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Datasheet for the decision of 12 December 2022

Case Number: T 2405/19 - 3.2.03

Application Number: 10710120.6

Publication Number: 2404151

IPC: E03F7/00, G01M3/24

Language of the proceedings: EN

Title of invention:
MONITORING SYSTEMS AND METHODS FOR SEWER AND OTHER CONDUIT SYSTEMS

Patent Proprietor:
University Of North Carolina At Charlotte

Opponent:
Acoustic Sensing Technology (UK) Limited

Headword:

Relevant legal provisions:
EPC Art. 100(c), 123(2), 84, 111(1)
RPBA 2020 Art. 11, 13(2)
RPBA Art. 12(4)

Keyword:
Amendments - added subject-matter (yes) - main request and auxiliary request 1 - added subject-matter (no) - auxiliary request 1a
Claims - interpretation of ambiguous terms - clarity (yes)
Late-filed request - circumstances of appeal case justify admittance (yes)
Remittal to the department of first instance

Decisions cited:
G 0002/10

Catchword:

Europäisches Patentamt
European Patent Office
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Beschwerdekammern

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Case Number: T 2405/19 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 12 December 2022

Appellant: (Patent Proprietor)	University Of North Carolina At Charlotte 9201 University City Boulevard 305 Cameron Building Charlotte, NC 28223-0001 (US)
Representative:	dompatent von Kreisler Selting Werner - Partnerschaft von Patent- und Rechtsanwälten mbB Deichmannhaus am Dom Bahnhofsvorplatz 1 50667 Köln (DE)
Respondent: (Opponent)	Acoustic Sensing Technology (UK) Limited 3000 Aviator Way Manchester M22 5TG (GB)
Representative:	TLIP Limited 14 King Street Leeds LS1 2HL (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 21 June 2019 revoking European patent No. 2404151 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	C. Herberhold
Members:	B. Goers
	D. Prietzel-Funk

Summary of Facts and Submissions

I. European patent 2 404 151 concerns a monitoring system, a monitoring method, and a monitoring and maintenance method for a conduit network.

II. An opposition was filed against the patent based on the grounds under Article 100(c) EPC, Article 100(b) EPC and Article 100(a) EPC in conjunction with Articles 54 and 56 EPC. The Opposition Division decided to revoke the patent on the grounds of Article 100(c) EPC. That decision was appealed by the patent proprietor ("appellant").

III. At the end of the oral proceedings before the Board, the parties confirmed the following requests:

The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted or, alternatively, on the basis of any of auxiliary requests 1 to 7 filed with the statement setting out the grounds of appeal, or auxiliary requests 1a or 8 to 10, which were filed with the letter dated 5 October 2022. Further subsidiary, the appellant requested that the case be remitted to the Opposition Division for it to decide on the grounds of Article 100(a) and Article 100(b) EPC.

The opponent ("respondent") requested that the appeal be dismissed.

IV. The following evidence is relevant to the decision.

D0: WO 2010/101966 (A-publication, on which the patent is based, filed on 3 March 2010 and

claiming priority of D4)

D9: Excerpt from the Merriam-Webster online dictionary: definition of the word “transmit” (https://www.merriam-webster.com/dictionary/transmit)

D10: Excerpt from the online Oxford dictionaries: definition of the word “transmit” (https://en.oxforddictionaries.com/definition/transmit)

V. Claim requests

(a) Main request (patent as granted)

Claim 1 of the main request reads as follows (feature numbering added in "[]"):

"[1.1] *A monitoring system for a conduit network comprising one or more conduit sections (30, 38) joined at one or more conduit nodes, comprising:*
[1.2] *one or more sensor devices (40-48) disposed at selected ones of the one or more conduit nodes,*
[1.3] *wherein each of the one or more sensor devices is operable for sensing a blockage or breakage (50) in an associated conduit section*
[1.4] *by transmitting a signal*
[1.4a] *that is affected by the blockage or breakage to another sensor device that measures a transmitted signal after it has passed through or by the blockage or breakage,*
[1.4b] *and/or that is reflected by the blockage or breakage back to itself,*
[1.5] *wherein both the transmitted signal after it has passed through or by the blockage or breakage*
[1.6] *and a reflected signal after it has been reflected by the blockage or breakage are measured,*

