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D E C I S I O N
of 17 April 1996

Case Number: T 0428/95 - 3.4.2

Application Number: 85903747.5

Publication Number: 0188572

IPC: G01F 1/84

Language of the proceedings: EN

Title of invention:

Improved apparatus for mass flow rate and density measurement

Patentee:

EXAC CORPORATION

Opponent:

Endress + Hauser Flowtec AG
Krohne Messtechnik Massametron GmbH & Co. KG

Headword:

-

Relevant legal provisions:

EPC Art. 84, 54, 56, 100(a)

Keyword:

"Novelty (yes)"
"Inventive step (yes)"
"Clarity (no ground of opposition)"

Decisions cited:

-

Catchword:

-



Case Number: T 0428/95 - 3.4.2

~ D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 17 April 1996

Appellant:
(Opponent 02)

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Respondent:
(Proprietor of the patent)

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 24 April 1995
rejecting the opposition filed against European
patent No. 0 188 572 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: E. Turrini
Members: M. Chomentowski
B. J. Schachenmann

Summary of Facts and Submissions

I. The respondent is proprietor of European patent No. 0 188 572 which has been granted with 13 claims on the basis of European patent application No. 85 903 747.5. The patent acknowledges D16 = US-A-4 127 028 as prior art and its only independent claim reads as follows:

"1. A flow meter for measuring the mass flow rate in a stream of flowing material, comprising: a tubular conduit means arranged to form a loop (125 or 127) having an entrance portion through which the flowing material enters the conduit means, an exit portion through which the flowing material exits the conduit means, an actuated portion intermediate the entrance and exit portions, a first detection portion coupling the entrance portion and the actuated portion, and a second detection portion coupling the actuated portion and the exit portion, the entrance and exit portions being arranged so that the flowing material enters and exits the flow meter in substantially the same direction; actuating means (42) for causing said actuated portion to oscillate about a first axis Y-Y between positions on opposite sides of a rest position; detection means (46, 48, 56) for detecting motive differences occurring between the entrance portion and the exit portion caused by Coriolis forces acting about a second axis X-X perpendicular to the first axis Y-Y and induced in the first detection portion and the second detection portion as the actuating means causes the actuated portion to oscillate; and computing and indicator means (54) responsive to the detection means and operative to indicate the mass flow rate of material flowing through the tubular conduit means; characterised in that the loop (125 or 127) is generally helical with the exit

portion crossing the entrance portion in spaced apart relationship, and the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H is greater than unity."

II. The appellant is one of the two opponents who filed an opposition against the European patent on the grounds that the subject-matter of claim 1 lacked novelty having regard to D20 = WO-A-85/05677 & EP-A-0 185 709. Moreover, the appellant made formal objections concerning the separation in two parts of the text of said claim having regard to D16. The second opponent, after having additionally opposed the patent on the grounds that the subject-matter of claim 1 lacked an inventive step having regard to inter alia D16, withdrew his opposition during the procedure.

III. The opposition was rejected.

The Opposition Division took the view that the subject-matter of claim 1 was novel having regard to D20 and that the first feature of the characterising portion of claim 1, that the loop was generally helical, was not, in itself inventive as compared to the device known from D16, but that the second characterising feature, that said loop was with the exit portion crossing the entrance portion in spaced apart relationship, was not clearly disclosed in D16 and not immediately obvious either; moreover, concerning the third and last characterising feature, that the loop had a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H was greater than unity, there was no derivable need from the teaching of D16 to depart from the circular shape shown in Figure 5 of this document and, if there were any reason to modify said structure of Figure 5, it would be in the other direction, with L/H smaller than unity, in

accordance with the examples shown in other Figures of D16. Therefore, the subject-matter of the opposed claim 1 was considered as involving an inventive step.

