

4.3 It must now be examined whether the nozzle assembly of Figure 5 of D1 employs the venturi effect.

4.3.1 Lines 5 to 16 of page 1 of D1 explain that, while some spa bath arrangements work by entraining air on the water flow, there are arrangements which simply pump air into the bath water and arrangements where both the air and water are pumped and then mixed either in the nozzle or upstream thereof (see also page 4, lines 4 to 11).

Thus not all spa bath arrangements presented as prior art in D1 employ a venturi effect.

4.3.2 The sole specific description of Figure 5 is in lines 6 to 19 of page 8 and this concerns the mounting of the nozzle assembly in the bath. Other passages of D1 need to be consulted to see how the Figure 5 nozzle assembly might work.

To assume that the inlet 14 on Figure 5 is a water inlet is to make a choice from two possibilities since page 5, lines 6 and 7 refer to "Inlets 13,14 for air and water respectively, or vice versa".

Page 8, line 20 to page 9, line 1 explains that each of the embodiments (i.e. including that of Figure 5) can be used as shown in Figure 7.

While lines 21 to 24 of page 9 explain that water passing through the nozzle assembly entrains air to be mixed with the water, this is not the only possibility since page 9, line 24 to page 10, line 2 presents the alternative of mixing the air and water in manifold 46 (see Figure 7) and having only a single inlet pipe 48 to the nozzle assembly.

Lines 3 to 6 of page 10 add that the air inlet pipes 47 may be open to the surroundings or an air pump may be provided to pump air into an air manifold to which air pipes 47 are connected.

Thus not all the embodiments of the invention of D1 use the venturi effect.

- 4.3.3 Thus to choose the nozzle assembly shown in Figure 5 of D1 as the closest prior art to the present invention is to assume that in D1 (only) water enters through inlet 14 and (only) air through inlet 13, that the air is unpressurised and that a venturi effect is present.

The further discussion of Figure 5 of D1 proceeds after making these assumptions.

- 4.4 Looking at the general proportions and relative positions of the various components on Figure 5 of D1, it appears that the entraining effect on the air from inlet 13 by the water leaving inlet 14 would be poor.

The appellant agrees that the amount of entrained air

will be poor but argues that it will be drawn in all around the water stream because the air, although it has arrived from air inlet 13, is now present throughout the annular space around the water inlet 14. Thus the air will be well mixed with the water stream.

The board cannot agree with this argument. In the dynamic situation, as opposed to the static situation, with water leaving the inlet 14 but being held back by the nozzle 16 and the water in the bath, the water in the chamber will be turbulent and there is no reason to suppose that the unpressurised air from the inlet 13 will evenly fill the annular space around the water inlet 14 before being entrained by the water.

- 4.5 Figure 5 of D1 shows a gap defined by the axial spacing of the downstream end of the inlet 14 from the rear-end of the front body member (where the upstream end of the nozzle 16 is located). The rear end of the front body member 12 has a part that extends axially from it in the direction upstream of the water flow to shroud this gap. Air flow from the chamber defined by front body member 12 and the rear body member 11 can only reach the gap after passing through an annular space defined between the shrouding part of the front body member 12 and the downstream end of the water inlet 14.

This annular space narrows from its upstream end to its downstream end but even at its narrowest part it is plainly large (compare this with the cross-sectional areas of the bore 21 of the inlet and the bore of the nozzle 16 for example) and would seem to have no effect on the air flow towards the gap. The board cannot see that the designer wished to create a narrowing annular space and still less a constriction which would have an

effect on the air flow, the narrowing seems merely to be the result of having a tapered shrouding part (compare Figure 4 where there is no narrowing of the annular gap because the shrouding part of the front body member 12 is cylindrical).

5. *Problem and solution*

5.1 The board considers that the problem facing the skilled person confronted by the nozzle assembly of D1, and making the assumptions set out in section 4.3.3 above, is how to increase the amount of air entrained by the water and to improve their mixing.

5.2 It can be seen from the characterising portion of the present claim 1 that the water is delivered into the gap (numbered 20 on Figure 4 of the present patent) through a nozzle 18 which constricts the cross-sectional area of the water flow and, compared with the water flow conditions upstream, therefore increases the water flow velocity and lowers its pressure. Due to this nozzle 18, for a given pump output pressure, the pressure at the gap 20 is lower than if the water were delivered by a constant diameter flow pipe having the diameter of the nozzle inlet. This lower pressure (i.e. increased negative pressure) achieved by the nozzle 18 means that more air is entrained by the water stream.