[1.7] *wherein the signal is transmitted in a direction that is substantially parallel to an intended fluid flow direction in the associated conduit section,*
[1.8] *and wherein each of the one or more sensor devices is operable for communicating blockage or breakage information to a central location.*

Claim 9 of the main request reads:

"*A monitoring method for a conduit network comprising one or more conduit sections (30, 38) joined at one or more conduit nodes, comprising:*
disposing one or more sensor devices (40-48) at selected ones of the one or more conduit nodes, wherein each of the one or more sensor devices is operable for sensing a blockage or breakage (50) in an associated conduit section by transmitting a signal that is affected by the blockage or breakage to another sensor device that measures a transmitted signal after it has passed through or by the blockage or breakage, and/or that is reflected by the blockage or breakage back to itself, wherein both the transmitted signal after it has passed through or by the blockage or breakage and a reflected signal after it has been reflected by the blockage or breakage are measured, wherein the signal is transmitted in a direction that is substantially parallel to an intended fluid flow direction in the associated conduit section, and wherein each of the one or more sensor devices is operable for communicating blockage or breakage information to a central location."

Claim 17 of the main request reads:

"*A monitoring and maintenance method for a conduit network comprising one or more conduit sections (30,38) joined at one or more conduit nodes, comprising:*
assessing a blockage or breakage (50) state of each of the one or more conduit sections by measuring an attribute of a transmitted audio or radio frequency signal after it has passed through or by a blockage or breakage at each of the one or more conduit nodes, wherein the transmitted audio or radio frequency signal is transmitted in a direction that is substantially parallel to an intended fluid flow direction in each of the one or more conduit sections; and
maintaining each of the one or more conduit sections responsive to the assessed blockage or breakage state."

(b) Auxiliary request 1

With respect to the main request, independent claims 1, 9 and 17 have the following amendments (marked in bold), namely in feature [1.7] of claim 1 and in the corresponding features of the other independent claims:

Claims 1 and 9:

"*... wherein the signal is transmitted* ***from the one or more conduit nodes*** *in a direction that is substantially parallel to an intended fluid flow direction in the associated conduit section...*"

Claim 17:

"*... wherein the transmitted audio or radio frequency signal is transmitted* ***from the one or more conduit nodes*** *in a direction that is substantially parallel to*

an intended fluid flow direction in each of the one or more conduit sections; ..."

(c) Auxiliary request 1a

While claim 15 of auxiliary request 1a corresponds to claim 17 of auxiliary request 1, independent claims 1 and 8 of auxiliary request 1a have the following further limitation (marked in bold) compared to claims 1 and 9 of auxiliary request 1.

"... *wherein the signal is transmitted from the one or more conduit nodes in a direction that is substantially parallel to an intended fluid flow direction in the associated conduit section,* ***wherein the signal is an audio signal or a radio frequency signal and each of the sensor devices comprises one of an audio sensor device and a radio frequency sensor device,*** *and wherein each of the one or more sensor devices is operable for communicating blockage or breakage information to a central location.*"

VI. The appellant's arguments, where relevant to the present decision, can be summarised as follows.

(a) Main request - Added subject-matter

The subject-matter of independent claims 1, 9 and 17 did not extend beyond the application as filed. The Opposition Division's interpretation according to which features [1.4] to [1.7] related to a signal transmission at the point of emission from the sensor was not correct. The direction of the transmitted signal specified in feature [1.7] and in the corresponding features of claims 9 and 17 unambiguously related to signal propagation within the conduit

sections only, as originally disclosed in the application as filed, e.g. in the embodiments of Figures 2 and 4. Even if the term "transmit" had further and different definitions in D9 and D10, a resulting ambiguity was - according to established case law - to be resolved by consulting the whole specification (further reference was made to Article 69 EPC). A skilled person would inevitably come to the understanding that only the direction of signal propagation within the conduit sections was covered by the features, as was apparent from the embodiments of Figures 2 and 4 and the associated parts of the description, in particular paragraphs [0027] to [0029] and [0031] of D0. Interpretations linking the direction according to feature [1.7] to the point of emission of the signal from the sensor within the conduit nodes were thus to be ruled out.

