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D E C I S I O N
of 29 April 2004

Case Number: T 0712/99 - 3.4.2

Application Number: 88113429.0

Publication Number: 0304053

IPC: G01N 29/00

Language of the proceedings: EN

Title of invention:
Apparatus for inspecting a pipeline

Patentee:
NKK CORPORATION

Opponent:
Pipetronix GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes (appeal dismissed)"

Decisions cited:
-

Catchword:
-



Case Number: T 0712/99 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 29 April 2004

Appellant:
(Opponent)

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Respondent:
(Proprietor of the patent)

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Decision under appeal:

Interlocutory decision of the Opposition
Division of the European Patent Office posted
18 May 1999 concerning maintenance of European
patent No. 0304053 in amended form.

Composition of the Board:

Chairman: A. G. Klein
Members: M. A. Rayner
M. J. Vogel

Summary of Facts and Submissions

- I. The opponent has appealed against the interlocutory decision of the opposition division that account being taken of the amendments made by the patent proprietor (=respondent) during the opposition proceedings, European patent 304 053 (application No. 88 113 429.0, with filing date of 18 August 1998) the patent and the invention to which it relates meet the requirements of the EPC. The patent concerns apparatus for inspecting a pipeline.
- II. In the opposition and/or appeal proceedings, reference has been made, amongst others, to the following documents:
- E1: EP-A-0 271 670
- E19: DE-C-3 719 492 (published 29.12.1988)
- E20: EP-A-0 259 669
- E21: DE-A-3 131 883
- III. In the decision under appeal, the division established that in document E1 there was no disclosure of a an eddy current sensor for detecting faults or welds being used specifically as a distance measuring device and being combined with correction of a rotary distance measuring device. Amongst the matters considered in the decision under appeal with respect to the positive decision is setting an eddy current sensing device in the vicinity of a position where a scraper cup located in a front portion of the pig body is in contact with

the pipe body. The opposition division considered this feature a surprising constructional choice, particularly in view of vulnerability of a sensitive eddy sensor when placed in front of the pig body, which usually sustains the most damage due to dirt and particles that hit it while travelling in the pipeline.

IV. The appellant and respondent requested oral proceedings on an auxiliary basis and therefore such proceedings were appointed by the board. Following the summons, both parties advised the board that they did not intend to attend the oral proceedings. The appellant also requested a decision based on the state of the file (Entscheidung nach Aktenlage). Pursuant to Rule 71(2) EPC), the oral proceedings then however continued without the parties.

V. The case presented by the appellant can be summarised as follows:

Requests

Setting aside of the decision under appeal and revocation of the patent.

Arguments

VI. In its submissions, the appellant furnished a claim containing reference numerals for features thereof, including those referenced 1.8 and 1.8.1, which translated into English, are worded "said eddy current distance measuring device (7) comprises two sensor coils (71a,71b) for enabling measuring of a difference in impedance generated in said sensor coils during

travelling of said pig body through the pipe body". With respect to the vulnerability of a sensitive eddy sensor when placed in front of the pig body (feature 1.7a), the appellant argued this was a rather unrealistic approach and that established case law indicates accepting a disadvantage in this respect cannot justify patentability. Document E1 does not disclose explicitly that the eddy current measuring system detects welds, but it is obvious for the skilled person that these are detected and used correcting the odometer values. Axial sensor position is obvious, Figure 2a of document E1 not giving any direction of movement of the pig. Sensors 3' are arranged in the vicinity of the pipe wall, which for the skilled person must be the case for reasons of sensitivity and providing an adequately large eddy current signal. A power source is self evident for sensor function. The opponent also referred to documents E19, E20 and E21 in support of its case as to obviousness of sensor positioning, the former document, though post published, being cited to show the knowledge of the skilled person. Moreover, all the documents referred to in the proceedings before the first instance and the submissions relating thereto are subject of the appeal proceedings.

VII. The case presented by the respondent can be summarised as follows:

Requests

Dismissal of the appeal.