5.3 Moreover the annular space 24 (located between the shrouding part 22 and the nose-part 23, and through which annular space the air must pass from the air inlet pipe 21 to the gap 20) is also constricted in order to achieve a stated result. The constriction causes a pressure drop across this annular space which increases the velocity of air entering the gap 20 above

what it would be if no constriction were present and which encourages the air to enter this gap 20 from all points around the air chamber 19 in a more even manner instead of it tending to take the shortest route from the air-inlet pipe 21 to the gap 20 resulting in a less even distribution.

5.4 Thus in the nozzle assembly set out in the present claim 1 the constriction provided by the nozzle and the constriction in the annular gap produce pressure drops and flow velocity increases leading to improved mixing of the air with the water.

5.5 Accordingly the board finds that the problem posed by the nozzle assembly of D1 is solved by the nozzle assembly defined in the present claim 1.

6. *Disclosure of the invention and clarity of claim 1*

6.1 The appellant argues that the functional definitions in the present claim 1 are impermissible, that their deletion would reduce the claim to describing known jet units and moreover that these functions are already achieved by the structural features of the pre-characterising portion of the claim which are known from D1. He continues that the features in the characterising portion of "for enhancing the suction of air", "in consequence of the enhanced suction", and "enhanced mixing" merely set problems but give no details of what the improvement is to be compared with or how it is to be achieved.

6.2 It is clear from decision T 68/85 (OJ EPO, 1987, 228) that precise and clear functional definitions are permissible in claims. The functional definitions in

the present claim 1 are contained in the following passages:

- 6.2.1 "the nozzle (18) has an outlet diameter less than its inlet diameter such that the water-flow passage within the nozzle (18) towards the gap (20) is convergent in the direction of water flow so as to constrict water flow into the gap (20) for enhancing the suction of air into the gap (20) by venturi action"

D1 does not disclose a convergent nozzle so that the claimed subject-matter would remain novel over D1 even if the wording "so as to constrict water flow into the gap (20) for enhancing the suction of air into the gap (20) by venturi action" were deleted.

It is clear that a water nozzle constricts water flow to increase its velocity and lower its pressure and that thereby the venturi effect is increased. It will be clear to the skilled person that the effect of "enhancing the suction of air into the gap (20) by venturi action" is a comparison with the situation when no nozzle (i.e. no constriction) is present.

The passage quoted at the beginning of this section 6.2.1 thus gives the skilled person a clear teaching of one feature of the inventive jet unit.

- 6.2.2 "the constriction of the annular space is such that in consequence of the enhanced suction, the air is drawn into the gap (20) with a substantially even distribution around the gap (20) to result in enhanced mixing of the air with the water in the jet from the outlet (12)"

As remarked in section 4.5 above the board does not consider that the annular space shown on Figure 5 of D1 is constricted enough to have a marked effect on the air flow through it and as remarked in section 4.4 above does not consider that an even distribution of air is achieved.

The passage quoted at the beginning of this section 6.2.2 however gives the skilled person a clear teaching that the annular space must be constricted enough to increase the suction i.e. to create a pressure drop and that this is to be done so that air is drawn into the gap substantially evenly from all around. It is clear that this will result in better mixing than if the air is drawn more or less only by one side of the water stream. The even distribution of air (the purpose) is therefore linked to the presence of a constriction in the air stream (the technical feature).

6.3 The board considers that the claim gives the skilled person clear information to constrict the water flow (by the nozzle) and to constrict the annular gap to produce pressure drops and flow velocity increases leading to improved mixing of the air with the water.

6.4 The board thus does not accept the appellant's argument that D1 already achieves the effects specified in the present claim 1. The board also does not accept his argument that the patent does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

The appellant's lack of disclosure argument is moreover

incompatible with his argument reported in section 7.1 below that the skilled person would use his technical knowledge to modify the nozzle assembly of D1 in an obvious way to arrive at the claimed subject-matter.

- 6.5 The board considers that the skilled person reading claim 1 with the description and drawings of the patent specification would find the claim clear, and so disagrees with the appellant on this point. It is helpful to remember that when granted the claim was based on D7 as the closest prior art which discloses a hollow stem with a rear end opening to which the present invention adds a shrouding part. The wording that was already in the claim 1 when granted is in principle unobjectionable with respect to clarity in opposition proceedings. The board sees no problem with what has been added after grant and this has already been discussed in sections 2.2, 5 and 6.2 above.

Moreover, as set out in section 3 above, the subject-matter of claim 1 is new and this was accepted by the appellant in the oral proceedings.

7. *Inventive step*

- 7.1 To summarise, the appellant argues on inventive step as follows. It is clear that the water passing through the nozzle assembly of Figure 5 of D1 entrains the air by a venturi effect and that the air is drawn in all around the water stream. D1 deals with how nozzle assemblies are mounted on baths and so the skilled person will see that this nozzle assembly will not work very well because the flow parts of the nozzle assembly are shown merely schematically. He will therefore use his technical knowledge to construct the flow parts



properly, including replacing the constant diameter water inlet 14 by a constricting nozzle, and will arrive at a jet unit according to the present claim 1.

