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Datasheet for the decision of 22 April 2021

Case Number: T 2205/16 - 3.4.01

Application Number: 10839967.6

Publication Number: 2517033

IPC: G01R31/20, G01N27/90

Language of the proceedings: EN

Title of invention:
INSPECTION MODE SWITCHING CIRCUIT

Applicant:
Westinghouse Electric Company LLC

Headword:
Eddy current inspection / WESTING HOUSE

Relevant legal provisions:
RPBA 2020 Art. 13, 24, 25

Keyword:
Amendment to appeal case - exercise of discretion
Amendment after summons - exceptional circumstances (no)

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2205/16 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 22 April 2021

Appellant: (Applicant)	Westinghouse Electric Company LLC 1000 Westinghouse Drive Cranberry Township, Pennsylvania 16066 (US)
Representative:	Gallo, Wolfgang Fleuchaus & Gallo Partnerschaft mbB Patent- und Rechtsanwälte Buchenweg 17 86573 Obergriesbach (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 2 March 2016 refusing European patent application No. 10839967.6 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	P. Scriven
Members:	B. Noll
	C. Almberg

Summary of Facts and Submissions

I. The applicant appealed the Examining Division's decision to refuse European patent application 10839967.6.

II. The application was refused for lack of clarity (Article 84 EPC), and lack of novelty (Article 54 EPC).

III. With the statement of grounds of appeal, the appellant requested that the appealed decision be set aside and that a patent be granted on the basis of the claims underlying that decision (main request) or a set of claims submitted with the statement of grounds (auxiliary request).

IV. In preparation for oral proceedings, the Board issued a communication. Essentially, the Board discussed lack of clarity and of inventive step.

V. As regards clarity, the Board objected inter alia that, in claim 1 of the main and the auxiliary requests, the term "rapidly moved between a first ... and second configuration" was unclear, since the word "rapidly" was a relative term and did not make any clear limitation.

VI. As regards inventive step, the Board set out the following in respect of the main and auxiliary requests (points 9 to 16 of the communication):

> *9. D1 discloses an eddy current test system comprising a probe 11, detection circuits 12, 13 and an indicator 14. As shown in figures 2 and 3, the probe includes first and second coils 20, 21 orthogonally oriented to each other and to the surface to be inspected by the probe (page 5, penultimate paragraph). Fig. 4 shows a detection circuit 12 operating in an impedance mode in which a frequency signal is fed to each coil and the difference is monitored by ta differential amplifier. Fig. 6 shows a detection circuit 13 operating driver pick-up mode in which a driving signal is fed to coil 20 and the signal induced in coil 21 is captured for monitoring. The lines connecting the components in figs. 4 and 6 represent conductor assemblies for providing electrical signals from the current source 41, 61 to the coil terminal(s), from the coil terminal(s) to a differential amplifier 43, 62 and for providing an signal 44, 63 to a viewing screen (fig. 9) for being visualized. D1 is essentially about the concept of an inspection system but silent as regards a concrete implementation at circuit level. However, it is suggested (cf. page 10, second paragraph) that the detection circuits may share some components which may be switched between operating as circuit 12 or circuit*

13.

10. As regards novelty and inventive step, the appellant argues as follows:
(a) D1 did not disclose a probe having only first and second coils. The detector circuits 12 and 13 in figures 4 and 6 were distinct from one another, Consequently, D1 disclosed a probe having four coils.
(b) D1 did not disclose a concrete embodiment in which the detector currents shared between some components. In particular, D1 did not disclose that the coils were shared between the detector circuits.
(c) D1 did not disclose a switch assembly having a plurality of switches rapidly moved between a first and a second configuration.
(d) D1 did not disclose that selected conductors of the conductor assembly were coupled to at least one of the plurality of switches.
(e) The claimed apparatus involved an inventive step, since D1 did not disclose its essential features.

11. The Board disagrees. As regards point (a), the skilled reader understands figures 2 and 3 of D1 as schematic drawings of a probe which has a single pair of coils. The skilled reader understands figure 1 as a block diagram in which the detection circuits 12, 13 are coupled to a single probe 11. Figures 4 and 6 are understood as circuit diagrams showing the connection of

components of the detection circuits and the coils to obtain a circuit operating in impedance mode or in driver pick-up mode. Since the coils are designated by same reference signs in figures 4 and 6, and taking into account the suggestion at page 10, second paragraph, that the detection circuits may share components, the skilled reader would understand that the coils are shared between switched-mode detection circuits. Therefore, D1 does not disclose that the inspection system requires four coils.

12. As D1 does not relate to a concrete implementation at circuit level of an eddy current inspection system, it does not directly disclose a switch assembly having a plurality of switches, wherein selected conductors of the conductor assembly are coupled to and in electronic communication with at least one switch of the plurality of switches, that each switch is coupled to the first and second coils, and that the plurality of switches are configured to rapidly move between first and second configurations setting the probe to the driver pick-up and the impedance mode, respectively. Claim 1 is distinguished from D1 by these features.

13. These differences have the technical effect of obtaining an implementation, at circuit level, of an inspection system having a switched-mode detection circuit. This is the technical problem to be solved:

to obtain an implementation of an inspection system having a switched-mode detection circuit.

14. Based on the suggestion of sharing components between the detection circuits shown in Figures 4 and 6, the skilled person would consider all components present in both circuits for sharing, i.e. the oscillating current source (41 or 61), the two coils 20, 21 and the differential amplifier 43, 62, whilst components present only in one of the detection circuits, i.e. resistors 40, 41, would not be considered.