The independent claim upon which the request of the appellant is based is worded as follows:

Main Request

"1. An apparatus for inspecting a pipeline having a pig body (1) which measures an inner shape and a wall thickness of a pipe body (2), and travelling inside the pipe body (2), comprising:
at least two distance measuring devices for measuring a travelling distance of the pig body (1), and
said at least two distance measuring devices including a rotary distance measuring device (11),
wherein positions of known pipe body material variations such as welds in said pipe body (2) are used to correct measured data from said rotary distance measuring device (11);
a recorder (8) of the pig body (1) which stores measured data;
a rotation angle gauge (12) for measuring a rotation angle of the pig body (1) round its center axis;
a plurality of transducers (6) for transmitting and receiving ultrasonic beams, being arranged in the circumferential direction of the pig body (1) and being confronted with the inner surface of the pipe body (2) which measures the inner shape and the wall thickness of the pipe body (2),
a signal processing device (10) for processing signals from the distance measuring device, the rotation angle gauge and the transducers (6); and
a data processing device is provided for analysing the measured data stored in said recorder (8) after the pig body (1) has been taken out of the pipe body (2);
characterized in that

said at least two distance measuring devices also including an eddy current distance measuring device (7) which is provided in the pig body (1) so as to be set in the vicinity of a position where a scraper cup (4) located in a front portion of the pig body (1) is in contact with the pipe body (2), and includes a sensor (72) connected to a power source for being supplied with electric power, said eddy current distance measuring device (7) locating the positions of known pipe body material variations such as welds in said pipe body (2), said positions as located by said eddy current distance measuring device (7) being used to correct measured data from said rotary distance measuring device (11)."

Arguments

The claim presented by the appellant was different to that upon which the decision was based in respect of feature 1.8 and 1.8.1. Novelty of the claimed subject matter has not been disputed by the appellant. Document E1 does not show or render obvious locating distance sensors in the pig body in the vicinity of a position where a scraper cup is located in a front portion of the pig body. Figure 2a illustrates disposal of a plurality of sensors in a pipe body without showing any arrangement of said sensors in a pig body travelling through a pipe. Risk of damage to the sensor is reduced by positioning in the vicinity of the scraper cup. Document E19 is not pre-published and a combination of the teaching of documents E1 and E20 or E21 does not lead to the subject matter claimed.

VIII. At the end of the oral proceedings, the board gave its decision.

Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.

2. *Claim 1 under appeal*

The respondent is correct in respect of the submissions of the appellant pertaining to the feature referenced as 1.8 and 1.8.1. The subject matter concerned is not present in claim 1 of the patent under appeal. Accordingly, submissions of the appellant concerned therewith are not relevant to the present decision.

3. *Pertinent disclosure*

3.1 Document E1

This document concerns a method for the detection of corrosion or the like in a pipeline using an ultrasonic or eddy current field approach. Measuring and storage means is housed in the casing of a pig, which is moved by pressure difference through a pipeline. The measuring and storing means 1 has a measuring system 2, which can be an ultrasonic and/or an eddy current measuring system, or some other measuring system (see Figure 4). For example, several ultrasonic sensors 3 (see Figure 1a) are appropriately arranged over the circumference of the pig.

During position measurement, for which odometer wheels are usually used, it is possible that slip or free rotation of a wheel gives rise to errors for example in the vicinity of connection pieces. Several displacement transducers are provided for redundant distance measurement, in particular three odometer wheels are uniformly distributed around the pipe circumference. For correcting the odometer, it is possible to use welds on the pipeline. Where possible electronic markers outside the pipe can be provided or they can be set up during the travel of the pig. Their emitted signals are then detected by a receiver when the pig passes by to mitigate positional error. A pendulum potentiometer is used for clear definition of the azimuth position of the pig.

Low frequency, electromagnetic alternating field can be introduced into the pipe wall and with respect to amplitude, can be detected at a distance from the introduction point and the phase displacement can be measured. In this so-called distant field eddy current method the low frequency, sinusoidal alternating electromagnetic field produced by the exciter coil is passed over the pipeline wall and is detected by sensors, which are located along the wall with a given spacing and are in particular axially spaced from the exciter coil. This permits a sensitive fault or error detection by measuring the phase displacement between the sine-wave signal to the transmission coil and the sine-wave signals received by the sensors. This method can in particular be used for detecting pitting, but also for determining cracks. The detection of natural corrosion and also welding joints is possible with high

sensitivity on both the inside and outside. Preferably induction coils or Hall generators are used as sensors. Figure 2a shows an arrangement of exciter coil 3' and associated sensors 3''. A pipeline with wall is indicated by 4.

3.2 Document E20

This document shows an assembly for investigating pipes and has a rotating polycarbonate head, at the rear of which are arranged eddy current sensors (see 50 in the figure) for investigating the pipe. In use, the assembly is driven into steam generator tubes to a desired test position by a device known as a probe pusher.