IV. The appellant (opponent) filed an appeal against this decision. He requested that the decision under appeal be set aside and the patent be revoked or, at least, amended for meeting clarity objections. He submitted the following arguments in support of his requests:

A flow meter according to the first part of claim 1 in dispute is known from Figure 5 of D16. The claim is admittedly novel because in particular the last feature of the claim, that the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H is greater than unity, is not comprised in the teaching of D16. However, this last feature, as well as the two other features of the characterising portion of the claim in dispute, that the loop is generally helical and that said loop is with the exit portion crossing the entrance portion in spaced apart relationship, can be found by the skilled person, who in this particular technical field of Coriolis flow meters is of a high technical level, in an obvious way for the following reasons: the device of Figure 5 of D16, with its loop crossing itself, leads to an helical structure wherein, for technical reasons relating to loop vibration modes easily recognized by the skilled person, the parts of the loop cannot be in contact or connected, so that they must be spaced apart; moreover, the skilled person would also easily find, at least when carrying into practice the teaching of the generally circular loop of Figure 5 of D16, that this shape is not convenient for solving the object of D16 of increasing the sensitivity of the flow meter; he would also recognize for the same reasons that modifying the generally circular loop of Figure 5 of D16 by taking into account the teaching relating to Figure 1 of the

same document would not solve the problem either, so that he would be obviously led to modify the shape of the loop of said Figure 5 in the direction opposite to that of said Figure 1, thus obtaining the flow meter in dispute.

The claim in dispute lacks clarity because there is a contradiction between the text of the claim and all embodiments in the patent in suit except those illustrated by Figures 7 and 8. In particular, these embodiments, for instance the one illustrated by Figure 2, are identical with those of D20, so that, although it is admitted that lack of clarity is no ground of opposition, the patent should be amended and all embodiments of the patent in suit concerning circular devices should be deleted.

- V. The respondent (proprietor) requested that the appeal be rejected and, as auxiliary request, that oral proceedings take place. He argued substantially as follows in support of his requests:

It has not been contested that the flow meter of claim 1 in dispute is novel. A flow meter according to the pre-characterising portion of the claim is known from Figure 5 of D16. The device shown in said Figure 5 has undoubtedly a loop with a generally circular structure and, although the ends of said loop cross each other, there is no indication in D16 that the loop should be generally helical. Concerning the further feature of the characterising portion of claim 1 in dispute, that said loop is with the exit portion crossing the entrance portion in spaced apart relationship, there is no indication derivable in this sense either; in particular, the objections about problems arising when the crossing parts of the loop of Figure 5 of D16 are in contact or connected are irrelevant because this is not

required by the claim in dispute, which only states that these parts must be separated. The last feature of the characterising portion of claim 1 in dispute, that the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H is greater than unity, can be derived neither from the generally circular structure of Figure 5 of D16 nor from other Figures of said document, which lead to structures elongated in the opposite direction.

Therefore, D16 being silent about said three distinguishing features, the subject-matter of claim 1 in dispute involves an inventive step.

Concerning the objection of lack of clarity of claim 1 in dispute, it is to be remembered that this is no ground of opposition.

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty of claim 1*

2.1 A flow meter for measuring the mass flow rate in a stream of flowing material is known from D16 (see column 5, lines 46 to 64; Figure 5; see also Figure 4 and, additionally, Figure 1 to 3 and the corresponding text); the known flow meter comprises:

a tubular conduit means arranged to form a loop (76) having an entrance portion through which the flowing material enters the conduit means, an exit portion through which the flowing material exits the conduit means, an actuated portion (not shown) intermediate the

entrance and exit portions, a first detection portion coupling the entrance portion and the actuated portion, and a second detection portion coupling the actuated portion and the exit portion, the entrance and exit portions being arranged so that the flowing material enters and exits the flow meter in substantially the same direction; actuating means (32) for causing said actuated portion to oscillate about a first axis between positions on opposite sides of a rest position; detection means (40, 41) for detecting motive differences occurring between the entrance portion and the exit portion caused by Coriolis forces acting about a second axis perpendicular to the first axis and induced in the first detection portion and the second detection portion as the actuating means causes the actuated portion to oscillate; and computing and indicator means responsive to the detection means and operative to indicate the mass flow rate of material flowing through the tubular conduit means (76).

However, it has not been contested that in particular the last feature of the characterising portion of the claim in dispute that the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H is greater than unity is not comprised in the teaching of D16.

2.2 It is to be noted that, although the appellant has declared in his statement of grounds of appeal (see paragraph 2 on page 3) that he did not contest the novelty of the subject-matter of claim 1 in dispute, there is a further comment (see page 8, last paragraph to page 9, fourth paragraph) that all embodiments in the patent in suit except those illustrated by Figures 7 and 8 are identical with those of D20, so that all embodiments of the patent in suit concerning circular devices should be deleted. However, insofar as it

concerns the novelty of the subject-matter of claim 1 in dispute, the positive declaration of the appellant is accepted so that there is no need to comment further on the content of D20 in this respect.