15. The skilled person would lay out the system to switch shared components such that

- the oscillating current source are connected either to one terminal of resistors 40, 41 in parallel or to one terminal of the first coil 20,

- the one terminal of coil 20 is connected either to the other terminal of resistor 40 and the negative input of the amplifier in parallel or to the oscillating current source,

- the one terminal of coil 21 is connected either to the other terminal of resistor 41 and the positive input of the amplifier in parallel or to negative input of the amplifier,

- the negative terminal of the amplifier is connected either to the other terminal of resistor 40 and the one terminal of coil 20 in parallel or to one terminal of the second coil 21, and

- the positive terminal of the amplifier is connected either to the other terminal of resistor 41 and the one terminal of coil 21 in parallel or to ground.

16. By implementing the above switching scheme using ordinary electronic components such as commercially available printed circuit boards and electronic switches, the skilled person would obtain an inspection apparatus as defined in claim 1 of the main request without the exercise of inventive skill.

VII. With a letter dated 7 April 2021, the appellant withdrew its previous main and auxiliary requests, and submitted a set of revised claims as its sole request. Claim 1 reads as follows (amendments versus claim 1 of the previous main request in underlining or strike-through):

An eddy current probe testing apparatus, said eddy current probe testing apparatus having a signal producing device (110), an output device (120), a ground bus (109), and an eddy current probe (60), said signal producing device (110) structured to produce at least one test signal having a frequency, said output device (120)

structured to convert at least one output signal to a displayable format, said eddy current probe (60) having a first coil (64) and a second coil (66), said first coil (64) extending in a plane substantially perpendicular to said body surface (18), said second coil (66) extending in a plane substantially perpendicular to said body surface (18) and to said first coil (64), said first coil (64) having a first terminal (70) and a second terminal (72), said second coil (66) having a first terminal (74) and a second terminal (76),

characterized in that

said eddy current probe (60) is structured to operate in a ~~first~~ driver pick up mode in which said test signal is applied to one of the two coils to create a response in the second coil, and ~~a second~~ an impedance mode in which said test signal is applied to both coils to detect defects in a body having a surface (18),

and by a mode switching circuit (80) controlled by a multiplexer, said mode switching circuit (80) comprising:
a switch assembly (82) having a plurality of switches (84)

a conductor assembly (90) having a plurality of conductors (92), wherein selected conductors are structured to provide electrical signals from signal producing device (110) to said first coil

(64) and said second coil (66), and selected conductors are structured to provide electrical signals from said first coil and said second coil (66) to said output device (120);

wherein selected conductors of said plurality of conductors (92) are coupled to, and in electronic communication with, at least one switch of said plurality of switches (84), each said switch (84) further coupled to, and in electrical communication with at least one of said first coil (64) and said second coil (66); and

wherein said switch assembly (82) is structured to have said plurality of switches (84) ~~rapidly~~ moved between a first configuration, wherein said eddy current probe (60) acts in ~~a~~ said driver pick-up mode, and a second configuration, wherein said eddy current probe (60) acts in ~~an~~ said impedance mode with a frequency between about 1 and 714 kHz.

VIII. At oral proceedings, conducted by video link, the appellant requested that the appealed decision be set aside and that a patent be granted on the basis of the sole request filed with the letter dated 7 April 2021, which replaced the previous requests on file.

Reasons for the Decision

1. The appeal was pending on 1 January 2020 (cf. Articles 24 and 25(1) RPBA 2020) and the summons to oral proceedings were notified after this date (cf. Article 25(3) RPBA 2020 *e contrario*). The appellant's sole request was submitted after notification of the summons (cf. Article 13(2) RPBA 2020) thus also after filing of the grounds of appeal (cf. Article 13(1) RPBA 2020. Therefore, the admission of the sole request is at the Board's discretion under Article 13(1) and (2) RPBA 2020.

2. Among the considerations listed in Article 13(1) RPBA 2020, fourth sentence, is whether an amendment to the party's case prima facie overcomes the issues raised by the Board without giving rise to new objections.

3. In comparison to claim 1 of the auxiliary request submitted with the statement of grounds of appeal, amendments are that the eddy current probe is structured to operate in a first mode ("driver pick up mode", in which a test signal is applied to one of two coils) and in a second mode ("impedance mode", in which the test signal is applied to both coils); that a mode switching circuit is controlled by a multiplexer; and that switching between driver pick up mode and impedance mode is at a frequency between about 1 and 714 kHz (see point VII above).

4. The appellant argued that all clarity objections raised in the Board's communication were overcome by the amendments. The Board agrees.

5. The appellant further argued that by defining that the switches are moved between first and second configurations with a frequency between about 1 and 714kHz further distinguished the claimed apparatus from D1.

6. The Board does not agree with this. In D1, the output of the detection circuits may be sampled alternately for a few microseconds or milliseconds each (D1, page 10, second paragraph, last sentence). Sampling, says, once every 10 microseconds corresponds to a frequency of 100kHz. The skilled person, interpreting "a few microseconds", therefore, would have arrived a switching frequencies within the range defined in the amended claim. The Board concludes that the amendments put forward with the request submitted on 7 April 2021 do not clearly (or: *prima facie*) overcome the objection of lack of inventive step.

7. Moreover, under Article 13(2) RPBA 2020, admission of the request in principle requires exceptional circumstances which have been justified with cogent reasons by the appellant.

8. The appellant's only argument was that the Board’s communication set no time limit for submitting a response, as is done in proceedings before the Examining Division. This is not a cogent reason in the sense of Article 13(2) RPBA 2020. The Board notes, in addition, that Article 13(2) RPBA 2020 speaks of a time limit only in connection with a communication under Rule 100(2) EPC, and that there was no such communication being issued in this case.

9. In summary, in exercising its discretion pursuant to Article 13(1) and (2) RPBA 2020, the Board did not admit the sole request.

10. Thus with no admitted request on file, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

H. Jenney P. Scriven

Decision electronically authenticated