

(12) UK Patent Application (19) GB (11) 2523047 (13) A

(43) Date of Reproduction by UK Office 12.08.2015

(21) Application No: 1510120.7

(22) Date of Filing: 18.12.2013

Date Lodged: 10.06.2015

(30) Priority Data:
(31) 13719065 (32) 18.12.2012 (33) US

(86) International Application Data:
PCT/IB2013/061065 En 18.12.2013

(87) International Publication Data:
WO2014/097160 En 26.06.2014

(51) INT CL:
G01V 1/143 (2006.01)

(56) Documents Cited:
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(58) Field of Search:
INT CL E21B, G01V
Other: Korean and Japanese utility models and applications for utility models; eKOMPASS(KIPO Internal)

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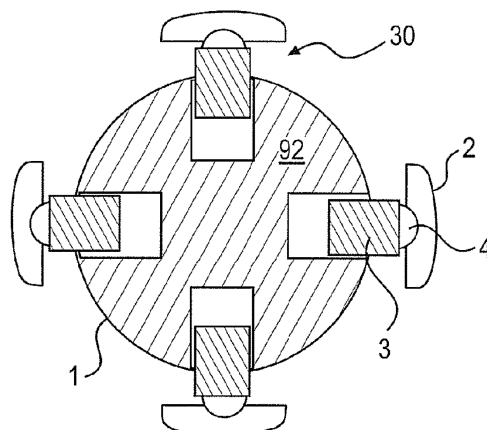
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(54) Title of the Invention: **Devices, systems and methods for low frequency seismic borehole investigations**
Abstract Title: **Devices, systems and methods for low frequency seismic borehole investigations**

(57) Downhole seismic sources that maybe compatible measurement-while-drilling systems. The downhole seismic sources are integrated into drill string components, including drill collars of the bottom hole assembly. The downhole seismic sources may generate a low swept frequency signal suitable for imaging around the drill-string and ahead of the drill bit. Integrated downhole seismic systems including a downhole seismic source, receivers and optionally data processing capabilities. The integrated systems may be configured to determine the distance and orientation of bed boundaries, including ahead of the drill bit up to about 200 m to 500 m in depth. Methods for downhole seismic, including single well and cross-well seismic. The methods may include obtaining seismic information ahead of the drill bit.

FIG. 3



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