2.3 Therefore, the subject-matter of claim 1 in dispute is novel in the sense of Article 54 EPC.

3. *Inventive step of claim 1*

3.1 It has not been contested that D20 is a document of the prior art according to Article 54(3) EPC, i.e. with a priority date prior to the priority date of the patent in suit but which has been published after the publication date of the European patent application having led to the patent in suit, and that thus D20 is not to be considered in deciding whether there has been an inventive step (Art. 56, second sentence, EPC).

3.2 As shown here above in relation with the assessment of novelty of claim 1 in dispute, all the features of the pre-characterising portion of the claim are known from D16. The characterising portion of the claim comprises the following further features:

- (i) the loop is generally helical,
- (ii) said loop is with the exit portion crossing the entrance portion in spaced apart relationship, and
- (iii) the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H is greater than unity.

3.3 The appellant has declared in the statement of grounds of appeal (see paragraph 3.4 on page 4) that he approves of the finding in the decision under appeal that it would appear most likely that the loop is a very flat helical loop, and therefore that feature (i) referred to above is in itself not inventive. Incidentally, it is to be noted that, thus, the appellant does not contest that said feature is not comprised in the teaching of D16. Concerning feature (i), the respondent in his observations (see paragraph 7) has pointed out that, taking into account in particular the indication in D16 that the device of Figure 5 is circular and further indications corroborating the conclusion that the structure as circular is in a plane, the device of D16 cannot be derived as being helical.

Indeed, in the only text location of D16 (see in particular column 5, lines 54 to 64) directly related to Figure 5, it is mentioned that the loop is "in the shape of a circle", and this can be indicative of some planar structure. However, the meaning of the expression "in the shape of a circle" is to be interpreted in the context of the document. In D16 (see column 5, lines 46 to 53; Figure 4), in relation with another example, it is stated that the shown loop (71) "is in the form of a circle". Yet, since the loop (71) of Figure 4 is shown as being in the form of an interrupted, incomplete circular loop only, it is derivable that, for the skilled reader taking into account the teaching of D16, "in the form of a circle" or "in the shape of a circle" only indicates a general shape or form of the loop, and not an exact circular shape and thus not an exact planar configuration.

Moreover, in relation to the example illustrated by Figure 5 of D16 (see column 5, lines 54 to 64), it is mentioned that "it will be noticed that the loop (76) must bypass itself as shown at (77)". This statement is in agreement with at least the left part of the drawing, which shows the entrance portion (81) of the loop (76) with a broken line portion and the loop itself with continuous lines, thus indicating a part of the entrance portion (81) under the loop (76) at this crossing location (77).

Therefore, the respondent's argument relating to a planar structure of the loop of Figure 5 of D16 is not convincing and the appellant's argument based on the conclusion of the Opposition Division that the first feature of the characterising portion of claim 1, that the loop was generally helical, was not in itself inventive as compared to the device known from D16, can be accepted.

- 3.4 The appellant has argued that the Opposition Division, in concluding that the feature (ii) that the loop is with the exit portion crossing the entrance portion in spaced apart relationship is not clearly disclosed in D16 and not immediately obvious either, has not sufficiently appreciated the content of D16.

It is first to be noted that the appellant's argument is not convincing already since, from the content of D16 alone, the feature that the loop is with the exit portion crossing the entrance portion in spaced apart relationship is not derivable. The appellant has further argued that the skilled person in this particular technical field is of a high technical level and will understand that, at the location where the loop (76) bypasses itself, the parts of the loop cannot be joined together or connected in any way, but must be spaced

apart, because of the good functioning of the Coriolis meter. This argument cannot be accepted either because, as convincingly argued by the respondent in his observations (see paragraphs 3 to 6 and 8), claim 1 in dispute only requires the loop to be with the exit portion crossing the entrance portion in spaced apart relationship, and this is not necessarily related to joining or connecting those parts together.

Therefore, even if it had been obvious for the skilled person to give the crossing loop of Figure 5 of D16 a generally helical shape, the further step of separating the crossing parts of the loop is not derivable from this document and irrelevant in view of the appellant's arguments concerning a feature which is not required by the claim.