- 7.2 It is clear from section 4.3.3 above that the board is not convinced that the disclosure of D1 supports the appellant's presumption that the nozzle assembly of Figure 5 of D1 must employ a venturi effect which the skilled person will wish to improve.

If the skilled person considers that the nozzle assembly shown in Figure 5 of D1 does not work very well, then the question arises as to what he would do to improve it.

He could increase the amount of air by pressurising it with an air pump (see D1, page 10, lines 3 to 6) or he could mix the air and water better by mixing in the manifold 46 upstream of the nozzle assembly.

The board does not consider that he would (as opposed to "could") redesign the interior of the nozzle assembly.

- 7.3 Even if he did redesign the interior of the nozzle assembly, the board does not see that he **would** arrive at a nozzle assembly as defined by the present claim 1.
- 7.4 He might replace the constant diameter inlet 14 by a (constricting) nozzle, such nozzles being known in similar spa bath arrangements (e.g. nozzle 35 on Figure 3 of D8).

However it has been stated in section 4.5 above that the annular space between the shrouding part and the

inlet 14 is not effectively constricted and to replace the inlet 14 by a (constricting) nozzle would be to make the narrowest part of the annular space either still wider (with constant wall thickness) or keep it as it was (with constant nozzle outside diameter). The appellant argues that obviously the skilled person would also adapt the free cross section of the annular gap but the board can see no reason why he would be led to do so - unless he knew of the present invention.

- 7.5 The appellant points to Figure 2 of D4 which shows a narrow annular gap between a water outlet 39 and a flanged part 36. Air is aspirated through this gap by the water passing through the outlet, see column 3, lines 52 to 58. He considers that the skilled person would incorporate this narrow gap in the assembly of Figure 5 of D1 which has been modified with the (constricting) nozzle of D8.

The skilled person would however need a reason if he were to narrow the gap in the assembly of D1 modified using D8. The purpose of the constriction of the annular gap in the present invention is to evenly distribute entrained air (see the patent specification, column 4, line 51 to column 5, line 2) but D4 does not mention that the air must be evenly distributed. If this is achieved in D4 then it may be by the plurality of air inlets 31 (two are shown in the cross sectional Figure 2).

Moreover the annular gap in D4 is the consequence of needing to connect the flanged part 36 to the water outlet so that turning the former will axially move the latter to open or close the water inlets 29.

D7 would not help the skilled person since there is no shrouding part to provide an annular gap (and the arrow in the air passage 32 implies that the air meets the water stream unevenly from above).

Thus there is no reason why the skilled person (unless he knows of the present invention) would reshape the shrouding part of the D1 assembly (which has already been modified using D8 to have a nozzle) to produce an effective constriction in its annular gap.

- 7.6 The appellant argues that the skilled person is free to make any changes that he wishes to the D1 assembly using his general technical knowledge and the prior art such as D4.

The board considers that there would need to be reasons arising from the prior art if the skilled person were to change the D1 assembly in such a way as to arrive at the claimed subject-matter. The appellant's cherry-picking of parts of D1, D8 and D4 impermissibly relies on knowledge of the present invention.

- 7.7 Thus, as required by Articles 52(1) and 56 EPC, the subject-matter of the present independent claim 1 involves an inventive step.

8. In the statement of grounds of appeal the appellant stated that he wished arguments put in writing and orally to the opposition division to be part of the appeal proceedings.

These arguments were considered by the opposition division before deciding that the patent could be maintained in amended form. If the appellant considered

that the opposition division's conclusions were wrong then it was his duty to point out specifically why. Blanket references to prior arguments will not be considered by the board.

9. The tests described in Mr Bailey's Statutory Declaration were made on scale models of the Figures of the present patent and D1. As these Figures are schematic and not engineering drawings, conclusions cannot be drawn from them, see decision T 204/83 (OJ EPO 1985, 310).
10. The patent may therefore be maintained amended, based on this independent claim 1, claims 2 to 9 dependent thereon, the amended description and the drawings as granted.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in the following version:
  - claims 1 to 9 as submitted in the oral proceedings;
  - pages 1 to 3 of the description as submitted in the oral proceedings, and column 2, line 50 to column 6, line 18 as granted, with the amendment that column 2, line 51 reads as follows "stem extends over the nose-part of the nozzle"; and

- Figures 1 to 4 as granted

The Registrar:

The Chairman:

G. Magouliotis

C. Andries