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(54) Title: SYSTEM AND METHOD FOR CHARACTERIZING FERROMAGNETIC MATERIAL

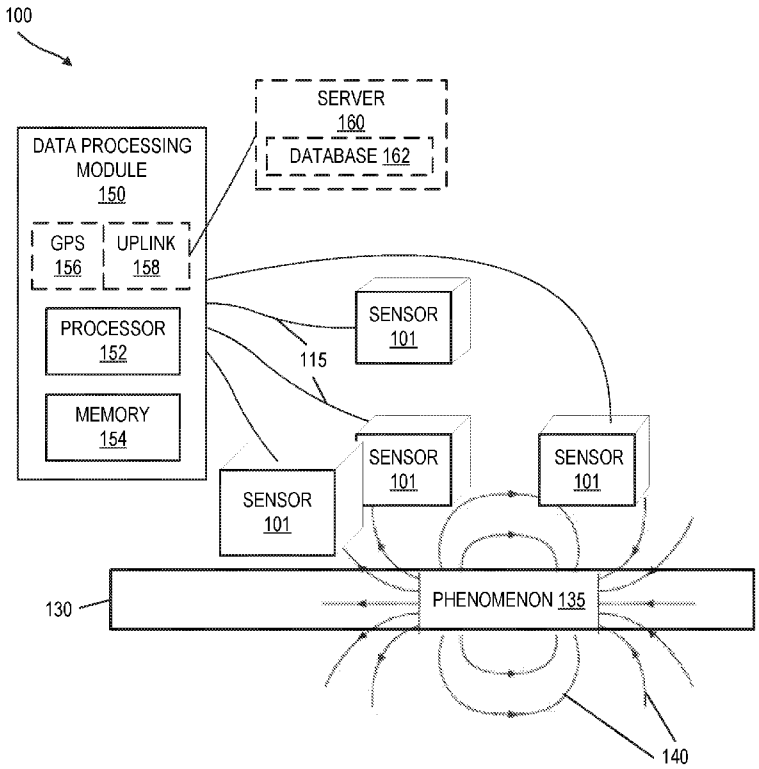

FIG. 1

(57) Abstract: A system and method using magnetic sensing to non-intrusively and non-destructively characterize ferromagnetic material within infrastructure. The system includes sensors for measuring magnetic field gradients from a standoff distance adjacent to ferromagnetic material. The method includes using the system to measure magnetic fields, determining magnetic field gradients measured by a sensor array, and comparing measured and modeled or historical magnetic field gradients at the same or similar positions to identify differences caused by a phenomenon in the ferromagnetic material, and, in a particular embodiment, to recognize defects and developing defects.

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A. CLASSIFICATION OF SUBJECT MATTER
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CPC - G01N 27/72, G01N 27/82, G01V 3/081
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G01N27/72,82,83,85,87,90; G01V3/08 (2017.01); CPC - G01N27/72,82,825,83,85,87,90,9006,9013,902,9026,9033,904,9046, 9073,908; G01V3/081

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase, Proquest Dialog, Google Patents, Google Scholar, Search terms used: ferromagnetic, magnetic, steel, iron, field, model, gradient, material, plurality, multiple, array, sensors, detectors, monitors, magnetometers, compare, defect, crack, threshold, signature, scan, welded junction, pair, pairwise, statistical, plot, graph, closest, neares

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2007/0069720 A1 (GOLDFINE et al.) 29 March 2007 (29.03.2007), Fig 7, 22, abstract, para [0003], [0008], [0039], [0041], [0043], [0044], [0050], [0070]	1-3, 6, 8, 19-22, 26 ---------- 4, 5, 7, 9-18, 23-25, 27
Y	US 4,538,108 A (HUSCHELRATH et al.) 27 August 1985 (27.08.1985), Fig 7, abstract, col 1, ln 24-25, col 7, ln 21-23	4, 5, 15, 16
Y	US 8,214,161 B2 (GIRNDT) 03 July 2012 (03.07.2012), Fig 1, 3, 5, abstract, col 4, ln 15-44, col 5, ln 44-57, col 6, ln 1-23, col 6, ln 55-67	7, 24, 25
Y	US 2012/0123699 A1 (KAWATA et al.) 17 May 2012 (17.05.2012), Fig 7-13, abstract	9, 10, 27
Y	US 2015/0149103 A1 (SHIMZU) 28 May 2015 (28.05.2015), Fig 6A, 6B, abstract, para [0025], [0030], [0035], [0078]-[0081]	11-16
Y	US 7,944,165 B1 (O'DELL) 17 May 2011 (17.05.2011), Fig 3, abstract, col 2, ln 24-37, col 6, ln 34-49	17, 18
Y	US 7,161,351 B2 (GOLDFINE et al.) 09 January 2007 (09.01.2007), Fig 6, abstract, col 9, ln 4-26	23

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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