(b) Auxiliary request 1

The amendments made to the independent claims of auxiliary request 1 resolved the ambiguity by specifying that the direction of the signal transmission in feature [1.7] and in the corresponding features of claims 9 and 17 concerns the conduit sections. From the overall disclosure it was further apparent that the invention was not limited to audio and radio frequency signals, but applied to signals in general.

(c) Auxiliary request 1a

Auxiliary request 1a should be admitted. It constituted a reaction to objections of unallowable intermediate generalisation regarding the types of signals, which were raised for the first time by the Board in its

communication under Article 15(1) RPBA 2020. These objections had not been the subject of the decision under appeal or the respondent's reply. Therefore, exceptional circumstances applied.

The amendments made to the claims complied with the requirements of Article 84 EPC and Article 123(2) EPC since the signal types were limited to those disclosed in the context of the embodiments of Figures 2 and 4.

(d) Remittal

If the requirements of Article 123(2) EPC were considered to be met, the case should be remitted to the Opposition Division for further prosecution, since the grounds of opposition under Article 100(a) and Article 100(b) EPC had not yet been discussed and decided in oral proceedings before the Opposition Division.

VII. The respondent's arguments, where relevant to the present decision, can be summarised as follows.

(a) Main request - Added subject-matter

The subject-matter of the independent claims extended beyond that of the application as filed as correctly concluded in the decision under appeal. Feature [1.7] and the corresponding features of claims 9 and 17 had neither a literal basis nor any other basis in the application as filed. The disclosure was, at best, ambiguous with even Figures 2 and 4 showing signal transmission / emission also in a direction substantially perpendicular to the intended fluid flow direction in the associated conduit section. An ambiguous disclosure could not, however, be considered

clear and unambiguous. Furthermore, "features (i) to (iv) of the Notice of opposition" constituted added subject-matter.

(b) Auxiliary request 1 - Added subject-matter

Even in view of the amendments made, the subject-matter of all independent claims still extended beyond that of the application as filed. In addition to the objections discussed in the decision under appeal, the omission of the specification of the signal as being of the audio and radio frequency type - these being the only originally disclosed signal types in the context of the embodiments of Figures 2 and 4 - also constituted an unallowable intermediate generalisation.

(c) Auxiliary request 1a

Auxiliary request 1a should not be admitted under Article 13(2) RPBA 2020 since it was late-filed and *prima facie* not allowable. It was not clear how a node could transmit an audio or radio frequency signal and where the added signal's direction was to be evaluated. In addition, the amendments made to auxiliary request 1a did not, *prima facie*, resolve the issues of added subject-matter. Claim 2 as filed did not provide a sufficient basis for the amendment, and nor did the specification as a whole.

Reasons for the Decision

1. Main request - Article 100(c) EPC

The subject-matter of independent claims 1, 9 and 17 of the main request extends beyond that of the application as filed, as also concluded in the decision under appeal.

1.1 Only features [1.1] to [1.3] and feature [1.8] have a literal basis in the application as filed (see claim 1 of D0). In the respondent's view, at least the following two points constitute an extension of the subject-matter beyond the disclosure of the application as filed:

- The term "transmit" as used in features [1.4] to [1.6] and in the corresponding features of claims 9 and 17 had a different meaning from when it was disclosed in the application as filed, in particular in claim 3 and paragraph [0028] thereof.
- The direction of signal transmission as specified in feature [1.7] and in the corresponding features of claims 9 and 17 was not clearly and unambiguously disclosed in the application as filed.

1.2 The term "transmit"

Features [1.3] to [1.6] concern the transmission and measurement of a signal which is propagating at least in parts of its path inside "an associated conduit section".