3.5 Concerning the last feature of the claim that the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ration L/H is greater than unity, the appellant has declared in his statement setting out the grounds of appeal (see paragraph 3.6 on pages 5 to 8) that this feature is not derivable from D16 itself, but went on to argue that the skilled person trying to achieve the purpose of D16 (see column 2, lines 1 to 6 and column 4, lines 13 to 17) of increasing the sensitivity of the flow meter, which is as well the object of the invention of the patent in suit (see page 2, lines 17 to 24), would get aware, at least when carrying out into practice the teaching of D16 relating to Figure 5, that this particular structure does not allow to increase the sensitivity of the measurements; the appellant has also argued that, should the skilled person then try to modify the device of Figure 5 of D16 by taking into account the device of Figure 1 of said same document, wherein, contrary to the requirement of claim 1 in

dispute, the loop is generally U-shaped and extend in the second axis and so has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ratio L/H is not greater than unity, he would also get aware, at least when carrying into practice said modified device, that the modification based on Figure 1 does not solve the problem, but increases it, and would thus in an obvious way adopt the opposite modification, i.e. in the sense of claim 1 in dispute. However, this argument of the appellant, based on the general knowledge of the skilled person, is not convincing since, as plausibly pointed out by the respondent in his observations (see paragraph 9), D16 is silent about elongating the loop (76) of Figure 5 in any direction, let alone in the Y-Y- direction, as required by the main claim, and is also silent about the two other features (i) and (ii) of the characterising portion of the claim that the loop is generally helical with the exit portion crossing the entrance portion in spaced apart relationship.

3.6 Therefore, starting from the incomplete teaching of D16 and even if the first feature (i) can be considered as providing no inventive contribution, it was not obvious for the skilled person using his general knowledge to arrive at the combination of features of the claim in dispute, so that the subject-matter of the claim involves an inventive step in the sense of Article 56 EPC.

4. *Further objections of the appellant*

4.1 In his statement of grounds of appeal (see page 8, last paragraph to page 9, fourth paragraph), the appellant has objected that all illustrated embodiments in the patent in suit except those illustrated by Figures 7 and 8 were shown as circular devices and that, taking into

account the text of the patent (see page 8, lines 15 to 17), those devices of Figures 2 to 6 could be derived as being embodiments of lesser quality than the embodiments corresponding to Figures 7 and 8 ("...are further improved..."), thereby resulting in a contradiction between the claim, on the one hand, and description and drawings on the other hand, and thus in the claim lacking clarity.

4.2 Concerning this objection, it is first to be noted that, as admitted also by the appellant, lack of clarity of the claims in the sense of Article 84 EPC is not one of the grounds of opposition in the exclusive list of grounds of Article 100 EPC. Thus, there can be seen no provision in the EPC for obliging the respondent to amend the patent in suit only because of lack of clarity.

4.3 Incidentally, concerning the further objection in the statement of grounds of appeal (see page 8, last paragraph to page 9, fourth paragraph) that all embodiments in the patent in suit except those illustrated by Figures 7 and 8 are identical with those of D20, the following is to be added: The flow meter of Figure 2 of the patent in suit (see page 7, lines 2 to 6), in particular, is mentioned as having a "circular loop". Thus, this device does not comprise the feature of claim 1 in dispute that the loop has a dimension L along the first axis Y-Y and a dimension H along the second axis X-X such that the ration L/H is greater than unity and therefore is not a flow meter according to claim 1 in dispute. Thus, whether a device of D20 is identical with the device of Figure 2 of the patent in suit is irrelevant since said known device, because of said distinguishing feature, is unambiguously not identical with the flow meter of claim 1 in dispute and cannot attack its novelty. Moreover, taking into account

the statement in the patent in suit (see page 8, lines 15 to 17) referred to by the appellant according to which the mass flow rate measurement sensitivity of the devices depicted in Figures 2 to 6 are further improved by configuring the loops in such a way that the ratio of the length to the height is greater than unity, it can be derived that at least the embodiments illustrated by Figures 3 to 6 are also generally circular and do not correspond to the flow meter of claim 1 in dispute. As mentioned here above, the appellant has also admitted the novelty of the claim. Therefore, this objection relative to D20 can be ignored.

4.4 As shown here above, the grounds of opposition do not prejudice the maintenance of the patent unamended. Since only the respondent and proprietor has submitted an auxiliary request for oral proceedings, there was no reason to issue a communication prior to deciding the case (Art. 113(1) EPC).

Order

For these reasons it is decided that:

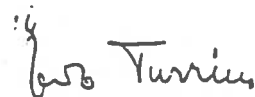
The appeal is dismissed.

The Registrar:



P. Martorana

The Chairman:



E. Turrini

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