(12) UK Patent Application (19) GB (11) 2625492 (13) A

(43) Date of Reproduction by UK Office 19.06.2024

(21) Application No: 2405014.8

(22) Date of Filing: 03.06.2022

Date Lodged: 08.04.2024

(30) Priority Data:
(31) 63263898 (32) 11.11.2021 (33) US
(31) 17832393 (32) 03.06.2022 (33) US

(86) International Application Data:
PCT/US2022/032263 En 03.06.2022

(87) International Publication Data:
WO2023/086129 En 19.05.2023

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(51) INT CL:
E21B 47/107 (2012.01) ***E21B 47/008*** (2012.01)
G01V 1/44 (2006.01) ***G06N 20/00*** (2019.01)

(56) Documents Cited:
EP 1250513 B1 **US 20190203585 A1**
US 20170205260 A1 **US 20150021015 A1**
US 20120146805 A1

(58) Field of Search:
INT CL **E21B, G01V, G06N**
Other: **eKOMPASS(KIPO internal)**

(54) Title of the Invention: **Oil and gas well multi-phase fluid flow monitoring with multiple transducers and machine learning**
Abstract Title: **Oil and gas well multi-phase fluid flow monitoring with multiple transducers and machine learning**

(57) A method can be used to determine multi-phase measurements of fluid flowing with respect to a wellbore. Signals can be received, and the signals can be emitted by each variable frequency acoustic emitter of a set of variable frequency acoustic emitters positioned spaced apart in a sensing transducer that is in an interior of a wellbore. The received signals can be converted into a flow rate of each of a set of different fluid phases of a fluid in the wellbore. The multi-phase measurements of the fluid can be determined using the converted flow rate.

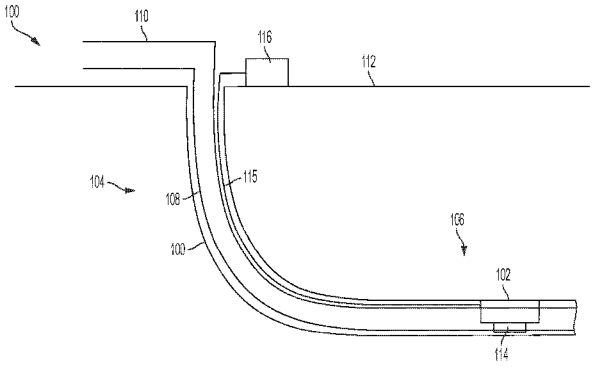

FIG. 1

THIS INTERNATIONAL APPLICATION HAS ENTERED THE NATIONAL PHASE EARLY

GB 2625492 A