Features [1.4], [1.4a] and [1.4b] specify that one or more sensor devices located at selected conduit nodes are capable of "transmitting" a signal. This is in line with the skilled person's understanding. Both D9 and D10 provide (*inter alia*) a definition of the verb "to transmit" in the context of signal propagation (this representing the only relevant interpretation for the present case), namely as an action of "sending out by radio waves or over a wire" (D9), or to "broadcast or send out" (D10) the signal. Contrary to the conclusion in the decision under appeal, the term is thus not restricted to the emission of the signal from the sensor but also includes the propagation of the signal in general, including the propagation thereof inside a particular structure, such as a wire or the conduit sections.

According to claims 1, 9 and 17, when transmitted from the conduit nodes into the conduit sections, the signal is either "passing through" a blockage or breakage towards another sensor or is "reflected back" to "itself" (i.e. to the emitting sensor in the conduit node). There is no ambiguity present in these claims as the terms "transmitted", "reflected" and "passed" each have a distinct meaning.

This type of signal propagation is described, in slightly different wording, in the original claim 3 and in the context of the embodiments of Figures 2 and 4 including in the corresponding parts of the description, in particular paragraphs [0027] and [0028]. It thus corresponds to what the skilled person derives, directly and unambiguously, using common general knowledge, and seen objectively and relative to the date of filing, from the whole of D0. Therefore, the wording of features [1.4] to [1.6] as such does not

constitute an unallowable extension of the subject-matter.

1.3 The direction of signal transmission

Feature [1.7] and the corresponding features of claims 9 and 17 specify that the signals are transmitted "in a direction that is substantially parallel to an intended fluid flow direction in the associated conduit section". It was contentious whether feature [1.7] described the direction of the signal as it is emitted directly at its source, i.e. from the sensor located somewhere in the conduit node such as in the upper part of a manhole (see Figure 2 of D0), as concluded in the decision under appeal, or whether feature [1.7] solely concerns the transmission of the signal inside the conduit section, as argued by the appellant. Hence, feature [1.7] needs to be construed first.

1.3.1 When construing feature [1.7] the definition "direction ... parallel to ..fluid flow" allows for two divergent interpretations.

According to a first line of interpretation, feature [1.7] solely specifies a reference direction, but it does not specify where in the signal's path the direction of signal propagation is to be evaluated, i.e. it is understood to only specify a reference direction for the term "parallel" (a direction ... parallel to an **intended fluid flow direction in the associated conduit section**). According to this interpretation, the claimed direction of the signal is to be evaluated both within the conduit section and inside the nodes (i.e. including directly where the signal is emitted from the sensor, such as the manholes).

According to a second line of interpretation, the term specifies the **location / part of the signal's path where the signal's direction** is to be evaluated (i.e. in the sense that the signal is transmitted **in the conduit** in a direction parallel to the intended fluid flow direction in the associated conduit section).

1.3.2 The appellant argued, by reference to Article 69 EPC, that, in view of this ambiguity and according to established case law, the skilled person must also consult the description and drawings and to apply a mind willing to understand to resolve the ambiguity.

The appellant further argued that when proceeding in that way, a certain interpretation had to be ruled out, if, after consultation of the whole specification, that interpretation turns out to be technically illogical or meaningless.

While according to established case law even such interpretations may not generally be disregarded (see Case Law of the Boards of Appeal, 10th edition, 2022, II.E.1.3.9.c), the situation in the case at hand is different.

1.3.3 In the present case, the ambiguity resulting from the two lines of interpretation cannot be resolved - even when considering the whole patent specification - by ruling out one of the interpretations, already for the reason that neither of them is technically illogical. A continuous signal transmission path exists from the sensor/emitter towards and through the conduit sections. The specification of the signal transmission direction, e.g. in the manhole, at directly where the signal is emitted from the sensor (see Figures 2 and 4)

according to the first line of interpretation as such is thus - even in the context of the whole application - a technically meaningful definition.

Applying the skilled person's understanding does not allow technically meaningful alternative interpretations of a claim to be ruled out for the sole reason that they were not originally disclosed (see Case Law of the Boards of Appeal, 10th edition, 2022, II.E.1.3.9.e).