3.3 Document E21

Ultrasonic sensors on an ultrasonic test head 1 are arranged behind a scraping ring towards the front of the pig, it can be seen from the figure that the sensors are mounted on one of the narrower parts of the pig and thus away from the pipe wall. Means such as a potentiometer provide an indication of forward movement.

4. *Novelty*

An eddy current distance measuring device as specified in the characterising features of the claim 1 cannot be found either in disclosure of document E1 or in documents E20 or E21. Document E19, also not showing these features is not pre-published and is thus not relevant to novelty. Accordingly, the board considers

the subject matter of claim 1 to be novel in the sense of Article 54 EPC.

5. *Inventive Step*

5.1 In view of its being post published, the board cannot take into account the teaching of document E19 either on its own or in combination with any other document in the context of its consideration of Article 56 EPC. Nor is the board prepared to consider this document as showing the knowledge of the skilled person - it is simply too late, the appellant should have provided a textbook or other document which was published before the filing date of the patent.

5.2 The board considers the closest prior art document to be represented by document E1. The problem solved by the novel features of the present invention is that of improving pig sensor configuration for determining its position a pipeline. The configuration permits closeness to the pipe wall at a front portion of the pig with a degree of protection provided by a scraper cup.

The eddy current device shown in Figure 2a of document E1 involves sensors located along the wall with a given spacing, in particular axially spaced from an exciter coil. The arrangement is alternative or additional to an ultrasonic arrangement and is disclosed in the context of providing information about differing thickness of the pipe wall, i.e. corresponds in function to what is claimed in claim 1 as measuring inner shape and the wall thickness of the pipe body. This drawing and indeed all the other are not very

clear as to the structure of the pig as its body is not shown anywhere, one can only assume that if sensors are included in the pig, they are "appropriately arranged" over its circumference.

5.3 The appellant thus wishes the board to consider obvious

- (a) picking out from the disclosure of document E1, the ultrasonic transducers
- (b) taking the "in addition to", not the "alternative to" option for the eddy current transducers
- (c) then ascribing a positioning correcting function to the eddy current sensors, and
- (d) setting them in the vicinity of a scraper cup as claimed.

The specific embodiment is not very supportive of the wish of the appellant because position is determined using a number of odometer wheels corrected by signals received from electrical markers external to the pipe. There is therefore, in relation to the specific embodiment, a further item to be considered obvious, namely

- (e) using the eddy current transducers in preference to the electrical markers.

While it is true that the skilled person could have taken all of these steps, without knowledge of the invention, board has not been convinced by the submissions of the appellant that this would have been

the case. Therefore, the board was not convinced as to lack of inventive step on the basis of document E1 alone.

5.4 It is difficult to fit, in a way favourable to the appellant, the disclosure of document E20 or E21 to that of document E1 to reach the subject matter of claim 1 in an obvious way because the rear of a rotating head as in document E20 and the position shown in the figure of document E21 do not correspond to point 5.3(d) above. Moreover, problems associated with correction of position are not addressed in these documents. The appellant relied on mentioning what the documents disclose but did not provide any chain of reasoning as to why they render the claimed subject matter obvious. It therefore seems a hindsight motivated approach to argue that because these documents show that transducers of ultrasonic or eddy current type can be placed in various places, the configuration of claim 1 in dispute is obvious. The board is not therefore persuaded by the appellant and is therefore satisfied as to inventive step of the subject matter of claim 1 having regard to document E1, even taking into account the disclosure of document E20 or E21. The same conclusion applies to the very general reference made by the appellant to all the documents in the proceedings before the first instance.

5.5 The remaining line of argument advanced by the appellant concerns vulnerability of sensors positioned in the vicinity of a position where a scraper cup is located in a front portion of the pig body. The written submissions from both sides left the board with an open mind as to whether or not there may be problems in this

context and the absence of the parties at the oral proceedings meant there was there no chance to pursue this question. However, as the board is satisfied as to inventive step for the reasons already given in sections 5.1 to 5.4 above, delving deeper into this question or established case law pertaining thereto is not necessary for the decision. The appellant therefore failed to convince the board that the decision of the opposition division should be set aside.

5.6 Accordingly, the subject matter of claim 1 can be considered to involve an inventive step in the sense of Article 56 EPC. The same applies to the dependent claims by virtue of their dependence.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

A. G. Klein