1.3.4 The technically meaningful first line of interpretation includes a specification of the direction of signal propagation outside of the conduit sections which has no basis in the application as filed. D0 does not provide a literal definition for a particular direction of signal transmission "parallel to" an "intended fluid flow". The only information in D0 with respect to the direction of the signal transmissions is provided in paragraphs [0029] and [0031] ("pipes ... act as waveguides", i.e. here indeed parallel to the fluid flow inside the conduit sections) and the visualisation of the signals in Figures 2 and 4. A direction of the transmission inside the conduit nodes (manholes, directly where the signal is emitted from the sensor) is indicated in Figures 2 and 4, but it is normal to the direction specified by feature [1.7], since the sensor/emitters are located above the level of the conduit sections. While it is not technically impossible to install a sensor/emitter such that the signal is transmitted directly parallel to the extension of the conduit lines, this specific solution is not disclosed in D0.

Therefore, the application as filed does not provide a clear and unambiguous basis for a signal transmission

direction as specified by feature [1.7] for a location outside the conduit sections and, in particular, not in the conduit nodes / manhole (i.e. directly where the signal is emitted from the sensor). For this reason alone, feature [1.7] and the corresponding features of claims 9 and 17 extend beyond the subject-matter as originally filed in the first interpretation.

1.3.5 However, even when applying the second line of interpretation, the issue of added subject-matter is not resolved.

As previously shown, D0 discloses that signals are transmitted within the associated conduit section (i.e. between the conduit nodes) in a direction that is substantially parallel to an intended fluid flow direction **within** the associated conduit section. Here, the direction of wave propagation parallel to the conduit extension (i.e. the intended fluid flow direction) is inherently given, because the pipes act as waveguides. This technical function is disclosed in paragraph [0028] ("transmission and reflection ... between the sensor nodes") and paragraphs [0029] and [0031] ("for the conduit network applications of the present invention, the pipes act as waveguides") as well as by the schematic drawings of Figures 2 and 4.

However, the phenomenon of guiding signals by means of the conduits parallel to the intended fluid flow direction is disclosed in D0 only for specific sensor modalities that produce wave-like signals, i.e. audio and radio frequency type signals. The selection of the type of signals and the direction of signal propagation are functionally linked, because parallel transmission within the conduits is a consequence of the conduits acting as waveguides for these signal modalities. No

further or more general signal modalities are disclosed in this functional relation in the application as filed. Contrary to this, the transmission in feature [1.7] and in the corresponding features of claim 9 comprises any kind of signal parallel to the fluid flow. Therefore, even if following the second line of interpretation, feature [1.7] and the corresponding feature of claim 9 constitute an unallowable intermediate generalisation.

1.4 The respondent raised further objections of added subject-matter against "features (i) to (iv)" by reference to its notice of opposition. In accordance with established case law, mere references to submissions made previously in the department of the first instance are insufficient to properly substantiate an objection. In addition, in the present case no reference to "features (i) to (iv)" is found in the discussion of the ground of opposition under Article 100(c) EPC in the notice of opposition. Therefore, these further objections introduced by mere reference are not substantiated and thus not taken into account in the present decision (Article 12(4) RPBA 2007).

2. Auxiliary request 1 - Added subject-matter

2.1 Contrary to the conclusion in the decision under appeal, the amendments made to the independent claims of auxiliary request 1 do resolve the ambiguity with respect to feature [1.7] (and the corresponding features of claims 9 and 17), as addressed above. It has now been made clear that the signal is transmitted in a direction parallel to the fluid flow in the part of the path outside the nodes, i.e. inside the conduit

sections between the nodes. This has, as discussed above, a basis in paragraphs [0029] and [0031] as well as in Figures 2 and 4. The signal is transmitted from the one or more conduit nodes as claimed, there being thus no ambiguity with respect to the specification "transmitted from the one or more conduit nodes".

The fact that the direction of transmission inside the conduit nodes remains unspecified does not constitute an unallowable intermediate generalisation. Indeed, the skilled person directly and unambiguously understands that the signal-emitting sensors can be arranged at any point in the conduit nodes, including at the intersection of the conduit sections, without compromising the claimed transmission direction inside the conduit lines.

2.2 However, the amendments made do not overcome the issue of an unallowable intermediate generalisation due to the omitted limitation to the specific signal modalities originally disclosed in the context of the associated feature (see point 1.3.5 above). Also, paragraphs [0002] and [0010], which were referred to by the appellant in this respect, do not provide a basis for this intermediate generalisation, since both paragraphs relate solely to audio or radio frequency signals. The appellant's argument that, when construing the content of the application as filed, the skilled person would consider the specific drafting style for US applications and come to a different conclusion is not convincing. Different origins of application documents cannot lead to a different understanding when applying the gold standard according to which, after an amendment, the skilled person is not to be presented with new technical information (see decision G 2/10, OJ 2012, 376).

Therefore, auxiliary request 1 is not allowable due to added subject-matter.

3. Auxiliary request 1a

3.1 Auxiliary request 1a - admittance

3.1.1 Auxiliary request 1a was filed for the first time after notification of the summons and constitutes an amendment to the appellant's appeal case according to Article 13(2) RPBA 2020. Any such amendment can only be taken into account if there are exceptional circumstances, which have been justified with cogent reasons.

3.1.2 In the decision under appeal the objection of added subject-matter was based on the argument that the application as filed, in general, did not disclose a direction of transmission of the signal, which thus resulted in an unallowable intermediate generalisation. The additional argument of a lack of limitation to specific sensor modalities as a further part of the added subject-matter objection was mentioned for the first time by the Board in the communication under Article 15(1) RPBA 2020. Since the amendments made to auxiliary request 1a address this new argument, exceptional circumstances are present and auxiliary request 1a is admitted into the appeal proceedings.

3.2 Auxiliary request 1a - clarity

By reference to Article 84 EPC the respondent objected that the independent claims of auxiliary request 1a were ambiguous as to where the introduced feature of

signal's direction was to be evaluated. This is not persuasive. The ambiguity, as already discussed for the main request (see points 1.3 and2.1 above) in the context of added subject-matter, was resolved by the amendments made to auxiliary request 1.

Due to these amendments, the specified direction unambiguously relates to the signals transmitted "from the conduit nodes", i.e. outside of the conduit nodes. The skilled person thus directly and unambiguously understands that the direction addressed in the claims concerns the direction between the nodes, inside the conduit sections only.

3.3 Auxiliary request 1a - No added subject-matter

Due to the restriction of the subject-matter of independent claims 1 and 8 to audio and radio frequency signals the issue of an unallowable intermediate generalisation (see points 1.3.5 and2.2 above) is resolved. The amendment not only has a basis in the description of the embodiments of Figures 2 and 4, but D0 is generally directed towards the two types of signal modalities now claimed (see D0, paragraph [0002]).

To conclude, the subject-matter of claims 1, 8 and 15 of auxiliary request 1a does not extend beyond the application as filed.

4. Remittal to the Opposition Division

4.1 The case is remitted to the Opposition Division for further prosecution pursuant to Article 111(1) EPC

since special reasons as per Article 11 RPBA 2020 present themselves.

4.2 The sole ground of opposition on which the revocation of the patent was based (Article 100(c) EPC) is found not to prejudice the maintenance of the patent.

The Opposition Division had not yet reached a decision on the further outstanding grounds of opposition under Article 100(a) EPC (in conjunction with Articles 54 and 56 EPC) and Article 100(b) EPC. Since it is the primary object of appeal proceedings to review the decision under appeal in a judicial manner (Article 12(2) RPBA 2020), it is not appropriate in the present case to carry out a complete examination of these grounds only in the appeal proceedings without giving a losing party an opportunity to challenge such a decision on its merits.

4.3 The respondent pointed out that the question of the validity of the priority had yet to be decided. Although this is true, the validity of the priority here is only relevant with respect to the grounds of opposition under Article 100(a) EPC and, therefore, not considered in the present decision.

The validity of the priority is thus to be considered by the Opposition Division in the course of the assessment of patentability.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition decision for further prosecution.

The Registrar: The Chairman:

C. Spira C. Herberhold

Decision electronically authenticated